Vickery Coal Project

Environmental Impact Statement

APPENDIX I

ABORIGINAL CULTURAL HERITAGE ASSESSMENT

Resource Strategies

WHITEHAVEN COAL

Vickery Coal Project

Aboriginal Cultural Heritage Assessment

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Whitehaven Coal Ltd

Vickery Coal Project

Aboriginal Cultural Heritage Assessment

Landskape

Natural and Cultural Heritage Management

a division of M.L. Cupper Pty Ltd

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EXECUTIVE SUMMARY

Whitehaven Coal Ltd (Whitehaven) is seeking a Development Consent under Part 4, Division 4.1 of the New South Wales (NSW) *Environmental Planning and Assessment Act,* 1979 for the Vickery Coal Project (the Project).

The Project is located within the Gunnedah Basin, in the NSW Gunnedah Coalfield. The proposed Project would involve the development of an open-cut coal mining operation located approximately 25 kilometres (km) north of Gunnedah (herein referred to as the mining area). The Project would also involve the construction of a new section of private haul road and overpass across the Kamilaroi Highway, approximately 5 km west of Gunnedah (herein referred to as the haul road and overpass area).

Whitehaven commissioned Landskape to undertake an Aboriginal Cultural Heritage Assessment of the Project. This report presents an assessment of the Aboriginal cultural heritage related issues for the Project in accordance with the general requirements of the NSW Department of Environment, Climate Change and Water *Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010 (Part 6 National Parks and Wildlife Act, 1974*), the NSW Office of Environment and Heritage *Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales*, *Guide to investigating, assessing and reporting on Aboriginal cultural heritage in NSW*, the NSW Department of Environment and Conservation *Draft Guidelines for Aboriginal Cultural Impact Assessment and Community Consultation*, The Australia International Council on Monuments and Sites (ICOMOS) Burra Charter, NSW National Parks and Wildlife Service *Aboriginal Cultural Heritage: Standards and Guidelines Kit*, the Australian Heritage Commission *Ask First; A Guide to Respecting Indigenous Heritage Places and Values* and NSW Minerals Council *NSW Minerals Industry Due Diligence Code of Practice for the Protection of Aboriginal Objects*.

The specific objectives of the cultural heritage assessment were to:

- Consult the local Aboriginal community to identify any concerns they may have (consultation with the Aboriginal community followed *Aboriginal Cultural Heritage Community Consultation Requirements for Proponents*.
- Conduct a desktop assessment to delineate areas of known and predicted cultural heritage within the Project area.
- Undertake a stratified archaeological survey of known and predicted cultural heritage identified in the desktop assessment with representatives of the local Aboriginal community.
- Record any cultural heritage sites within the Project area and assess their significance.
- Identify the nature and extent of potential impacts of the Project on cultural heritage.
- Devise options in consultation with the community to avoid or mitigate potential impacts of the development on cultural heritage places and items.

Five Aboriginal cultural heritage sites have previously been recorded in the Project area. These comprise stone artefact scatters, with one also containing axe-grinding grooves. The present survey encountered an additional 20 stone artefact scatters and 15 isolated finds of stone artefacts.

Fifteen of the Aboriginal cultural heritage sites (11 stone artefact scatters and four isolated finds) are located within the proposed open-cut disturbance area. Additionally, five Aboriginal cultural heritage sites (two stone artefact scatters and three isolated finds) are located within the proposed disturbance area for the western out-of-pit waste rock emplacement, two Aboriginal cultural heritage sites (isolated finds) occur within the eastern emplacement, four Aboriginal cultural heritage sites (two stone artefact scatters and two isolated finds) within the infrastructure area, one Aboriginal cultural heritage site (stone artefact scatter) within the alignment of the water pipeline, one Aboriginal cultural heritage site (stone artefact scatter) within the realignment of Blue Vale Road and four Aboriginal cultural heritage sites (stone artefact scatters) within the haul road and overpass across the Kamilaroi Highway.

The Aboriginal cultural heritage sites are all small scatters or isolated finds of stone artefacts. This assessment has concluded that these sites are not of high archaeological significance. Moreover, the mine and ancillary infrastructure disturbance areas are located in areas where impacts on significant cultural heritage values will be avoided.

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

- Whitehaven arrange to salvage the Aboriginal objects at the 32 Aboriginal cultural heritage sites located within the mine and ancillary infrastructure disturbance areas. A suitably qualified archaeologist and representatives of the local Aboriginal community should be engaged to record and collect the Aboriginal objects. These items should be properly curated and stored in a “Keeping Place” at the Red Chief Local Aboriginal Land Council office. Following the completion of mining, artefacts should be replaced within rehabilitated areas in consultation with local Aboriginal groups and the NSW Office of Environment and Heritage.
- In the unlikely event that human skeletal remains are encountered during the course of activities associated with the Project, all work in that area must cease. Remains must not be handled or otherwise disturbed except to prevent further disturbance. If the remains are thought to be less than 100 years old the Police or the State Coroner’s Office (tel: 02 9552 4066) must be notified. If there is reason to suspect that the skeletal remains are more than 100 years old and Aboriginal, Whitehaven should contact the NSW Office of Environment and Heritage’s Environmental Line (tel: 131 555) for advice. In the unlikely event that an Aboriginal burial is encountered, strategies for its management would need to be developed with the involvement of the local Aboriginal community.
- Whitehaven should coordinate and implement these proposed management strategies by integrating them into a single programme and document in the form of a Heritage Management Plan (HMP). The HMP should remain active for the life of the Project and define the tasks, scope and conduct of all Aboriginal cultural heritage management activities. The HMP should be developed in consultation with the local Aboriginal community.
- Whitehaven should provide training to all on-site personnel regarding the HMP strategies relevant to their employment tasks.
- Whitehaven should continue to involve the registered Aboriginal parties and any other relevant Aboriginal community groups or members in matters pertaining to the Project. In particular, the recording, collection, curation, storage and replacement of Aboriginal objects should occur with the invited participation of local Aboriginal community representatives.

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1 INTRODUCTION

1.1 THE PROPONENT

Whitehaven Coal Ltd (Whitehaven) is seeking Development Consent under Part 4, Division 4.1 of the New South Wales (NSW) *Environmental Planning and Assessment Act*, 1979 (EP&A Act) for the Vickery Coal Project (the Project).

1.2 THE PROJECT AREA

The Project is located within the Gunnedah Basin, in the NSW Gunnedah Coalfield. The proposed Project would involve the development of an open-cut coal mining operation located approximately 25 kilometres (km) north of Gunnedah (herein referred to as the mining area) (Figure 1). The Project would also involve the construction of a new section of private haul road and overpass across the Kamilaroi Highway, approximately 5 km west of Gunnedah (herein referred to as the haul road and overpass area) (Figure 1).

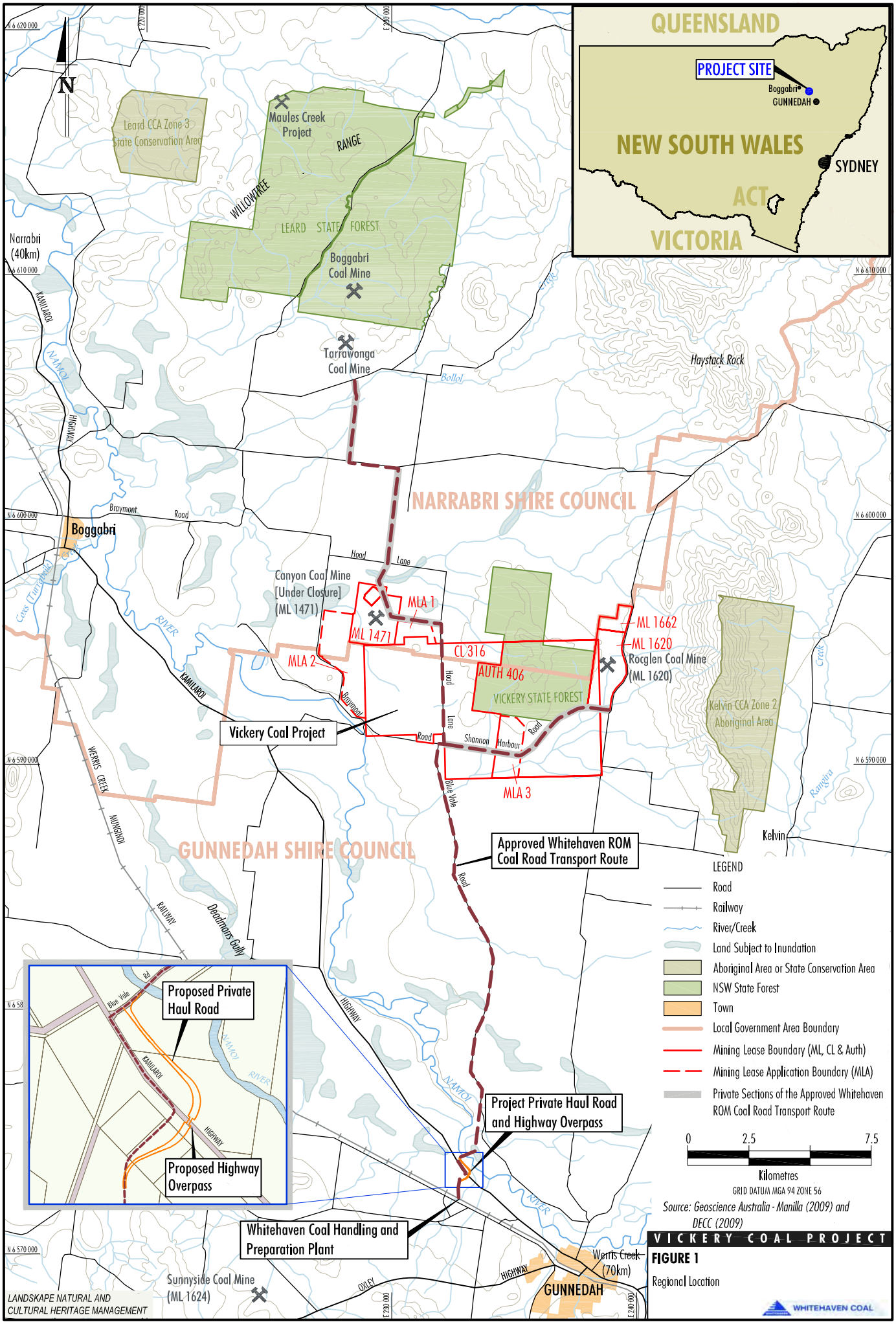
1.3 AIM AND OBJECTIVES OF THE ASSESSMENT

The objective of this study is to provide Whitehaven with an Aboriginal Cultural Heritage Assessment (ACHA) for inclusion in an Environmental Impact Statement (EIS) in support of an application under Part 4, Division 4.1 of the EP&A Act. This investigation involves a description of the context of the Project area, identification of heritage places and cultural values in the Project area, an assessment of the potential impacts to Aboriginal heritage as a result of the Project, and development of recommendations to minimise, manage and mitigate these potential impacts.

This assessment has been undertaken in accordance with the relevant requirements of the various advisory documents and guidelines. These guidelines and documents include:

- *Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010 (Part 6 National Parks and Wildlife Act, 1974*) (NSW Department of Environment, Climate Change and Water [DECCW], 2010a).
- *Due Diligence Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales* (DECCW, 2010b).
- *Guide to investigating, assessing and reporting on Aboriginal cultural heritage in NSW* (NSW Office of Environment and Heritage [OEH], 2011)
- *Draft Guidelines for Aboriginal Cultural Impact Assessment and Community Consultation* (NSW Department of Environment and Conservation [DEC], 2005a).
- The Australia International Council on Monuments and Sites (ICOMOS) Burra Charter (Australia ICOMOS, 1999).
- *Aboriginal Cultural Heritage: Standards and Guidelines Kit* (NSW National Parks and Wildlife Service [NPWS], 1997).
- *Ask First; A Guide to Respecting Indigenous Heritage Places and Values* (Australian Heritage Commission, 2002).
- *NSW Minerals Industry Due Diligence Code of Practice for the Protection of Aboriginal Objects* (NSW Minerals Council, 2010).

A glossary of commonly used terms in the report is provided in Appendix 1.



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1.4 STRUCTURE OF THIS REPORT

This report has been prepared in consideration of the requirements of the *Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales* (DECCW, 2010b) and as such includes the following specific information:

Section 1: Outlines the Project area and the objectives and structure of this report.

Section 2: Lists the investigators and contributors involved with this report.

Section 3: Provides a detailed description of the development proposal.

Section 4: Details the consultation and partnership with indigenous communities.

Section 5: Outlines the landscape context and includes descriptions of land use history, climate, geology and vegetation within the Project area.

Section 6: Provides background information relevant to previous archaeological works including relevant ethno history, the regional archaeological context and previous predictive models for the Project area.

Section 7: Describes predictions for the Project area and documents the archaeological survey and data collection, and includes information regarding the method of the survey and site recording and a description of the areas surveyed.

Section 8: Lists the results of the survey.

Section 9: Provides a discussion and analysis of these results.

Section 10: Assesses the cultural heritage and archaeological significance of the Project area.

Section 11: Assesses the impact of the Project on Aboriginal heritage.

Section 12: Lists the management, mitigation measures and recommendations.

Section 13: Lists the references cited in this report.

2 INVESTIGATORS

Landskape was commissioned by Whitehaven in June 2012 to complete the ACHA for the Project and to prepare this report. Prior to June 2012 Kayandel Archaeological Services had coordinated and undertaken the initial desktop review, Aboriginal stakeholder consultation and surveys of the Project area, including involvement by representatives of the registered Aboriginal parties. The findings of the Kayandel Archaeological Services desktop review, surveys and consultation were considered and incorporated in the ACHA undertaken by Landskape.

Dr Matt Cupper, a qualified archaeologist and geoscientist with 13 years' experience as a cultural heritage advisor, was Landskape's project archaeologist.

Kayandel Archaeological Services' project archaeologists were Lance Syme, Caroline Hubschmann, Nicole Castle, Tristan Jones, Cheryl Rosburg and Tom Knight.

3 DEVELOPMENT PROPOSAL

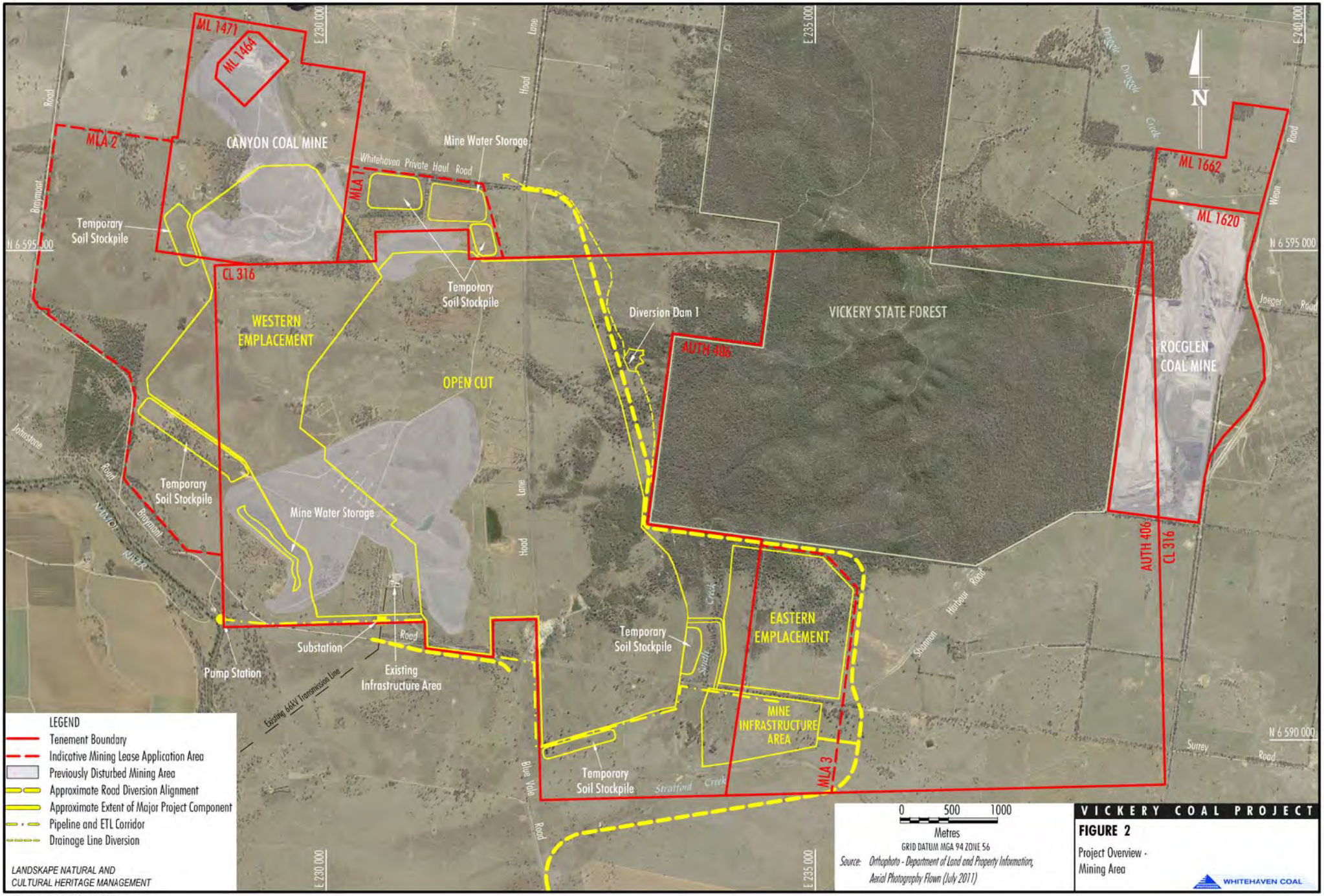
The proposed development will involve an application under Part 4, Division 4.1 of the EP&A Act.

A detailed description of the Project is provided in Section 2 of the Main Report of the EIS. The layout of the proposed Project is shown on Figures 2 and 3.

The main activities associated with the development of the Project would include:

- development and operation of an open cut mine within Coal Lease (CL) 316, Authorisation 406, Mining Lease (ML) 1471, Mining Lease Application Area (MLA) 1, MLA 2 and MLA 3;
- use of conventional mining equipment, haul trucks and excavators to remove up to 4.5 million tonnes per annum of run-of-mine (ROM) coal and approximately 48 million bank cubic metres of waste rock per annum from the planned open cut;
- placement of waste rock (i.e. overburden and interburden/partings) within external emplacements to the west and east of the planned open cut (i.e. Western Emplacement and Eastern Emplacement) and within mined-out voids;
- construction and use of a Mine Infrastructure Area, including on-site coal crushing, screening and handling facilities to produce sized ROM coal, workshops, offices and services;
- transport of sized ROM coal by haulage trucks to the Whitehaven Coal Handling and Preparation Plant (CHPP) on the outskirts of Gunnedah (approximately 20 km to the south of the Project open cut);
- use of an on-site mobile crusher for coal crushing and screening of up to 150,000 tonnes of domestic specification coal per annum for direct collection by customers at the Project site;
- use an on-site mobile crusher to produce up to approximately 90,000 cubic metres of gravel materials per annum for direct collection by customers at the Project site;
- construction and use of water supply bores, and a surface water extraction point on the bank of the Namoi River and associated pump and pipeline systems;
- construction and use of new dams, sediment basins, channels, dewatering bores and other water management infrastructure required to operate the mine;
- construction and use of soil stockpile areas, laydown areas and gravel/borrow areas;
- construction of a 66 kilovolt (kV)/11 kV electricity substation and 11 kV electricity transmission line;
- transport of coarse rejects generated at the Whitehaven CHPP via truck to the Project for emplacement within an in-pit emplacement area;
- transport of tailings (i.e. fine rejects) generated within the Whitehaven CHPP via truck to the Project for emplacement within co-disposal storage areas in the open cut and/or disposal in existing off-site licensed facilities (e.g. the Brickworks pit);
- realignment of sections of Blue Vale Road, Shannon Harbour Road and Hoad Lane to the east and south of the open cut;
- realignment of the southern extent of Braymont Road to the south of the open cut;
- construction of an approximately 1 km long section of private haul road (including an overpass over the Kamilaroi Highway) between Blue Vale Road and the Whitehaven CHPP;
- ongoing exploration, monitoring and rehabilitation activities; and
- construction and use of other associated infrastructure, equipment and mine service facilities.

An indicative general arrangement of the Project open cut, waste rock emplacements and infrastructure area is shown on Figure 2. Figure 3 shows the indicative general arrangement of the proposed section of private haul road and Kamilaroi Highway overpass near the Whitehaven CHPP. The Project would result in the disturbance of approximately 2,241 hectares (ha).



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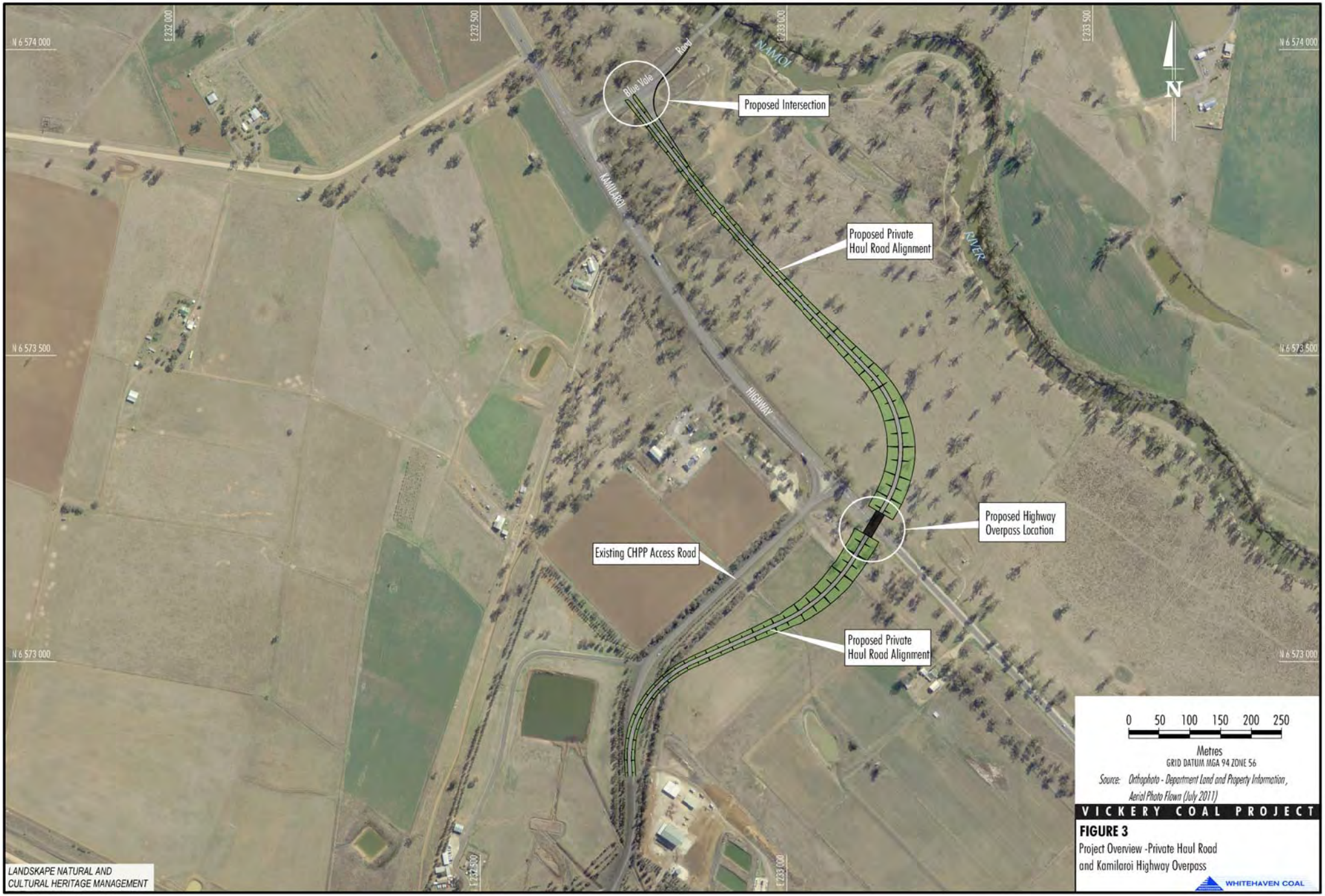

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4 ABORIGINAL SOCIAL AND CULTURAL INFORMATION

4.1 INTRODUCTION

In accordance with the *Aboriginal Cultural Heritage Community Consultation Requirements for Proponents, 2010* (DECCW, 2010a), this assessment has involved representatives of the local Aboriginal community and considered their cultural values and concerns.

The following sections describe involvement by the Aboriginal community (via the registered Aboriginal parties) and demonstrate that the input of the affected Aboriginal community has been considered when determining and assessing impacts, developing options, and making final recommendations relevant to Aboriginal cultural heritage outcomes of the Project.

4.2 ABORIGINAL COMMUNITY PARTICIPATION

Representatives of the registered Aboriginal parties participated in the social and cultural study and archaeological field survey, and contributed to devising management protocols to avoid or mitigate disturbance to cultural heritage sites.

Aboriginal community consultation for the ACHA was conducted:

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

4.2.1 Identification of Aboriginal Community Groups and Individuals

Relevant stakeholders from the Aboriginal community were identified using a process consistent with the *Aboriginal Cultural Heritage Community Consultation Requirements for Proponents* (DECCW, 2010a)[1]. A summary of the community consultation undertaken for the Project is outlined below and in Appendix 2. All written correspondence sent to and received from the Aboriginal community is provided in Appendices 3 and 4, respectively.

Notification of the Proposed Project

Whitehaven provided written notification to the organisations listed in Table 1 and asked for the names of any Aboriginal persons or groups who could hold cultural knowledge of, or have a right or interest in Aboriginal objects, places and/or Aboriginal cultural heritage values in the Project area or surrounds.

[1] Prior to the release of the DECCW's 2010 consultation requirements, guidance on community consultation was specified in *National Parks and Wildlife Act 1974: Part 6 Approvals – Interim Community Consultation Requirements for Applicants* (Department of Environment and Climate Change [DECC], 2004). One of the key differences between the 2004 and 2010 consultation guidelines is that the 2004 guidelines require Aboriginal stakeholders who register after the specified registration closing period be included in the draft ACHA review stage. As specified in Section 4.2, 23 stakeholder groups registered after the specified registration closing period however were included in all steps of the assessment from that point forward, including field work, discussions regarding cultural significance and review of the draft ACHA.

Table 1: Notified Organisations and Date of Notification

Name of Organisation	Written Notification Date
OEH Dubbo Environmental Protection and Regulation Group	15 September 2011
Red Chief Local Aboriginal Land Council (LALC)	15 September 2011
The Registrar, *Aboriginal Land Rights Act, 1983*	15 September 2011
The National Native Title Tribunal	15 September 2011
Native Title Services Corporation Limited (NTSCORP Limited)	15 September 2011
Gunnedah Shire Council	15 September 2011
Narrabri Shire Council	15 September 2011
Namoi Catchment Management Authority	15 September 2011

Whitehaven then wrote to the Aboriginal parties identified by the organisations listed in Table 1, as well as those parties previously involved with the nearby Tarrawonga Coal Project. These parties were all invited to register an interest in the process of community consultation with Whitehaven regarding the ACHA for the proposed Project. In addition to the written notifications, a notice was placed in the *Namoi Valley Independent* (29 September 2011) seeking registrations from any additional interested Aboriginal parties.

Registered Aboriginal Parties

Aboriginal parties listed in Table 2 registered their interest in being involved in the consultation process for the Project.

Table 2: Registered Aboriginal Parties

Registered Aboriginal Parties	Date of Registration
Aboriginal Native Title Consultants	30 September 2011
Bigundi Biame Traditional People	30 September 2011
Bullen Bullen Consultants	30 September 2011
Cacatua Culture Consultants	30 September 2011
Deslee Talbott Consultants	30 September 2011
Giwiir Consultants	30 September 2011
Gomilaroi Cultural Consultancy	30 September 2011
Minnga Consultants	30 September 2011
Red Chief LALC	30 September 2011
Gunida Gunyah Aboriginal Corporation	5 October 2011
T'N'L Site Trackers	5 October 2011
Ronald Long	11 October 2011
Gomeroi Namoi Traditional Group	14 October 2011
Michael Long	14 October 2011
Min-Min Aboriginal Corporation	14 October 2011
Ngurrimbaa-Gunidjaa Traditional Owners	14 October 2011
Traditional Owner of Gomeroi Country	14 October 2011
Yinarr Cultural Services	14 October 2011
Gunnedah Elders Justice Committee	20 October 2011*
Gunjeewong Cultural Heritage Aboriginal Corporation	26 October 2011*
Muswellbrook Cultural Consultants	31 October 2011*
Reg Talbott	31 October 2011*
Roger Matthews	31 October 2011*
James Foley	4 November 2011*
Hunter Valley Cultural Consultants	8 November 2011*
T & G Culture Consultants	8 November 2011*

Registered Aboriginal Parties	Date of Registration
Upper Hunter Heritage Consultants	8 November 2011*
Yvonne Rodgers	8 November 2011*
Sonny Fitzroy	9 November 2011*
Bullwarra Consultants	10 November 2011*
Joan Suey	16 November 2011*
Joyce Dorrington	16 November 2011*
Bill Mitchell	16 November 2011*
Dulcie Robinson	16 November 2011*
Judith Walters	16 November 2011*
Linda Roser	16 November 2011*
Lorraine Robinson	16 November 2011*
Patricia Gail Reynolds	16 November 2011*
Henry Roser-Talbott	16 November 2011*
Brian Draper	22 November 2011*
Gomery Cultural Consultants	9 December 2011*
Cindy Foley	No date on registration

* These stakeholders registered after the closing date, however, were included in all steps of the consultation process (after their registration) for completeness, an open consultation process and in accordance with the DECC (2004) consultation guidelines.

4.2.2 Presentation of Information about the Proposed Project

The registered Aboriginal parties were provided with information about the proposed Project and the proposed cultural heritage assessment process in the form of a Proposed Methodology and an information session held at the Mackellar Motel in Gunnedah on 31 October 2011. The purpose of the proposed methodology and information session was to explain the Project and consultation process in detail, define the roles of the registered Aboriginal parties and the proponent, identify any protocols for obtaining and using sensitive cultural information and to give the registered Aboriginal parties an opportunity to comment on the proposed assessment method and provide any relevant information on the cultural significance of the Project area.

Information Session

Representatives from the registered Aboriginal parties listed in Table 3 attended the information session.

Table 3: Registered Aboriginal Parties Who Attended the Project Information Session

Registered Aboriginal Parties	Representative
Bigundi Biame Traditional People	Gary Griffiths
Bullen Bullen Consultants	Tracey Wortley
Cacatua Culture Consultants	Donna Sampson
Deslee Talbott Consultants	Mitchum Neave and Martin Salvador
Gomeroi Namoi Traditional Group	Stephen Talbott
Gomilaroi Cultural Consultancy	Scott Talbott
Gunida Gunyah Aboriginal Corporation	Tammy Bush
Gunnedah Elders Justice Committee	Louise Conlon and Gloria Foley
Muswellbrook Cultural Consultants	David Horton
Ngurrimbaa-Gunidjaa Traditional Owners	Leonard Talbott
T & G Culture Consultants	Matthew Drapper
T'N'L Site Trackers	Troy Silver
Traditional Owner of Gomeroi Country	Veronica Talbott
-	Cindy Foley
-	Michael Long
-	Roger Matthews
-	Ronald Long

The following issues/comments were raised and discussed by representatives from the registered Aboriginal parties during the Project information session:

- Previous archaeological surveys that had been undertaken in the area and the current status of the sites that were located during these surveys.
- The need to involve Elders in the consultation process as their knowledge was important in determining the cultural significance of the area.
- The storage of artefacts after they had been salvaged. They commented that a specific storage area should be built so that everyone could access the artefacts.
- The Project area would have been used/occupied by Aboriginal people in the past.

A record of the Project information session is provided in Appendix 4.

Proposed Methodology

The following written comments were received about the proposed methodology:

Comment: "*The project area is a part of some of the Registered Aboriginal parties traditional home lands (country) and as such retains immeasurable cultural values. Aboriginal cultural heritage provides crucial links between the past and the present and therefore represents an essential part of the identities of Aboriginal people and all Australians*." (Deslee Talbott Consultants)

Comment: *"Aboriginal people should have access to areas of cultural significance, providing access can be provided without compromise to safety, these arrangements should be discussed with steak holders* [sic] *and Whitehaven Coal."* (Deslee Talbott Consultants)

Response: As outlined in Section 12, Whitehaven would provide opportunities for Aboriginal community members to access known Aboriginal sites located on Whitehaven owned land (e.g. for cultural reasons or as part of scheduled field activities) in accordance with occupational health and safety requirements.

4.2.3 Aboriginal Involvement during the Field Assessment

All registered Aboriginal parties were invited to express an interest in participating in the field surveys. Due to the large number of registered groups that expressed an interest in being involved in the field surveys, a roster system was devised. Representatives from the registered Aboriginal parties listed in Table 4 participated in the field survey.

Table 4: Registered Aboriginal Parties Who Participated in the Field Survey

Registered Aboriginal Parties	Representative[1]
Aboriginal Native Title Consultants	Danielle Matthews
Bigundi Biame Traditional People	Matthew Draper
Bullen Bullen Consultants	Tania Matthews
Cacatua Culture Consultants	George Matthews
Deslee Talbott Consultants	Mitchum Neave and Deslee Matthews
Gomilaroi Cultural Consultancy	Scott Talbott
Red Chief LALC	Peter Beale, Robert Miller and Shaun Dixon
-	Ronald Long
Gomeroi Namoi Traditional Group	Allan Talbott
-	Michael Long
Min-Min Aboriginal Corporation	Kenneth Kennedy and Shaun Dixon
Ngurrimbaa-Gunidjaa Traditional Owners	Leonard Talbott and Matthew Talbott
Traditional Owner of Gomeroi Country	Peter Whitten
Yinarr Cultural Services	Adam Sampson
Gunjeewong Cultural Heritage Aboriginal Corporation	Bruce Turnise

Registered Aboriginal Parties	Representative[1]
Muswellbrook Cultural Consultants	David Horton
Hunter Valley Cultural Consultants	Josh Matthews
T & G Culture Consultants	Gordon Matthews and Samuel Cameron
Upper Hunter Heritage Consultants	Brodie Matthews
-	Natasha Rodgers on behalf of Yvonne Rodgers
-	Sonny Fitzroy
Bullwarra Consultants	Tammy Knox
-	Luke Roden on behalf of Cindy Foley

[1] All registered Aboriginal parties were invited to send one representative on each of their rostered days. Those parties with two or more representatives listed sent different representatives to attend on different days.

4.3 ABORIGINAL COMMUNITY INFORMATION ABOUT CULTURAL SIGNIFICANCE

During the initial information session, as part of the review of the proposed methodology and during the field survey, the registered Aboriginal parties were asked to contribute their knowledge on the Project area and the sites that were found. This information contributed to the assessment of the cultural heritage significance of the Project area and is discussed further in Section 10.

At the request of the registered Aboriginal parties, further consultation (including meetings and site inspections) is being undertaken with recognised senior Elders of the local Aboriginal community to discuss the cultural significance of the Project area and the Project in general.

4.4 REVIEW OF THE DRAFT ACHA

A summary of the issues raised by the registered Aboriginal parties as a result of their review of the draft ACHA and how they have been addressed is detailed in Table 5. All written correspondence received from the registered Aboriginal parties is provided in full in Appendix 4.

Table 5: Summary of the Issues Raised by the Registered Aboriginal Parties and How They Have Been Addressed in the ACHA

Issue Number (see corresponding numbers in the responses provided in Appendix 4)	Issue	Response
1.	- Lack of consultation with the registered Aboriginal parties regarding the cultural significance of the Project area.	- The registered Aboriginal parties have been asked to provide input regarding the cultural significance of the Project area throughout the consultation process for the Project including during the proposed methodology review period, field surveys, meetings and during the review of the draft ACHA. - Section 10 documents the comments received to date from the registered Aboriginal parties regarding the cultural significance of the area. - At the request of the registered Aboriginal parties further consultation is being undertaken (including meetings and site inspections) with Elders in the local Aboriginal community to discuss the cultural significance of the Project area.
2.	- Concerns that the views of some Aboriginal people were considered to reflect the views of the Aboriginal community as a whole.	- In response to this comment, Section 10.2 has been revised to state that the views expressed by individuals may not necessarily reflect the views of the Aboriginal community as a whole.
3.	- The ACHA does not contain an assessment of the cultural values of the Project area and contains limited ethno-historic information.	- The ethno-historic and cultural information that has been included in the ACHA is based on the information that is publically available in addition to information provided by the Aboriginal parties to date through the consultation process for the Project.

Issue Number (see corresponding numbers in the responses provided in Appendix 4)	Issue	Response
4.	- All sites (with the exception of the site associated with the grinding grooves) are assessed as being of low significance which does not reflect the views of the registered Aboriginal parties.	- The significance ratings for the recorded Aboriginal heritage sites in Section 10.6 are based on archaeological significance only. The registered Aboriginal parties have been asked to provide input regarding the cultural significance of the recorded Aboriginal heritage sites throughout the consultation process. - Section 10.2 documents the comments received from the registered Aboriginal parties regarding the cultural significance of the area and recorded Aboriginal heritage sites to date.
5.	- No information is provided on the coverage or effectiveness (given the visibility at the time of the field surveys) of the field surveys.	- In response to this comment, more detail regarding survey coverage and visibility conditions during the field surveys has been included in Section 7.4. Detailed field survey notes have also been included as Appendix 7.
6.	- Limited level of detail has been provided on each of the recorded sites.	- In response to this comment, site cards for each of the recorded sites have been included as Appendix 8.
7.	- The proposed management measures are limited in scope and no consultation has been undertaken with registered Aboriginal parties in developing the management measures.	- The management measures proposed in Section 12 are considered best practice in the industry. - As detailed in Section 12, a Heritage Management Plan will be developed for the Project. The Heritage Management Plan will contain further detail on the proposed management measures (e.g. salvage works) and will be developed in consultation with the registered Aboriginal parties prior to ground disturbance.
8.	- The size of the Project is not shown on the figures or described in the text.	- The size of the Project (in hectares) is detailed in Section 3. The approximate extent of disturbance (which includes all Project components) is shown on Figures 2 and 3.
9.	- No discussion is included on the archaeological potential of landforms within the Project area.	- A description of the archaeological potential is included in Section 9.1. In response to this request, further discussion regarding landforms within the Project area and their archaeological potential has been provided in Section 11.4.
10.	- More detail regarding the blasting assessment needs to be included in the ACHA to demonstrate that there will be negligible impacts from blasting on the grinding groove site.	- The blasting assessment for the Project has been undertaken by noise and vibration specialists, Wilkinson Murray. In response to this request, more detail regarding how this conclusion has been drawn has been provided in Section 11.3. - The blasting assessment will be included in the EIS for the Project. A copy of the EIS for the Project will be provided to all registered Aboriginal parties.
11.	- Concern that Section 11.3 states that the grinding grooves site 20-4-0009 will not be directly impacted but Table 14 states that the site will be partially impacted.	- Site 20-4-0009 consists of an artefact scatter and grinding grooves. As discussed in Section 11.3, the grinding grooves will not be impacted by the Project. The artefact scatter at site 20-4-0009, however, will be partially impacted through the construction of a pipeline from the mine site to a pump station on the Namoi River.
12.	- There is no assessment of the impacts on landforms of archaeological potential.	- In response to this comment, an assessment of the impacts on landforms of archaeological potential is included in Section 11.4.
13.	- No consideration has been given to the cumulative impacts on Aboriginal heritage of this Project and other developments in the region.	- In response to this comment, an assessment of the cumulative impacts on Aboriginal heritage of this Project and other developments in the region has been provided in Section 11.5.
14.	- No consideration has been given to how the Project could have been refined to avoid Aboriginal heritage sites.	- A discussion of how the Project footprint has been refined is provided in Section 11.6. - The locations of the proposed mine components associated with the Project are currently within their optimum design locations, having already been reduced in footprint to minimise disturbance to alluvium, drainage lines and threatened ecological communities.

Issue Number (see corresponding numbers in the responses provided in Appendix 4)	Issue	Response
15.	- Aboriginal cultural features and sites recorded during the field surveys have been omitted from the ACHA.	- In response to this comment, justification as to why certain features that were recorded during the survey have not been included in the report is provided in Section 7.3.1. - Furthermore, a list of trees that were examined during the field surveys and justification as to why they were not recorded as scarred trees of Aboriginal origin is provided in Appendix 6.
16.	- Concerns about the qualifications of Lance Syme (Kayandel Archaeological Services). - Concerns that Matt Cupper (Landskape) has undertaken a desktop study.	- As discussed in Section 2, due to contractual issues with Lance Syme (Kayandel Archaeological Services), Matt Cupper (Landskape) was engaged to finish the Aboriginal cultural heritage assessment for the Project. - Matt Cupper undertook a site inspection and reinspected all of the sites that were recorded during the field surveys as part of the Aboriginal cultural heritage assessment.
17.	- The ACHA needs to be revised and provided to the Aboriginal parties for a second 28 day review period.	- The draft ACHA was provided to the registered Aboriginal parties. In accordance with the *Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010* (DECCW, 2010a) the registered Aboriginal parties were given 28 days to review and provide comments on the draft ACHA. - At the request of the registered Aboriginal parties, the review period was extended. An additional 11 days was given for the registered Aboriginal parties to review and provide comment on the draft ACHA. - The final ACHA will be made available to all registered Aboriginal parties. Comments on the final ACHA can be made during the exhibition period for the EIS.
18.	- Recommendation that blast vibration monitoring be undertaken at the grinding grooves (site 20-4-0009).	- Blast vibration monitoring would be undertaken as part of the Project and would be detailed in the Blast Management Plan. Blast monitoring would be undertaken at potentially sensitive receptors located around the mine site. The grinding groove site would be considered as a potential monitoring location. Furthermore the results of the blast monitoring would be used to calibrate the blast vibration predictions at the grinding groove site.
19.	- "Consultation with the local Aboriginal community" should be amended to "consultation with the registered Aboriginal parties"	- Section 4.1 has been amended to clarify that consultation has been undertaken with the local Aboriginal community via the registered Aboriginal parties.
20.	- The ACHA should include specific consultation commitments with the registered Aboriginal parties.	- As detailed in Section 12, a Heritage Management Plan will be developed for the Project. The Heritage Management Plan will include detail regarding the ongoing consultation with the Aboriginal community over the life of the Project.
21.	- The ACHA does not contain an assessment of the historic values of the Project area.	- In response to this comment, an assessment of the historic values of the Project area and the recorded Aboriginal heritage sites is provided in Section 10.5 and in Table 11.

5 ENVIRONMENTAL CONTEXT

5.1 INTRODUCTION

The *Code of Practice for Archaeological Investigation of Aboriginal Objects in NSW* (DECCW, 2010b) requires a review of the environmental context to assist in the determination or prediction of the potential of a landscape to have accumulated or preserved objects, the ways Aboriginal people may have used the landscape in the past, with regard to identifiable resources or focal points for activities, and the likely distribution of the material traces of Aboriginal land use based on these factors.

Detailing the landscape context is an integral procedure in modelling potential past Aboriginal land use practices and/or predicting site distribution patterns. The natural environment of an area influences the availability of local resources such as food and raw materials for artefacts, rock platforms for engravings and axe sharpening, and rock outcrops that may provide shelter. The landscape also provides the sediments which may bury objects and archaeological features, as well as the erosive processes that might expose or disperse them.

Geomorphic (land formative) processes may impact upon the type and frequency of archaeological remains. Past climate may also influence the location and types of resources available, which in turn shapes settlement and mobility patterns of past Aboriginal groups in the area. The location of different site-types (such as middens, stone artefact scatters, axe-grinding grooves, petroglyphs [engravings], etc.) are strongly influenced by factors such as these along with a range of other associated features, which are specific to different land systems and bedrock geology.

5.2 GEOLOGY

The Project area is located in the Gunnedah Basin region of northwestern NSW (Figure 1). The Gunnedah Basin forms the central part of the Sydney-Gunnedah-Bowen Basin, which extends across the eastern fringe of Australia. The Gunnedah Basin is divided into the Maules Creek sub-basin to the east and the Mullaley sub-basin to the west and south. The Project area is situated on the western side of the Maules Creek sub-basin.

A shallow sea occupied the basin during the Late Carboniferous and Early Permian geological epochs (320 to 280 million years ago [Ma]) (Roberts *et al*., 2004). It subsequently filled with sediments from rivers, lakes and extensive peat swamps, the latter now represented by coal seams of the Black Jack Group, which are mined in the region. The Project mining area is situated on Early Permian age coal measures, which, in addition to coal, comprise mainly conglomerates, with lesser amounts of sandstone, siltstone and claystone (Roberts *et al*., 1994). Infilling of the Namoi Valley with alluvial deposits (Namoi Sediments) to form a broad flat valley floor is thought to have begun in the Pliocene (period after 5.3 Ma) and has continued to the present (Pratt, 1998). The surface layer of the Namoi Sediments, known as the Curlewis Member, is Pleistocene in age (less than 2.6 Ma), and comprises brown clays becoming darker near the surface, with limited channel sand and gravel deposits (Pratt, 1998).

5.3 LANDFORMS AND SOILS

The Project area is located in a gently undulating terrain between the alluvial plains of the Namoi River and uplands of the Nandewar Range. The proposed open-cut and western emplacement comprises rolling hills and footslopes of Palaeozoic volcanic and sedimentary bedrock (or rehabilitated landforms associated with previous mining activities), which gently slope down to Quaternary (less than a few million years old) alluvial plains in the south (Plates 1-4). Elevations range from 330 metres (m) Australian Height Datum (AHD) near the boundary of the Vickery State Forest to around 270 m AHD at the southern extent of the proposed Eastern Emplacement. The lower slopes have weathered to colluvium and low-lying areas to the south of the Project mining area are alluvial channel and overbank deposits of gravel, sand, silt and clay and colluvial gravels. The soils of footslopes are mostly sodic duplex or sandy gravelly, with clayey soils at low elevations.

Plate 1: Typical plain landscape

Plate 2: Typical lower slope landscape

Plate 3: Typical ridge top landscape

Plate 4: Typical alluvial terrace landscape

The west and centre of the Project mining area has previously been mined as part of the original Vickery Coal Mine and comprises rehabilitated open-cut workings and waste rock emplacements from these prior mining activities.

5.4 HYDROLOGY AND CLIMATE

The climate of the Project area is dry subhumid, receiving approximately 615 millimetres of rainfall per annum (Bureau of Meteorology, 2012). The Project is located within the Namoi River Catchment, with the Namoi River abutting the southwestern extent of CL 316 but outside the proposed disturbance area for the mine site (Figure 2). The Namoi River generally flows in a westerly direction from its headwaters in the Great Dividing Range and ultimately into the Barwon River.

The headwaters of Driggle Draggle Creek and a number of un-named ephemeral drainage lines originate in the slopes of the Vickery State Forest. As they descend onto the flatter areas to the north and south of the mining area they become less well-defined drainage paths, which become expansive, ponded, overland flow areas during and following heavy rainfall.

The proposed haul road and overpass area is located southwest of the Namoi River, and parallel to the Kamilaroi Highway.

5.5 VEGETATION

Overall, the environments of the Project area have been extensively modified by past European land use practices. The majority of land in the north, south and west of the Project mining area has previously been cleared for agricultural cropping and sheep and cattle grazing following European settlement in the second half of the nineteenth century, and open-cut mining as part of the original Vickery Coal Mine.

The largest area of existing woodland occurs to the east of the Project mining area adjacent to the Vickery State Forest and predominately consists of White Cypress Pine (*Callitris glaucophylla*), White Box (*Eucalyptus albens*) and Narrow-leaved Ironbark (*Eucalyptus creba*).

More sparse open vegetation occurs on the cleared adjacent hills and plains in the west and north of the Project mining area, the majority comprising various combinations of degraded Poplar Box (*Eucalyptus populnea*), White Cypress Pine, White Box and Silver-leaved Ironbark (*Eucalyptus melanophloia*) stands and isolated paddock trees.

The area in the vicinity of the haul road and highway overpass has been previously cleared with some scattered trees remaining. Vegetation includes degraded combinations of White Box, Blakely's Red Gum (*Eucalyptus blakelyi*), Yellow Box (*Eucalyptus melliodora*) and River Red Gum (*Eucalyptus camaldulensis*) grasslands.

6 ABORIGINAL CULTURAL HERITAGE CONTEXT

6.1 ETHNO-HISTORIC CONTEXT

Aboriginal people of the Kamilaroi (or *Gamilaraay*) language group occupied the Gunnedah Basin at the time of first contact with Europeans (Mitchell, 1839; Fison and Howitt, 1867; Parker, 1905; Tindale, 1974; Howitt, 1996). This language group comprised people who spoke the sub-dialects *Yuwaalaraay*, *Yuwaaliyaay* (Euahlayi), *Gamilaraay*, *Gawambaraay*, *Wirayaraay* (Wiriwiri) and *Walaraay* (Austin *et al*., 1980; O'Rourke, 1995, 1997). These tribes shared similar language and kinship systems, notably the division of members into exogamous moieties (two-part social classification) known as *Gubadhin* (Kupathin) and *Dhilbay* (Dilbi) (Frazer, 1994; O'Rourke, 1997).

At the time of first contact with European observers the Kamilaroi were hunter-fisher-gatherers and appear to have had a semi-sedentary lifestyle. Surveyor-General of NSW, Major Thomas Livingstone Mitchell (1839) described the deserted bark shelters of a 'numerous encampment' of Aborigines beside a billabong of the Namoi River some 5 km northwest of the Project area (present-day Barbers Lagoon). On the Gwydir River, 100 km north of the Project area near where Moree is now located, he noted an abandoned village of circular huts with conical roofs made from reeds, grass and boughs. Similarly, colonial botanist Allan Cunningham recorded 14 huts with bark floors and conical roofs on Coxs Creek between present-day Boggabri and Mullaley (O'Rourke, 1997).

O'Rourke (1997) estimates that there were at least 60 Kamilaroi clans, with perhaps 160 adult men, women, adolescents and children in each, suggesting a total regional population in northwestern NSW of around 10,000 people. Each clan probably resided most of the year at a small number of established, favourable locations within their estate.

The Kamilaroi caught fish including eels, freshwater crayfish, yabbies, tortoises and freshwater mussels in the Namoi River and other streams and wetlands in the region (Mitchell, 1839; Parker, 1905; O'Rourke, 1997). Watercraft were manufactured from large slabs of bark cut from river red gum trees. Fish were caught using fishing lines and nets made from reed fibre (Mathews, 1903).

Nets were used to catch waterbirds, whose eggs were also collected. Some of the other animals that Aboriginal people of the Gunnedah Basin hunted include kangaroos, wallabies, koalas, possums, emus, echidnas, lizards, snakes and frogs (Mitchell, 1839; Fison and Howitt, 1867; Parker, 1905; O'Rourke, 1997). Plant foods included grass seeds, wild orange, emu apple, melons, tubers, yams and roots (Mitchell, 1839; Parker, 1905; Gott, 1983; O'Rourke, 1997).

Aspects of the initial interaction between Europeans and the Kamilaroi led to violent conflict. Aborigines were shot, poisoned and displaced from their land by pastoral settlers and, in retaliation, cattle, sheep, stockmen and shepherds were speared. Historical sources record a rapid decline in Kamilaroi numbers, caused by dispossession of land and the consequent destruction of habitat and social networks (Mitchell, 1839; Parker, 1905; O'Rourke, 1997). Diseases including smallpox and malnutrition also took their toll (Mitchell, 1839; O'Rourke, 1997).

Within a decade of the first contact many of the Kamilaroi were living adjacent to pastoral homesteads, often working as shepherds or stockmen or engaged in other labouring activities (O'Rourke, 1997). Traditional social networks collapsed. The last Kamilaroi bora ceremony is recorded to have occurred in 1905 on the Namoi River at Wee Waa, approximately 75 km northwest of the Project area (O'Rourke, 1997). Other social structures, such as marriage laws, were also abandoned.

In the early twentieth century, Aboriginal reserves were gazetted on 20-acre allotments of land adjacent to the Namoi River at Baan Baa (approximately 30 km northwest of the Project area) and Borah Crossing (approximately 30 km southeast of the Project area). Baan Baa Aboriginal Reserve (AR 32747) operated between 1901 to 1918 and Manilla Aboriginal Reserve (AR 35745) at Borah Crossing from 1903 to 1961 (Thompson, 1981; Barber *et al*., 2007).

Many of the contemporary Aboriginal people of the Gunnedah Basin live in regional centres such as Gunnedah and Narrabri, which each have populations of around 1,200 Aboriginal people, or some 10 percent (%) of the total population (Australian Bureau of Statistics, 2006).

6.2 PREHISTORIC CONTEXT

Accounts of Aboriginal land use of the Gunnedah Basin during the nineteenth century provide an insight into possible settlement patterns in the prehistoric period. O'Rourke (1995; 1997), using these historical ethnographies, invoked a subsistence model for the region based on the relationship between occupation of the riverine corridors and drier 'backcountry'. Large populations of people congregated at the rivers during the drier months. In cooler or wetter months, mobile bands dispersed over the plains and adjacent foothills exploiting ephemeral resources (O'Rourke, 1997).

The material record of this occupation is preserved in the archaeological sites of the Gunnedah Basin, most of which probably date to the period since the last Ice Age (after around 18,000 years ago). At Lime Springs, south of Gunnedah, stone artefacts associated with megafaunal marsupials have been excavated in deposits dating back 19,300 ± 500 years Before Present (BP; SUA-915). The Lime Springs assemblage shows change over time in artefact size, types and raw material proportions. The earlier assemblage consisted of small flakes of a variety of siliceous rock types, while the latter industry was what archaeologists have termed "Kartan", with large horse hoof-type cores and scrapers, often of tuff (Gorecki *et al*., 1984). "Kartan" artefact types were once thought to be Pleistocene in age (greater than around 11,500 years old), but this typological classification is no longer regarded as a chronological marker (Lourandos, 1997).

In the mid-Holocene (period around 5000 years ago) several types of finely made small implements were added to the toolkit; in this region backed artefacts are the most frequent of these. The flaking technology was characterised by the production of blades, together with technological changes in core preparation and controlled flake production. Fine grained siliceous rock types were preferred (Lourandos, 1997). On the New England tablelands to the east of the Project area, excavations at Bendemeer show that backed artefacts were used during the past 1,500 years or so and at Graman from about 5,500 years ago (McBryde, 1974).

Edge ground hatchets were added to the toolkit by 4,500 years ago (McBryde, 1974). Petrological analysis of source stone has been combined with information on the distribution of hatchets across northern NSW (Binns and McBryde, 1972). Hatchets found in the Gunnedah Basin and Namoi River areas were predominantly of a type termed Group 2B. These hatchets were of coarse and fine-grained greywackes with pale bluish-green inclusions, mostly derived from metamorphosed andesitic volcanic detritus, which originated from the Moore Creek quarry north of Tamworth. Hatchets from this quarry are numerous and widely distributed. They are abundant in the Liverpool Plains and extend northerly and northwesterly into the Western Slopes and Plains, along the Darling River to Wilcannia. They also occur on the New England Tableland from Walcha-Bendemeer to Inverell-Glen Innes, and one was found south of Willow Tree (Binns and McBryde, 1972).

The distribution of Group 2B-type hatchets from the Moore Creek quarry is remarkably similar to the distribution of the Kamilaroi language area (Wafer and Lissarrague, 2008). These hatchets may have usually been distributed by people related through language or some other social association, which may have been in place for the past few thousand years of prehistory. The current Project area falls within that distribution area.

All that presently remains at many of the Gunnedah Basin's past Aboriginal occupation sites are flakes of stone debris from the making and resharpening of stone tools. These were made both at Aboriginal open habitation areas (campsites) or special activity areas such as stone knapping sites.

As well as being the sites of manufacture and maintenance of stone implements, open habitation areas usually contain evidence of domestic and other activities such as cooking and food preparation. Campfires or oven hearths are common, marked by heat retaining stones or hearthstones and charcoal. Organic remains consist of marsupial, rodent, bird, lizard, snake and fish bones, eggshell and freshwater mussel shell.

Scarred trees show where bark may have been removed by Aboriginal people to manufacture canoes, shelters and dishes.

6.3 TYPES OF ABORIGINAL CULTURAL HERITAGE SITES IN THE REGION

Based on the results and analytical conclusions of previous archaeological surveys in similar landscape contexts in the Gunnedah Basin it is possible to predict the types and topographic contexts of Aboriginal cultural heritage sites in the Project area. The occurrence and survival of archaeological sites is, however, dependent on many factors including micro-topography and the degree of land surface disturbance.

The types of Aboriginal cultural heritage site previously recorded in the Gunnedah Basin are described below.

6.3.1 Stone Artefact Scatters

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

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

6.3.2 Hearths

Hearths consist of lumps of burnt clay or stone cobble hearthstones. Sometimes ash and charcoal are preserved. Other materials found in hearths include animal bone, freshwater mussel shell, emu eggshell and stone artefacts. Hearths probably represent the remains of cooking ovens, similar to those described in ethnographic accounts by Major Thomas Mitchell (1839). These were lined with baked clay nodules and stone cobbles, possibly to retain heat. Hearths may be isolated or occur in clusters and may be associated with open campsites or middens. They are often located on floodplain terraces of the Gunnedah Basin.

6.3.3 Freshwater Shell Middens

Shell middens are deposits of shell and other food remains accumulated by Aboriginal people as food refuse. In inland NSW these middens typically comprise shells of the freshwater lacustrine mussel *Velesunio ambiguus* or the freshwater riverine mussel *Alathyria jacksoni*. Freshwater middens are most frequently found as thin layers or small patches of shell and often contain stone or bone artefacts and evidence of cooking. Such sites are relatively common along the watercourses of the Gunnedah Basin and their associated lakes and other wetlands.

6.3.4 Earth Mounds

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

6.3.5 Rockshelter Sites

Caves or shelters in cliff lines and beneath boulder overhangs were often used by Aboriginal people as campsites. Because of the confined area in these shelters and because of repeated Aboriginal occupation of such sites, the occupation deposits that they contain are often richer than open campsites and are usually stratified.

Rockshelters will only be found where suitable geological formations are present. They may occur as sandstone overhangs, shelters beneath granite tors or as limestone caves.

6.3.6 Rock Art Sites

Rock art consists of paintings, drawings and/or engravings on rock surfaces. In most instances in the wider region, rock art is related to the distribution of rockshelters but it may also be found on freestanding rocks.

6.3.7 Quarry Sites

These are locations where Aboriginal people obtained raw material for their stone tools or ochre for their art and decoration. Materials commonly used for making flaked stone tools include chert, silcrete, quartz and quartzite. These materials were obtained from exposed sedimentary formations or picked up as loose rock on the surface. Stone quarries may also be associated with volcanic rock outcrops, which provided the raw material for ground stone tools such as stone axes.

6.3.8 Axe-Grinding Grooves

These result from Aboriginal people having rubbed the edges of stone axe-heads repeatedly against a soft abrasive rock in order to shape or sharpen them. Grinding grooves are normally located adjacent to creeks where suitable stone for grinding may be present. In most instances, sandstone outcrops provided the most suitable surface for grinding.

6.3.9 Modified Trees

Slabs of bark were cut from trees by Aboriginal people and used for a variety of purposes including roofing shelters and constructing canoes, shields and containers. Scars also resulted from the cutting of toeholds for climbing trees to obtain honey or to capture animals such as possums. Some trees were carved, whereby Aboriginal people cut designs through the bark onto the wood beneath. Ethnohistoric records indicate that some carved trees were associated with burials whilst others may have been sacred or totemic sites.

In the Gunnedah Basin River Red Gums and White Box are the most commonly scarred species. Carvings are often on White Cypress Pine. The classification of scarred trees as natural, European or Aboriginal is often problematic. However, if the scar is Aboriginal the tree must now be more than 200 years old.

6.3.10 Stone Arrangements, Ceremonial Rings and Ceremony and Dreaming Sites

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

6.3.11 Burials

Aboriginal burial grounds may consist of a single interment or a suite of burials. In the drier parts of the Murray-Darling Basin skeletal material is regularly found eroding from sand deposits (Bonhomme, 1990; Hope, 1993), but in the higher slopes east of the Namoi River burial sites are rarely found because conditions for the preservation of bone are poor. Knowledge of Aboriginal burial grounds is best sought from local Aboriginal communities (NPWS, 1998).

6.4 PREVIOUS ABORIGINAL CULTURAL HERITAGE INVESTIGATIONS

An understanding of the Aboriginal archaeology of the Gunnedah Basin has begun to emerge based on a number of previous studies, including some in and near the Project area (Table 6). Studies by Balme (1986) and Purcell (2000, 2002) are among the most wide-ranging and provide a summary of the regional archaeological record. In short, surface scatters of flaked stone artefacts are the most common site type. These stone assemblages are dominated by flakes and flaked pieces mostly struck from quartz, chert, silcrete, quartzite and fine-grained sedimentary rocks (Balme, 1986; Purcell, 2000, 2002). Eucalypt trees with scars possibly made by Aboriginal people are also well represented in the Gunnedah Basin. Other site types include axe-head grinding grooves, stone quarries, earthen features including mounds and hearths, stone arrangements and ceremonial rings. The highest density of sites in the Gunnedah Basin is along the Namoi River and its tributaries including the Mooki and Peel Rivers (Purcell, 2000, 2002). Purcell (2000, 2002) found that Aboriginal occupation of the Gunnedah Basin was focussed within floodplain terrace landforms. Sites were an average distance of about 400 m from watercourses (Purcell, 2000, 2002).

Table 6: Previous Aboriginal Cultural Heritage Studies in the Gunnedah/Narrabri Area

Reference	Locality	Comments	Results
Kayandel (2011)	Narrabri Shire	Results of a cultural heritage assessment of the Tarrawonga Coal Project.	A total of 57 previously unidentified sites were recorded during the surveys including 21 artefact scatters, 25 isolated finds and 11 scarred trees.
Cupper (2010)	Narrabri Shire	Results of a cultural heritage assessment of the Tarrawonga Coal Mine.	This survey did not encounter any additional items or places of Aboriginal cultural heritage significance.
Insite Heritage (2010)	Narrabri Shire	Result of a cultural heritage assessment for the continuation of the Boggabri Coal Mine.	A total of 77 archaeological sites (artefact scatters, isolated finds and scarred trees combined).
Archaeological Surveys & Reports (2009)	Narrabri Shire	An Aboriginal Heritage Assessment for Narrabri Coal Mine.	Forty-three sites were recorded during the survey within the Panels 1 to 7 of the survey area. One scarred tree, and one fireplace, 12 isolated artefacts, 19 sites with five artefacts or less, and nine sites that contained more than five artefacts were recorded. Of these, only seven sites contained 10 or more artefacts, and only one was believed to contain more than 100 artefacts.
Archaeological Surveys & Reports (2007)	Gunnedah Shire	An Aboriginal Heritage Assessment of the Belmont Coal Project site (now Rocglen Coal Mine) and transport route.	Seven sites were recorded but only three (two artefact scatters and an isolated artefact) would be impacted upon by the Project. Four scarred trees were found but did not fall within the potential impact zones.
Barber *et al*. (2007)	Namoi River	Results of a cultural heritage assessment of the potential impacts of three options for the Keepit Dam Upgrade.	Total of 28 previously unidentified Aboriginal sites were recorded. Sites comprise five isolated finds, 13 artefact scatters, nine scarred trees and one stone procurement source.
Archaeological Surveys & Reports (2005)	Narrabri Shire	Archaeological investigation on the proposed East Boggabri Coal Mine (now the Tarrawonga Coal Mine).	Eight Aboriginal sites were identified consisting of one scarred tree, six artefact scatters and an isolated artefact.
Hamm (2005)	Narrabri Shire	Results of a cultural heritage assessment of the Boggabri Coal Mine.	Identified 59 sites including 30 artefact scatters, 26 isolated finds and four scarred trees.
Purcell (2000)	Brigalow Belt South Bioregion	Aboriginal cultural heritage assessments of NSW Western Region	This assessment covered a large regional area and within it they located and recorded 1,110 Aboriginal sites, with 311 sites found within the Liverpool plains.
Haglund (1985)	Gunnedah Shire	Archaeological investigations of areas within proposed coal mining in Gunnedah area.	Four extensive artefact scatters found with two located on the banks of the Namoi River, which were tested by excavation. Findings of surface artefacts and test excavations recovered artefacts that were low in number.
Thompson (1981)	Gunnedah Shire	EIS for the proposed Vickery Coal Mine Project.	This assessment included investigations for the proposed Vickery Coal Mine. Several site types were found including grinding grooves, two stone artefact scatters and some smaller open sites near minor drainage channels, on slopes and ridge tops.

Reference	Locality	Comments	Results
Kamminga (1978)	Narrabri Shire	Report on proposed coal mining operation at the Boggabri Coal Mine.	This archaeological investigation examined the area for the proposed Vickery Coal Mine, which included the Vickery State Forest. No Aboriginal sites were identified during this assessment.

Source: Kayandel (2011).

The Project area has been the focus of a number of systematic archaeological studies in recent years. Of relevance to this study are those by Kamminga (1978), Thompson (1981), and Haglund (1985). These field studies document the distribution of Aboriginal archaeological sites on the alluvial plains and bedrock hills to the east of the Namoi River, and make predictions about site distribution based on observations of the landforms of the Project area.

Kamminga (1978) archaeologically investigated the Vickery ML between Gunnedah and Boggabri. This area encompassed part of the present Project area. No sites were located during the cultural heritage assessment (Kamminga, 1978). Several years later, however, Thompson (1981), also investigating the Vickery ML, located several site types including axe-head grinding grooves, two extensive open sites (on the banks of the Namoi River, Greenwood Creek and Top and Bottom Rocks), smaller open sites near intermittent streams, and isolated stone artefacts (generally located near minor drainage channels, on slopes and ridge crests). These sites are all located west of the present Project area.

Haglund (1985) later located four extensive artefact scatters as well as isolated finds within the Vickery ML. Two locations on the banks of the Namoi River were tested by excavation. One test pit was positioned within an existing site and the other in a position deemed to be a potential site. The latter excavation yielded no archaeological material (Haglund, 1985).

Haglund (1985) found that surface collection and test excavations recovered artefacts that were low in number and generally so damaged or indeterminate that statistical analysis was inconclusive. The excavated material was diffused through the top 0.2 m of deposit. Haglund (1985) suggested that the results indicate repeated use of the site during recent millennia.

A summary of the results of previous Aboriginal cultural heritage investigations in the Gunnedah region is presented in Table 6.

6.5 PREVIOUSLY RECORDED ABORIGINAL CULTURAL HERITAGE SITES IN THE PROJECT AREA

NSW OEH Aboriginal Heritage Information Management System (AHIMS) database searches for the Project mining area and haul road and overpass area were carried out on 11 May 2012 and 24 November 2011, respectively. Searches were conducted over areas (20 km x 20 km centred on the mining area and 2 km x 2 km centred on the haul road and overpass area) sufficient to allow adequate landscape interpretation and also provided a large number of registered Aboriginal sites to assist in an understanding of the distribution of Aboriginal cultural heritage across the landscape. The results of the AHIMS searches are included in Appendix 5.

It should be noted that the distribution of sites in the AHIMS database is a reflection of where site surveys have been previously completed. Other sites may be present, but in areas that have not been previously examined.

The results of the AHIMS search for the Project mining area are summarised in Table 7. A total of 71 sites have been previously recorded within the search area for the Project, with stone artefact scatters being the most common site type. Culturally modified trees (carved or scarred) were the second-most prevalent site type.

Table 7: Summary of Sites from AHIMS Database Search - Project Mining Area

Site Type	Number of sites	%
Stone artefact scatter	53	75
Modified tree (carved or scarred)	10	15
Stone artefact scatter and modified tree (carved or scarred)	3	4
Grinding grooves	2	3
Stone artefact scatter and grinding grooves	1	1
Stone arrangement	1	1
Habitation structure and potential archaeological deposit	1	1
Total	71	100

The results of the AHIMS search for the haul road and overpass area are summarised in Table 8. A total of six sites have been previously recorded within the search area for the haul road and overpass area. Site types represented are modified trees and stone artefact scatters.

Table 8: Summary of Sites from AHIMS Database Search - Haul Road and Overpass Area

Site Type	Number of sites	%
Modified tree (carved or scarred)	3	50
Stone artefact scatter	3	50
Total	6	100

NSW State Heritage Inventory and Australian Heritage Database searches completed on 11 May 2012 yielded no Statutory Listed Heritage Items in the Project area.

The summary of registered sites in the region of the Project area provides insight into forming predictive models for the Project area and is discussed in Section 7.1.

7 CULTURAL HERITAGE FIELD INVESTIGATION

In accordance with the *Guide to investigating, assessing and reporting on Aboriginal cultural heritage in NSW* (OEH, 2011) and *Code of Practice for Archaeological Investigation of Aboriginal Objects in NSW* (DECCW, 2010b), an archaeological design and survey methodology was prepared as a key component of the cultural heritage field assessment. Details of the archaeological design and survey methodology are presented in the following sections.

7.1 CULTURAL HERITAGE SITE PREDICTIVE MODEL

Previous archaeological studies indicate that the most frequently recorded Aboriginal cultural heritage places in the Gunnedah Basin are open occupation areas represented by scatters of stone artefacts and culturally modified trees (NSW OEH AHIMS site database). Burials, earthen features including mounds and hearths and stone features including stone quarries, ceremonial rings, axe-grinding grooves, rockshelters and rock art sites are also represented in the archaeological record.

The potential for encountering Aboriginal cultural heritage in the Project area is mitigated to some extent by the high degree of previous disturbance. For example, the extent of tree clearance from past agricultural and mining land use reduces the probability of encountering scarred and carved trees. Similarly, modification of the original land surface during past clearing and mining activities could have destroyed earthen features such as mounds and stone features such as arrangements and ceremonial rings, had they previously existed in this area. Stone artefacts, alternatively, are more likely to survive in the soil.

Based on past observations of archaeological site types and their distribution and landscape setting, the following predictive model of Aboriginal cultural heritage site locations for the activity can be proposed.

- **Trees scarred or carved by Aboriginal people** may occur wherever mature Eucalypt and White Cypress Pine trees grow. However, the extent of vegetation clearance reduces the probability of encountering culturally modified trees.
- **Stone artefact scatters** and **isolated finds** of stone artefacts are possible over the entire surface of the Project area (excluding rehabilitated areas where artificial landforms have been reinstated after past mining activities). They are typically found within 200 m of water sources, so are most likely to be encountered on the margins of the Namoi River and other intermittent streams in the Project area.
- **Burial sites** are unlikely, given that the region's acidic soils are not suited to preserving bone and other organic material.
- **Freshwater shell middens** may occur on the margins of the Namoi River.
- **Earthen features** including **mounds**, **ovens** and **hearths, stone arrangements** and **ceremonial rings** are normally restricted to level ground, the former usually adjacent to water sources. They are unlikely to be encountered because previous land disturbance such as earthworks associated with past mining activities and ploughed cultivation during agricultural cropping is likely to have destroyed earthen and stone features, had these site types originally occurred in the Project area.
- **Rockshelters**, **rock art sites, axe-grinding grooves** and **quarries** will not occur in the Project area due to the absence of suitable rock outcrops, although a sandstone slab containing axe-grooves is known to occur immediately west of the Project mining area in the Namoi River base rock.

While predictive studies such as this can be expected to identify areas in which sites associated with economic or subsistence activities may be present, notably open habitation areas, other sites may fall outside such a predictive framework. For example, places associated with spiritual aspects of traditional Aboriginal society such as ceremony and dreaming sites are often located at topographically distinct or unique features, which cannot be identified from an examination of maps or other records. For this reason it was essential that local Aboriginal communities be consulted so that sites of significance to them can be identified.

7.2 FIELD METHODOLOGY

The archaeological field survey was conducted based on the sampling strategy developed in accordance with the *Guide to investigating, assessing and reporting on Aboriginal cultural heritage in NSW* (OEH, 2011) and Requirement 5a of the *Code of Practice for Archaeological Investigation of Aboriginal Objects in NSW* (DECCW, 2010b) and outlined in Section 7.1.

The objective of the field survey was to identify places of Aboriginal cultural significance in the Project area.

An assessment of the Project area was made based on the level of disturbance from previous land use, survey variables (ground visibility and archaeological visibility) and the potential archaeological sensitivity of the area.

The methodology for the field survey involved:

- A focus on the areas that had a high probability of locating traditional Aboriginal artefacts, including creek beds and banks, and eroded tracks.
- The definition of the beginning and end points of the survey transects by physical markers such as roads, fire tracks and fences.
- The identification of landforms and areas of potential archaeological sensitivity.
- The numerical ordering of survey units based on the location of the area and the group who surveyed it.
- Representative coverage of all survey units, including those with a low probability of containing Aboriginal cultural heritage.

7.2.1 Personnel

The survey was conducted over a period of 13 days in November and December 2011 and March 2012. The participants of the field survey were project archaeologists Lance Syme, Caroline Hubschmann, Nicole Castle, Tristan Jones, Cheryl Rosburg and Tom Knight of Kayandel Archaeological Services, together with the representatives from the Aboriginal community listed in Table 4. The participants were divided into two teams of approximately seven to eight people. Each team consisted of two to three project archaeologists with five or six Aboriginal community representatives.

Project archaeologist Dr Matt Cupper from Landskape reinspected the features originally identified during the Kayandel Archaeological Services surveys in June 2012.

7.2.2 Survey Methods

The proposed disturbance areas of the Project were inspected on foot by the project archaeologists and Aboriginal community representatives. The field teams examined the ground surface for any archaeological traces such as stone artefacts, axe-grinding grooves, hearths, hearthstones, shells, bones and mounds. All mature trees in the areas of proposed disturbance were inspected for scarring or carving by Aboriginal people.

Particular attention was paid to areas with high ground surface visibility such as along fencelines and stock and vehicle tracks and in scalds, gullies and other eroded areas.

The team members walked abreast across the surveyed areas in a series of closely spaced transects. These were evenly distributed over the areas of proposed disturbance and approximately 10-20 m apart. Due to the general openness of the landscape it was usually possible to identify likely site locations from at least 10-20 m and deviate from the transects to make closer inspections.

Maps of the survey units and descriptions of the transects walked in each survey unit are provided in Appendix 7.

7.3 CULTURAL HERITAGE SITE DEFINITION AND RECORDING

In accordance with the *Guide to investigating, assessing and reporting on Aboriginal cultural heritage in NSW* (OEH, 2011) and Requirement 7 of the *Code of Practice for Archaeological Investigation of Aboriginal Objects in NSW* (DECCW, 2010b) sufficient information was collected at each site to enable completion of an AHIMS site recording form. For this investigation Aboriginal archaeological sites were defined as a concentration of stone artefacts or cluster of axe-grinding grooves on a single outcrop. Stone artefacts that were not part of a concentration were recorded as isolated finds. When a site was located the following variables were recorded:

- *Site designation*: sites were designated Vickery Coal Project (VCP) or Namoi River (NR) followed by a numeric identifier.
- *Site type*: site types recorded were stone artefact scatters and isolated finds of stone artefacts.
- *Grid reference*: this information was obtained using a Garmin handheld Global Positioning System and confirmed using the Gulligal 8936-111-N 1:25,000 topographic map sheet.
- *Environmental setting*: this describes the sites' environmental context including such factors as landform, slope, vegetation and local hydrology.
- *Aspect*: direction at which the site faces. Aspect is often thought to be a key determinant of site location.
- *Site size*: refers to the dimensions over which artefacts are visible.
- *Visibility*: a measurement of the conditions of ground surface visibility in the survey area. Ground surface visibility conditions will affect whether sites are detected and whether their full extent has been recorded.
- *Site contents*: this is a description of the artefacts at the site. With open campsites the features recorded included raw material, artefact type, artefact dimensions, presence of retouch or use wear and any general comments considered relevant. It is important to realise that these artefact descriptions are only preliminary descriptions, as more detailed recording is considered to be more appropriate if a mitigation phase is undertaken for this or other regional projects.
- *Site condition*: describes the condition of the site in terms of factors which may have disturbed it or which may have the potential to disturb.
- *Management considerations*: this details the potential threat to the site specifically in terms of the planned development. In addition, specific ameliorative measures are recommended if warranted.

7.3.1 Distinguishing Archaeological Features

A number of features were closely examined during the investigation to determine that their origin was not manufacture or modification by Aboriginal people during prehistory. Such features included broken fragments of gravel and cobbles and trees bearing scars. A list of the trees examined in the Project disturbance area is included as Appendix 6, which lists rationale for determining that scarring was not caused by past Aboriginal resource use. A number of other trees which exhibited scarring were examined outside of the Project disturbance areas and were also determined not to be caused by past Aboriginal resource use. The focus of Appendix 6, however, is on those trees within the Project disturbance areas.

Scarred Trees

DEC's (2005b) *Aboriginal Scarred Trees in NSW: A Field Manual* states: 'it is…important to ensure that scars are only registered if there are compelling grounds for believing that they are of Aboriginal origin and not a result of a natural or incidental impact'.

The following criteria, based on DEC's (2005b) scarred tree manual, were used to determine whether a scarred tree was culturally modified by Aboriginal people (see also Irish [2005] *When is a scar a scar?*):

- the scar should end above the ground in a rounded or square formation;
- the scar should be generally symmetrical;
- the scar may show evidence of axe marks;
- the tree should be of sufficient age carry a scar caused by traditional Aboriginal techniques;
- the tree should be a native species that is indigenous to the area;
- the scar should show evidence of developed overgrowth demonstrating its age and therefore likely to have been the result of Aboriginal traditional practices; and,
- there is no other obvious explanation for the damage to the tree (the scar is close to road, is in contact with a wire fence, a fallen limb from another tree which is in close proximity to the scar, etc).

Stone Artefacts

The following criteria, based on Holdaway and Stern's (2004) *A Record In Stone: The Study of Australia's Flaked Stone Artefacts*, were used to determine whether a rock fragment was an Aboriginal stone artefact:

- the stone artefact should bear the remains of a striking platform;
- the stone artefact should have a bulb of percussion;
- the stone artefact may show evidence of secondary working/retouch;
- the stone artefact should be uniformly patinated (siliceous or calcareous surface coating), demonstrating its age.

Stone Arrangements

Characteristics of stone arrangements as detailed in several expert sources including Dow (1938) (circular stone features, pathways), Towle (1939) (circular stone features, cairns) and Hamacher et al. (2012) (linear stone features) were used to distinguish between culturally modified assemblages of stones and naturally distributed cobbles or boulders.

On the basis of the above criteria and analysis, several of the features identified during the field surveys were determined not to be of Aboriginal origin. Such items included scarred trees (Appendix 6), several rock fragments and an area with stones.

7.4 SURVEY COVERAGE DATA

7.4.1 Conditions of Visibility

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

Conditions of ground surface visibility were typically less than 30% (Table 9). Grass and herbaceous plant growth was substantial, but the ground surface was exposed is some areas by erosion by scalding and stock and vehicular traffic.

Survey units and descriptions of the visibility conditions for each survey unit are provided in Appendix 7.

Table 9: Visibility Conditions at the Project Area

Survey Unit	Landforms	Vegetation	Exposures	Visibility[1]	Survey Method
A	Lower hill slope Middle hill slope Ridge crest	Box White Cypress Pine Grasses	Animal tracks, Vehicle tracks, Contour banks, Gullies, Scalds, Fencelines	10-20 %	Pedestrian
B	Plain Lower hill slope	Box White Cypress Pine Grasses	Animal tracks, Vehicle tracks, Contour banks, Gullies, Scalds, Fencelines	10-20 %	Pedestrian
C	Plain Lower hill slope Middle hill slope Ridge crest	Box White Cypress Pine Grasses	Animal tracks, Vehicle track, Gullies, Scalds, Fencelines	10-20 %	Pedestrian
D	Plain Lower hill slope Middle hill slope	Box White Cypress Pine Grasses	Animal tracks, Vehicle tracks, Gullies, Scalds, Fencelines	10-20 %	Pedestrian
E	Plain Lower hill slope Middle hill slope	Box White Cypress Pine Grasses	Animal tracks, Vehicle tracks, Contour banks, Gullies, Scalds, Fencelines	10-20 %	Pedestrian
F	Plain Lower hill slope Middle hill slope	Box White Cypress Pine Grasses	Animal tracks, Vehicle tracks, Contour banks, Gullies, Scalds, Fencelines	10-20 %	Pedestrian
G	Plain Lower hill slope Middle hill slope	Box White Cypress Pine Grasses	Animal tracks, Vehicle tracks, Contour banks, Gullies, Scalds, Fencelines	5-10 %	Pedestrian
H	Plain Lower hill slope Middle hill slope	Box White Cypress Pine Grasses	Animal tracks, Vehicle tracks, Contour banks, Gullies, Scalds, Fencelines	10-20 %	Pedestrian

Survey Unit	Landforms	Vegetation	Exposures	Visibility[1]	Survey Method
I	Plain Lower hill slope Middle hill slope	Box White Cypress Pine Grasses	Animal tracks, Vehicle tracks, Contour banks, Gullies, Scalds, Fencelines	10-20 %	Pedestrian
J	Plain Lower hill slope Middle hill slope	Box White Cypress Pine Grasses	Animal tracks, Vehicle tracks, Contour banks, Gullies, Scalds, Fencelines	10-20 %	Pedestrian
K	Plain Lower hill slope Middle hill slope	Box White Cypress Pine Grasses	Animal tracks, Vehicle tracks, Contour banks, Gullies, Scalds, Fencelines	10-20 %	Pedestrian
L	Alluvial terrace Plain Lower hill slope Middle hill slope	Box Gum White Cypress Pine Grasses	Animal tracks, Vehicle tracks, Contour banks, Gullies, Scalds, Fencelines	10-20 %	Pedestrian
M	Plain Lower hill slope	Box White Cypress Pine Grasses	Animal tracks, Vehicle tracks, Contour banks, Gullies, Scalds, Fencelines	10-20 %	Pedestrian
N	Lower hill slope Middle hill slope	Box White Cypress Pine Grasses	Animal tracks, Vehicle tracks, Gullies, Scalds, Fencelines	5-10 %	Pedestrian
O	Alluvial plain	Gum Box Grasses	Animal tracks, Vehicle tracks, Gullies, Scalds,, Fencelines	20-30 %	Pedestrian
P	Alluvial plain	Gum Box Grasses	Animal tracks, Vehicle tracks, Gullies, Scalds,, Fencelines	5-10 %	Pedestrian
Q	Alluvial plain	Gum Box Grasses	Animal tracks, Vehicle tracks, Gullies, Scalds,, Fencelines	5-10 %	Pedestrian

[1] Visibility based on field notes provided in Appendix 7.

7.4.2 Coverage Analysis

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

All of the surface areas of the proposed development areas for the Project were inspected on foot. The areas covered during the survey are outlined in Table 10. Despite relatively restricted surface visibility, survey coverage was considered adequate, given the intensive nature of the survey.

Table 10: Coverage of the Study Area

Survey Unit	Area (ha)	Visibility[1] (%)	Sites
A	275	10-20 %	2
B	165	10-20 %	2
C	235	10-20 %	3
D	270	10-20 %	8
E	140	10-20 %	-
F	225	10-20 %	-
G	80	5-10 %	-
H	140	10-20 %	6
I	425	10-20 %	-
J	165	10-20 %	-
K	90	10-20 %	2
L	25	10-20 %	1
M	405	10-20 %	4
N	35	5-10 %	-
O	10	20-30 %	-
P	20	5-10 %	2
Q	20	5-10 %	4
Total	**2755**	**-**	**40**

1 Visibility based on field notes provided in Appendix 7.

8 RESULTS

Five stone artefact scatters, one also containing axe-grinding grooves, had previously been recorded in the Project area. These were re-identified during the field investigation. Additionally, the present survey encountered 20 previously unrecorded stone artefact scatters and 15 isolated finds of stone artefacts.

A brief summary description of each of the Aboriginal cultural heritage sites identified during the field survey is provided below. Representative photographs of the Aboriginal cultural heritage sites identified during the field survey are provided in Plates 5 to 10. AHIMS site cards for each of the recorded Aboriginal cultural heritage sites are included in Appendix 8.

Plate 5: Photo of AHIMS site number 16-4-0002

Plate 6: Photo of OS-11

Plate 7: Grinding grooves at 20-4-0009

Plate 8: High bank of the Namoi River at 20-4-0009

Plate 9: Photo of IF-14

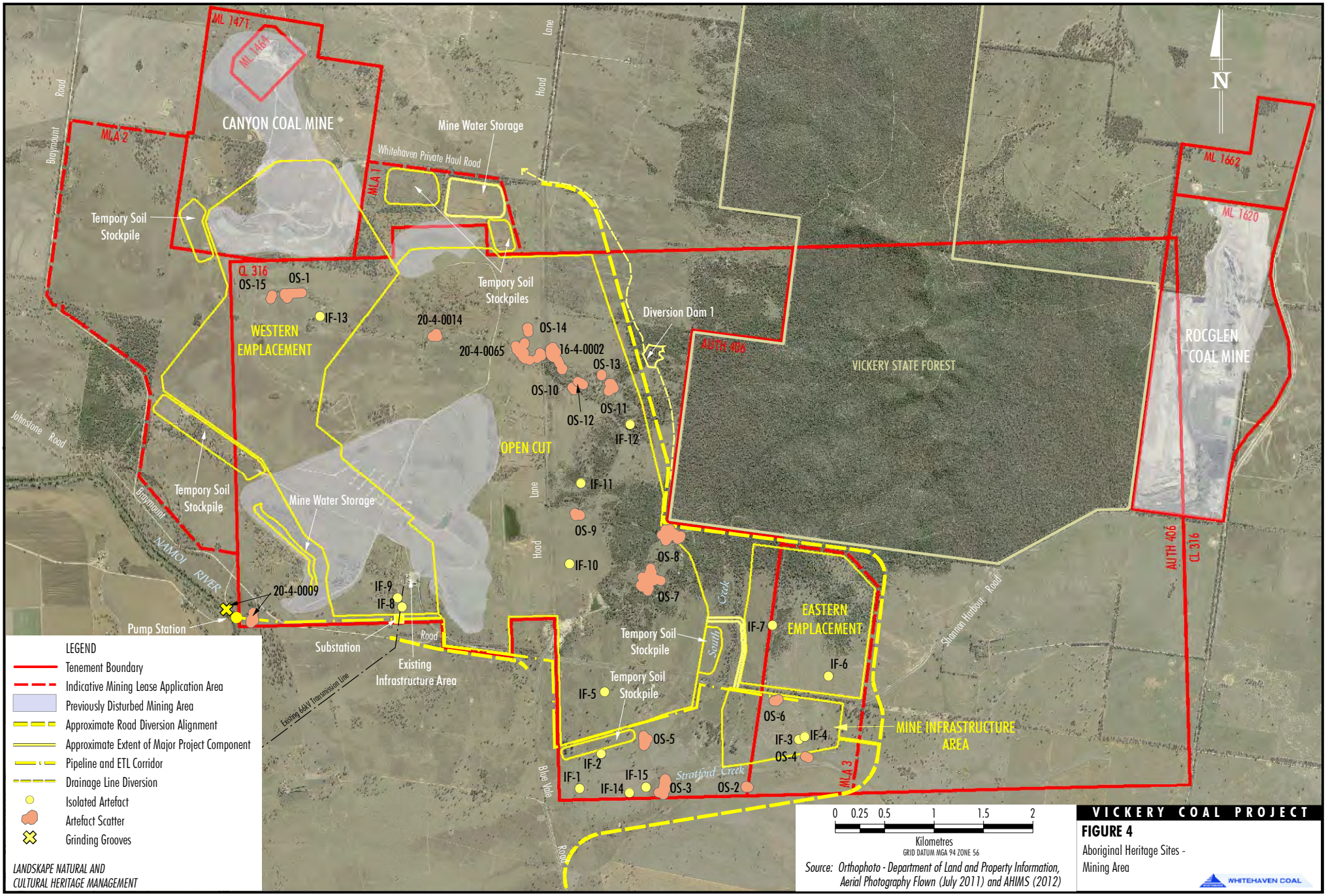
Plate 10: Photo of IF-15

8.1 CONCENTRATIONS OF ABORIGINAL OBJECTS

Nineteen stone artefact scatters were identified during the field surveys of the Project mining area (Table 11 and Figure 4). One of these sites (AHIMS site number 20-4-0009) was also associated with axe-grinding grooves.

Table 11: Concentrations of Aboriginal Objects - Project Mining Area

Site Number	Site Code (refer Figure 4)	Feature	Landform	Location GDA94 56 mE	Location GDA94 56 mN
VCP-OS-001	OS-1	Stone artefact scatter	Plain	229490	6594509
VCP-OS-009	OS-2	Stone artefact scatter	Plain	234095	6589516
VCP-OS-011	OS-3	Stone artefact scatter	Plain	233249	6589513
VCP-OS-014	OS-4	Stone artefact scatter	Plain	234701	6589818
VCP-OS-021	OS-5	Stone artefact scatter	Plain	233059	6589987
VCP-OS-036	OS-6	Stone artefact scatter	Plain	234390	6590393
20-4-0009	20-4-0009	Stone artefact scatter, Axe-grinding grooves	Plain, alluvial terrace	229087	6591229
VCP-OS-046	OS-7	Stone artefact scatter	Ridge top	233105	6591613
VCP-OS-049	OS-8	Stone artefact scatter	Ridge top	233320	6592067
VCP-OS-051	OS-9	Stone artefact scatter	Lower slope	232376	6592277
VCP-OS-055	OS-10	Stone artefact scatter	Lower slope	232333	6593553
VCP-OS-056	OS-11	Stone artefact scatter	Lower slope	232714	6593566
VCP-OS-057	OS-12	Stone artefact scatter	Lower slope	232409	6593609
VCP-OS-058	OS-13	Stone artefact scatter	Lower slope	232623	6593691
20-4-0065	20-4-0065	Stone artefact scatter	Lower slope	231992	6593886
16-4-0002	16-4-0002	Stone artefact scatter	Lower slope	232129	6593923
20-4-0014	20-4-0014	Stone artefact scatter	Plain	230937	6594089
VCP-OS-067	OS-14	Stone artefact scatter	Lower slope	231876	6594149
VCP-OS-069	OS-15	Stone artefact scatter	Plain	229280	6594481



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Six stone artefact scatters were identified in the haul road and overpass area (Table 12 and Figure 5).

Table 12: Concentrations of Aboriginal Objects - Haul Road and Overpass Area

Site Number	Site Code (refer Figure 5)	Feature	Landform	Location GDA94 56 mE	Location GDA94 56 mN
NR-OS-001	OS-16	Stone artefact scatter	Plain	233225	6573191
NR-OS-002	OS-17	Stone artefact scatter	Plain	232919	6573555
NR-OS-003	OS-18	Stone artefact scatter	Plain	232874	6573717
NR-OS-004	OS-19	Stone artefact scatter	Plain	232807	6573729
20-4-0037	20-4-0037	Stone artefact scatter	Plain	232887	6573862
NR-OS-006	OS-20	Stone artefact scatter	Plain	232854	6573952

Stone artefact concentrations are defined by the presence of two or more stone artefacts in close association (i.e. within 50 m of each other) (NPWS, 1997). The extent of each artefact scatter located in the Project area has been mapped by applying a 50 m buffer around the outermost artefacts in the scatter (except when the buffer surrounding the scatter falls over a disturbed area such as a road).

Concentrations of Aboriginal objects recorded during the field survey are summarised in Tables 11 and 12 and shown on Figures 4 and 5. Summary descriptions are provided in Sections 8.1.1 and 8.1.2.

8.1.1 Descriptions of Concentrations of Aboriginal Objects at the Project Mining Area

OS-1

Low density artefact assemblage of 19 flakes and two cores. Located on plain approximately 2.5 km west of Blue Vale Road.

OS-2

Nine artefacts in a disturbed context near a fenceline on the plain approximately 2 km east of Blue Vale Road.

OS-3

Located on plain approximately 1.25 km east of Blue Vale Road. Medium density artefact scatter consisting of 48 flakes, 17 cores, one piece of debitage and one piece of petrified wood.

OS-4

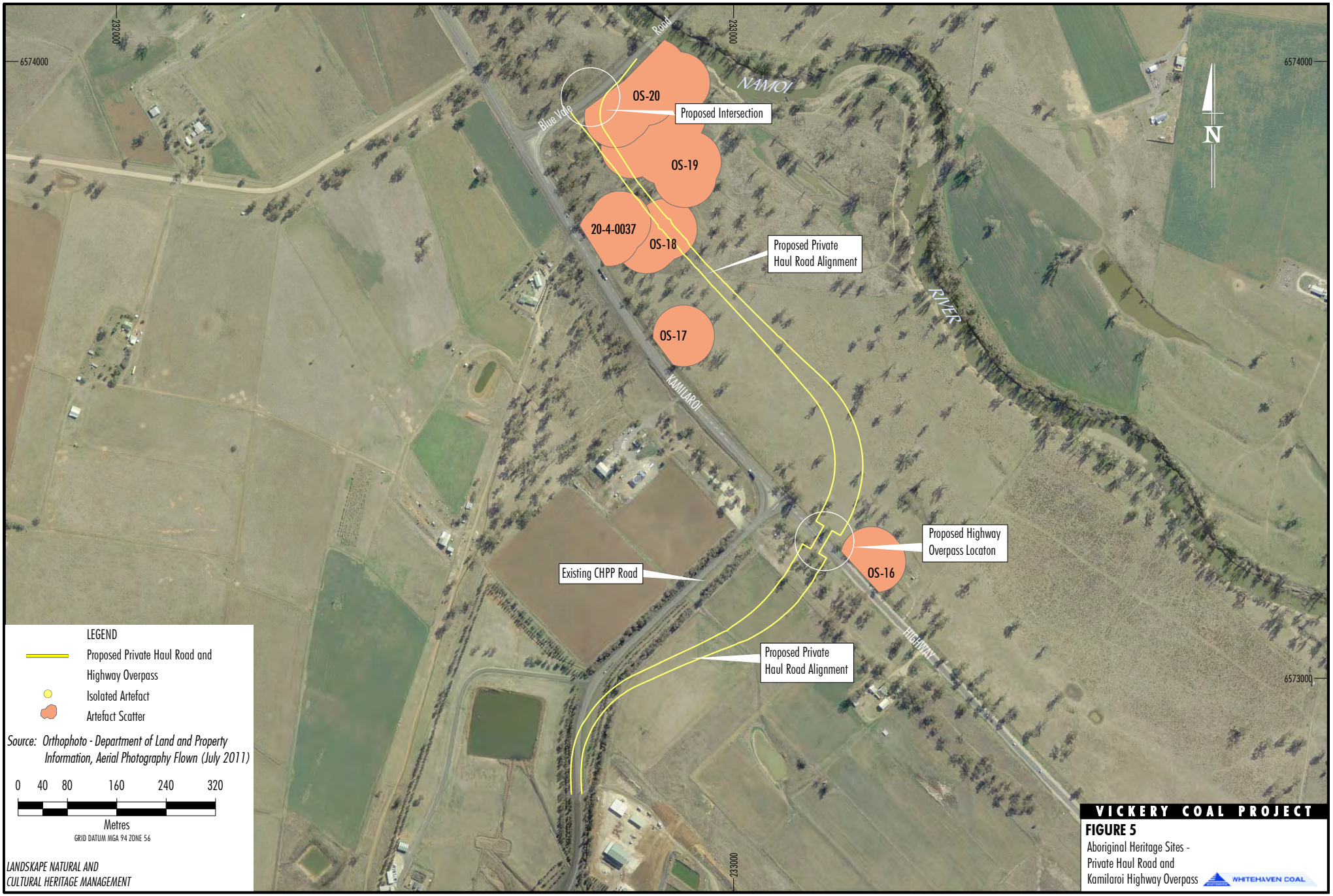
Two artefacts in disturbed context near a dam on plain approximately 750 m south of Shannon Harbour Road.

OS-5

Medium density artefact scatter on plain approximately 1.25 km east of Blue Vale Road. Assemblage includes 25 flakes, six cores and six pieces of debitage.

OS-6

Four artefacts occurring in disturbed setting of a contour bank on plain approximately 150 m south of Shannon Harbour Road.



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AHIMS site number 20-4-0009

Located on the bank of the Namoi River approximately 250 m west of Braymont Road. Site complex comprises a medium density artefact scatter consisting of 37 flakes and four cores on the higher terrace, and approximately 20 grinding grooves on an adjacent outcrop of sandstone lower down the riverbank. The site was previously recorded by Laila Haglund in 1982 (site appears to have been re-recorded on the AHIMS database as separate components; AHIMS site number 20-4-0289 [artefact scatter], 20-4-0290 [isolated find] and 20-4-0292 [grinding grooves]).

Due to heavy rain in the area prior to the survey, much of the sandstone outcrop was submerged and only a few of the grinding grooves were visible.

OS-7

Medium density artefact scatter of 22 flakes and 17 cores located on a low ridgeline approximately 900 m east of Blue Vale Road.

OS-8

Located on a low ridgeline approximately 1.25 km east of Blue Vale Road, on the border of the Vickery State Forest, this site has been identified as a medium density artefact scatter consisting of 24 flakes, nine cores and one piece of debitage.

OS-9

Flanks erosion gully in gently sloping terrain approximately 250 m east of Blue Vale Road. The site is a low density artefact scatter containing five artefacts.

OS-10

Three flakes and one core on eroded southern margin of ephemeral drainage line approximately 250 m east of Blue Vale Road.

OS-11

Medium density artefact scatter consisting of 28 flakes and two cores. Located scalded margins of drainage line, approximately 600 m east of Blue Vale Road.

OS-12

Four artefacts on eroded northern margin of ephemeral drainage line approximately 300 m east of Blue Vale Road.

OS-13

Four artefacts on eroded northern margin of ephemeral drainage line approximately 500 m east of Blue Vale Road.

AHIMS site number 20-4-0065

Medium density artefact scatter comprising 15 flakes and four cores located on the scalded northern margins of an ephemeral drainage line approximately 50 m west of Blue Vale Road. This site had been previously recorded (AHIMS site number 20-4-0065) by Archaeological Surveys & Salvage.

AHIMS site number 16-4-0002

Occurs on the scalded northern margins of an ephemeral drainage line approximately 50 m east of Blue Vale Road. Site is a medium density artefact scatter consisting of 22 flakes and three cores. This site had been previously recorded (AHIMS site number 16-4-0002) by Central West Archaeological and Heritage Services Pty Ltd.

AHIMS site number 20-4-0014

Medium density artefact scatter eroding from banks of ephemeral creek approximately 1.25 km west of Blue Vale Road. Fifteen flakes and four cores were identified. This site had been previously recorded (AHIMS site number 20-4-0014) by Karen Flick and Peter Thompson in 1981 for the original Vickery Coal Mine EIS.

OS-14

Three flakes and one core on scalded northern margin of ephemeral drainage line approximately 150 m west of Blue Vale Road.

OS-15

Two artefacts on the plain approximately 2.5 km west of Blue Vale Road.

8.1.2 Descriptions of Concentrations of Aboriginal Objects at the Haul Road and Overpass Area

OS-16

Located on high terrace of Namoi River approximately 25 m north-east of the Kamilaroi Highway this site has been identified as a low density artefact scatter consisting of three flakes and one core.

OS-17

On high terrace of Namoi River approximately 25 m north-east of the Kamilaroi Highway. Site is a low density artefact scatter consisting of three flakes and one core.

OS-18

Low density artefact scatter on high terrace of Namoi River approximately 50 m north-east of the Kamilaroi Highway. Contents includes seven flakes and one core.

OS-19

One flake and one core on high terrace of Namoi River approximately 100 m north-east of the Kamilaroi Highway.

AHIMS site number 20-4-0037

Medium density artefact scatter of 57 flakes and one core. Located on high terrace of Namoi River approximately 150 m south-west of Blue Vale Road. This site had been previously recorded (AHIMS site number 20-4-0037) by Laila Haglund.

OS-20

Located on high terrace of Namoi River approximately 50 m south-west of Blue Vale Road. Medium density artefact scatter consisting of 35 flakes and eight cores.

8.2 ISOLATED FINDS OF ABORIGINAL OBJECTS

Fifteen isolated stone artefacts were identified during the field surveys of the Project mining area.

Isolated artefacts recorded during the field surveys are summarised in Table 13 and shown on Figures 4 and 5. Summary descriptions are provided below.

Table 13: Isolated Finds of Aboriginal Objects - Project Mining Area

Site Number	Site Code (refer Figure 4)	Feature	Landform	Location GDA94 56 mE	Location GDA94 56 mN
VCP-IF-010	IF-1	Isolated Artefact	Plain	232401	6589501
VCP-IF-014	IF-2	Isolated Artefact	Plain	232620	6589857
VCP-IF-017	IF-3	Isolated Artefact	Plain	234619	658999
VCP-IF-018	IF-4	Isolated Artefact	Plain	234681	6590028
VCP-IF-034	IF-5	Isolated Artefact	Plain	232656	6590482
VCP-IF-040	IF-6	Isolated Artefact	Lower slope	234920	6590639
VCP-IF-043	IF-7	Isolated Artefact	Lower slope	23452	6591156
VCP-IF-055	IF-8	Isolated Artefact	Lower slope	230603	6591344
VCP-IF-060	IF-9	Isolated Artefact	Lower slope	230558	6591433
VCP-IF-070	IF-10	Isolated Artefact	Lower slope	232300	6591777
VCP-IF-090	IF-11	Isolated Artefact	Lower slope	232414	6592595
VCP-IF-095	IF-12	Isolated Artefact	Lower slope	232911	6593192
VCP-IF-109	IF-13	Isolated Artefact	Plain	229771	6594288
VCP-OS-007	IF-14	Isolated Artefact	Plain	232905	6589459
VCP-OS-008	IF-15	Isolated Artefact	Plain	233073	6589516

IF-1
Mudstone flake on plain approximately 350 m east of Blue Vale Road.

IF-2
Mudstone core on plain approximately 700 m east of Blue Vale Road.

IF-3
Chert flake in disturbed context near contour bank on plain approximately 500 m south of Shannon Harbour Road.

IF-4
Quartzite core in disturbed context near contour bank on plain approximately 500 m south of Shannon Harbour Road.

IF-5
Quartzite flake on plain approximately 200 m south of Shannon Harbour Road.

IF-6
Mudstone core on contour bank on lower slope landform approximately 200 m north of Shannon Harbour Road.

IF-7
Silcrete flake in disturbed context near fence line on lower slope approximately 600 m north of Shannon Harbour Road.

IF-8
Chert flaked piece on lower slope approximately 400 m north of Braymont Road.

IF-9
Mudstone flaked piece on lower slope approximately 400 m north of Braymont Road.

IF-10
Chert flake on the edge of an existing vehicle track approximately 150 m east of Blue Vale Road.

IF-11
Mudstone core on lower slope approximately 300 m east of Blue Vale Road.

IF-12
Chert core on lower slope approximately 1 km east of Blue Vale Road.

IF-13
Silcrete flake in disturbed context near farm sheds on plain approximately 1 km west of Blue Vale Road.

IF-14
Silcrete flake on plain approximately 1 km east of Blue Vale Road.

IF-15
Silcrete flake on plain approximately 1 km east of Blue Vale Road.

8.3 SURVEY RESULTS SUMMARY

A total of 34 Aboriginal cultural heritage sites (including those sites that had been previously recorded and were reinspected as part of the field surveys) were identified during the field surveys of the Project mining area. Six sites were identified in the proposed haul road and overpass Project area. The sites comprise 25 scatters of stone artefacts, one containing axe-grinding grooves, and 15 isolated finds of stone artefacts. The location of all recorded sites is provided on Figures 4 and 5.

The majority of sites located at the proposed Project mining area were associated with the open plains and the banks of ephemeral streams or drainage lines. Lower artefact densities occurred along the ridge top and upper slope areas. Stone assemblages are generally small in size ranging from single artefacts to 67 artefacts discovered in one scatter. This particular site, OS-3, was located on an open plain to the east of Blue Vale Road.

A number of small to medium artefact scatters were located in the proposed haul road and overpass area on the banks of the Namoi River. The largest scatter (AHIMS site number 20-4-0037) comprised approximately 57 flakes and one core.

Lithics were generally sourced from locally available raw materials such as mudstone, silcrete, quartz, quartzite, tuff and chert. Most were cores and waste flakes and flaked pieces from knapping, with few formal implements encountered.

9 DISCUSSION

9.1 EFFECTIVENESS OF THE SURVEY

The archaeological record of the Project area can be assessed based on the cultural features identified during the present field surveys and previous studies. There are two site types represented, which are open sites containing single or low-density scatters of stone artefacts and axe-grinding grooves. The pattern of site distribution and type is partly attributable to the degree of land surface modification that has occurred since European settlement, as such past disturbance associated with pastoralism, agriculture and coal mining may have obliterated many archaeological sites, had they occurred previously.

Previous tree clearing and land levelling could have destroyed earthen features such as mounds and hearths and stone arrangements including ceremonial rings. Shell middens were not encountered because most occur within 100 m of sources of permanent freshwater. Aboriginal stone quarry sites and other stone features such as rock shelters and rock art sites are also definitely not represented in the Project area as suitable rock outcrop is lacking.

None of the old growth trees present in the areas of proposed disturbance bore any evidence of having had bark or wood removed or carved by Aboriginal people (scarring on a previously recorded modified tree known as Whitehaven 3 near the old Canyon Mine in the northwest of the Project mining area was reassessed to be natural in origin). Additionally, none of the sandstone outcrops exhibited evidence of axe-grinding grooves (other than the previously recorded axe-grinding groove site [20-4-0009] in the bed of the Namoi River west of the Project area).

The Project area does not contain culturally sensitive landforms such as lunettes or source-bordering sand dunes where subsurface Aboriginal cultural deposits (e.g. burials) have been recorded previously.

The findings of the survey confirm the predictive model outlined in Section 7.1. The expected site extents and artefact densities largely corresponded to proximity to water sources (see Sections 8.3 and 9). Previous regional surveys recorded similar densities of artefacts to the current study (Table 14). The Aboriginal heritage assessment completed at the Narrabri Coal Mine reported found only one site containing a high density of artefacts (Archaeological Surveys & Reports, 2009). The majority of sites previously recorded contain small artefact densities (Table 14). Other previous surveys only located a small number of sites as often these assessments were in addition to previous Aboriginal assessments completed in the area.

The findings of this survey as well as the findings of past archaeological/cultural investigations in and around the Project area, provide detailed information on land use and past Aboriginal activities. The results provide grounding for a significance assessment of these past Aboriginal activities and therefore can contribute towards a risk based impact assessment and development of management and mitigation measures (including the development of recommendations for future archaeological investigations and recordings prior to disturbance).

Table 14: Summary of Relevant Artefact Densities from Past Archaeological Surveys

Reference	Locality	Comments	Results
Kayandel Archaeological Services (2011)	Narrabri Shire	Aboriginal assessment for the proposed extension of Tarrawonga Coal Mine.	Fifty-seven sites identified comprising 11 scared trees, 25 isolated finds and 21 open scatters containing between two and 61 artefacts.
Cupper (2010)	Narrabri Shire	Results of a cultural heritage assessment of the Tarrawonga Coal Mine.	This survey did not encounter any additional items or places of Aboriginal cultural heritage significance.
Insite Heritage (2010)	Narrabri Shire	Result of a cultural heritage assessment for the continuation of Boggabri Coal Mine.	A total of 77 archaeological sites were identified which included artefact scatters, isolated finds and scarred trees.

Reference	Locality	Comments	Results
Archaeological Surveys & Reports (2009)	Narrabri Shire	An Aboriginal Heritage Assessment for Narrabri Coal Mine.	Forty-three sites were recorded comprising one scarred tree, one fireplace, 12 isolated artefacts, 19 sites with five artefacts or less, and nine sites that contained more than five artefacts. Of these, only seven sites contained 10 or more artefacts, and only one was believed to contain more than 100 artefacts.
Archaeological Surveys & Reports (2005)	Narrabri Shire	Archaeological investigation on the proposed East Boggabri (Tarrawonga) Coal Mine.	Eight Aboriginal sites were identified consisting of one scarred tree, six artefact scatters and an isolated artefact.
Hamm (2005)	Narrabri Shire	Results of a cultural heritage assessment of Boggabri Coal Project.	Identified 60 sites including 30 artefact scatters, 26 isolated finds and four scarred trees.

Source: Kayandel (2011).

9.2 ABORIGINAL CULTURAL LANDSCAPE

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

9.2.1 Summary of the Archaeological Record

The material culture of past Aboriginal occupants of the Project area comprises 25 scatters of stone artefacts, one containing axe-grinding grooves, and 15 isolated finds of stone artefacts.

Artefact assemblages are generally small in size ranging from single artefacts to 67 artefacts discovered in one scatter. The majority of sites were located at the proposed mine site and were associated with the open plains and the banks of ephemeral streams or drainage lines. Lower artefact densities occurred along the ridge top and upper slope areas.

Lithics were generally sourced from locally available raw materials such as mudstone, silcrete, quartz, quartzite, tuff and chert. Most were cores and waste flakes and flaked pieces from knapping. Formal implements were not prevalent.

9.2.2 Aboriginal Settlement Patterns

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

The Aboriginal archaeological sites identified during the survey are within a few kilometres of the Namoi River, a semi-permanent watercourse that would have retained surface water in ponds (waterholes) even during drought.

Axe-grinding grooves, which for example were re-identified on a sandstone outcrop west of the Project mining area (AHIMS site number 20-4-0009), are usually found close to water. This is because when abrading axe-heads Aboriginal people often sprinkled water on the sandstone to make it more abrasive and to reduce dust (Archaeological Surveys & Reports, 2004). Past Aboriginal people of the Project area would have used water from the Namoi River for this purpose.

9.2.3 Aboriginal Subsistence Strategies

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

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

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

It is probable that the Aborigines who occupied the Project area were hunter-fisher-gatherers employing both foraging and collecting subsistence strategies. These people would have primarily occupied the riparian zone of the Namoi River, for example manufacturing stone axes at the axe-grinding groove site (AHIMS site number 20-4-0009), dispersing from the riverine corridor to exploit ephemeral resources of the drier hinterland during favourable climatic conditions, as invoked in the subsistence model of O'Rourke (1997).

Only small areas were investigated in a heterogeneous landscape, but it is probable that the archaeological record reflects the occupation of the Namoi River corridor and its drier, immediate hinterland by both larger, family groups and smaller, mobile bands.

The archaeology of the Project area probably mainly derives from temporary sites used by small groups or individuals. The small number and density of stone artefacts, paucity of formal implement types, suggests that Aboriginal people only visited or occupied most of the cultural heritage places for brief periods on an intermittent basis.

10 ABORIGINAL CULTURAL HERITAGE VALUES

10.1 BACKGROUND

All Aboriginal objects are afforded protection under the NP&W Act, but decisions about appropriate management of individual cultural heritage items or sites are usually based on their assessed significance (archaeological and cultural) as well as the likely impact of the proposed development and the benefits of the development. The *Guide to investigating, assessing and reporting on Aboriginal cultural heritage in NSW* (OEH, 2011) and *Code of Practice for Archaeological Investigation of Aboriginal Objects in NSW* (DECCW, 2010b) requires significance assessment in accordance with the processes set out in the Burra Charter (Australia ICOMOS, 1988, 1999).

The process of significance assessment has received considerable attention since the early 1980s and criteria for assessing these values have been developed and adapted to deal specifically with Aboriginal cultural heritage. The significance of Aboriginal archaeological sites such as those found during this study are usually assessed in terms of their importance to archaeologists (i.e. their scientific or research significance), their importance to contemporary Aboriginal people and their importance to the general public. Once the significance of a site has been assessed it can be ranked against others and specific recommendations formulated. Criteria for assessing scientific significance are set out below.

Under the Burra Charter (Australia ICOMOS, 1988, 1999), cultural significance means aesthetic, historic, scientific, or social value for past, present or future generations. Cultural significance is a concept that helps in estimating the value of places. The places that are likely to be of significance are those that help an understanding of the past, enrich the present, and may be of value to future generations. Cultural significance is embodied in the place itself, its "*fabric, setting, use, associations, meanings*, records, *related places* and *related objects*" (Australia ICOMOS, 1999). The components of significance - aesthetic, historic, scientific, social and spiritual - are described below.

Aesthetic value includes aspects of sensory perception for which criteria can and should be stated. Such criteria may include consideration of the form, scale, colour, texture and material of the fabric, the smells and sounds associated with the place and its use (Australia ICOMOS, 1988).

A place may have historic value because it has influenced, or has been influenced by, a historic figure, event, phase or activity. It may also have historic value as the site of an important event. For any given place the significance will be greater where evidence of the association or event survives in-situ, or where the settings are substantially intact, than where it has been changed or evidence does not survive. However, some events or associations may be so important that the place retains significance regardless of subsequent treatment (Australia ICOMOS, 1988).

The scientific or research value of a place will depend on the importance of the data involved, on its rarity, quality (integrity) or representativeness, and on the degree to which the place may contribute further substantial information (Australia ICOMOS, 1988). Scientific or archaeological significance may be assessed by placing a site, feature or landscape in a broader regional context and by assessing its individual merits in the context of current archaeological discourse.

Social value is broadly defined as *the qualities for which a place has become a focus of spiritual, political, natural or other cultural sentimental to a majority or minority group* (Australia ICOMOS, 1988: 30). Johnston (1994) explains *"Social value is about collective attachment to places that embody meaning important to a community, these places are usually community owned or publicly accessible or in some other way "appropriated into people's daily lives. Such meanings are in addition to other values, such as the evidence of valued aspects of history or beauty, and these meanings may not be apparent in the fabric of the place, and may not be apparent to the disinterested observer"* (Johnston, 1994: 10).

Although encompassed within the criterion of social value, the spiritual value of a place was added to The Burra Charter in 1999 (Australia ICOMOS, 1999: 1). Spiritual value is predominantly used to assess places of cultural significance to Aboriginal Australians.

10.2 ASSESSMENT OF ABORIGINAL CULTURAL HERITAGE SIGNIFICANCE

Aboriginal cultural heritage significance indicates the importance of a site or feature to Aboriginal communities. This category may include sites, items and landscapes that people may have traditional ties with, as well as areas that may have contemporary importance to Aboriginal communities. The perceptions of Aboriginal people on the significance of archaeological sites usually stem from traditional, cultural and educational beliefs although most local Aboriginal communities also value the scientific information that archaeological sites may be able to provide.

Places of cultural value may have social significance to Aboriginal communities, they may have historic value through association with historic themes (e.g. missions or massacres), or they may take on value because of their rarity or because a place may be able to contribute new information about the past. Places may have aesthetic significance, being natural features with symbolic values, dramatic presence or tranquil qualities. Such Aboriginal cultural significance may not be in accord with the interpretations made by archaeologists – a site may have low archaeological significance but high Aboriginal significance, or vice versa (Australia ICOMOS, 1988).

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

The level of significance attributed to individual sites may vary according to a number of factors including the nature and integrity of the heritage items and the landscape in which the site is located. The views of the Aboriginal representatives on the cultural significance of recorded sites were sought during the field survey, community field inspections, discussion forums and review of the draft report. The views documented below area based on feedback received from representatives of the registered Aboriginal parties and may not reflect the views of the Aboriginal community as a whole.

A number of Aboriginal representatives expressed concern about developments that might impact upon Aboriginal heritage and other values on land that is traditionally theirs. All land has high cultural significance for Aboriginal people. It should also be noted that development upon, or disturbance of land is often contrary to principal Aboriginal beliefs regarding land, its values and its inherent cultural significance.

A number of Aboriginal community representatives involved in the study identified the Project area as a place that Aboriginal people had occupied in the past. Comments received regarding the cultural significance of the Project area from the registered Aboriginal parties are documented in the Aboriginal consultation log (Appendix 2), provided in full in the written correspondence received from the Aboriginal parties (Appendix 4), and quoted in Section 4.2.2.

Generally, the Aboriginal representatives viewed all the archaeological sites as significant because they preserve a record of how and where people lived in the past. Such cultural heritage sites also stand as testimony to the continuation of Aboriginal culture and association with the land.

The Namoi River and its adjacent plains are also of cultural significance to the Aboriginal representatives. Several of the Aboriginal community members involved in the assessment advised that the riverine environs have special significance to the Aboriginal community. Local Aboriginal people previously and still visit the Namoi River for significant social events including meetings, fishing, mussel collecting and family outings.

10.3 ASSESSMENT OF SCIENTIFIC SIGNIFICANCE

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

10.3.1 Site Integrity

Site integrity refers to its state of preservation or condition. A site can be disturbed through a number of factors including natural erosional processes, destructive land use practices or repeated use of a site in the past by both humans and animals. Sites or landscapes in good physical condition are generally able to provide information on spatial relationships between (for example) stone artefacts, other remains, chronological units if present, and landscape settings:

- The connectedness of individual sites or landscapes – is the content, site or landscape part of a complex of related sites or landscapes?
- The potential of a site or landscape to provide a relative or absolute chronology extending back into the past, i.e. stratified sequences of cultural materials and/or dateable materials such as organic remains (radiocarbon dating), or sealed or cultural deposits (optical or thermoluminescence).
- The ability of the site or landscape to provide a large sample size (large numbers of stone artefacts, art motifs, grinding grooves etc) about which statistically significant statements can be made.

Assessment values for site integrity are set out below:

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

In terms of site integrity the sites located during this survey would rate moderate to low. This assessment is based on the degree of disturbance noted during the investigation. The stone artefact scatters, isolated finds of stone artefacts and axe-grinding grooves were typically identified in modified contexts within cleared areas, particularly in places with past earthworks such as along graded contour banks, roads and fencelines. They have also been disturbed by repeated ploughed cultivation, traffic of hooved animals and vehicles, coupled with erosion by wind and water.

10.3.2 Site Structure

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

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

The shallow and stony soils over almost all of the Project mining area, coupled with the degree of past disturbance from land clearing and soil stripping for pastoralism, agriculture and mining, means that *in situ* subsurface cultural deposits are improbable. Poor stratigraphic integrity is similarly expected on the floodplain of the Namoi River as flooding (and subsequent erosion and deposition processes) would have resulted in disruption of the cultural sequence. The potential for significant sub-surface deposits that provide intact chronological sequences is assessed to be low based on the soil profiles within the extent of the site. Artefacts generally form a lag deposit on scalded surfaces. The surfaces of all these sites are degrading.

The isolated finds rate low according to the site structure criterion. Most of the stone artefact scatters are also small in size and have a low site structure. The axe-grinding grooves rate moderate.

10.3.3 Site Contents

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

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

The original cultural materials of the sites recorded during the survey have been exposed to weathering. Only stone artefacts and axe-grinding grooves remain at the open sites, with no organic materials preserved. Stone artefacts are mainly of mudstone, although silcrete, quartz, quartzite, volcanic and chert artefacts were also recorded. Formal tool types are not prevalent, but include scrapers. The stone artefact assemblage is dominated by unmodified flakes and cores. Artefact density at these sites is typically relatively low.

Most of the stone artefact and axe-grinding groove sites rate low to moderate by the site contents criterion. They could be useful for studies of human subsistence strategies.

10.3.4 Site Representativeness and Rarity

Representativeness or rarity refers to how often a particular site type occurs in an area and requires some knowledge of the background archaeology of the area in which the study is being undertaken. Sites that are representative of the local and regional archaeological record may have value for that reason and if a site is rare or unique in some way then it is *ipso facto* significant (Bowdler, 1983). Whether items are of rare or common forms will depend to some extent on the variables used to distinguish them. Open sites, for example, may be distinguished from grinding grooves or scarred trees according to the general type of evidence present (e.g. stone artefacts distinguishable from trees with marks or grooves on rock platforms). To assess rarity and representativeness site type can be used initially, then this category subdivided until a satisfactory level of (dis)similarity is achieved. Within the general group " stone artefact scatters", sites may be distinguished according to other variables, such as their content, or their landscape setting. Technically, an assessment of representativeness should identify both what is typical or common as well as what is rare.

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

On the basis of the results of previous archaeological investigations (e.g. Purcell, 2000, 2002) and information held on the OEH AHIMS site register it is clear that stone artefact scatters and isolated finds of stone artefacts are widespread in the region. Axe-grinding grooves are also relatively abundant where suitable rock outcrops near water exist. These types of archaeological sites located during this study are therefore not unique and are well represented outside the Project area.

10.3.5 Educational Value

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

10.4 AESTHETIC SIGNIFICANCE

Aesthetic significance relates to the scale, form, materials, texture, colour, space and relationship of the components of the place. The relationship of the place with its setting is equally important.

The stone artefact scatters are subdued features in the landscape and lack high aesthetic value. The outcrop containing the axe-grinding grooves is also not prominent and is often underwater. The aesthetic significance of the cultural heritage sites mainly relates to their setting along the Namoi River corridor.

10.5 HISTORIC SIGNIFICANCE

A place may have historic value because it has influenced, or has been influenced by, an historic figure, event, phase or activity. It may also have historic value as the site of an important event. For any given place the significance will be greater where evidence of the association or event survives in situ, or where the settings are substantially intact, than where it has been changed or evidence does not survive. However, some events or associations may be so important that the place retains significance regardless of subsequent treatment (Australia ICOMOS, 1988).

The historic value of the Aboriginal archaeological sites in the Project area largely stems from their importance in providing evidence of Aboriginal peoples' association with the area. It is within a region that was occupied by the Kamilaroi tribal group at the time of first contact with Europeans (Mitchell, 1839). Archaeological and ethno-historical sources show that past Aboriginal people frequented specific places within the region such as the stone artefact scatter and grinding-groove sites in the Project area for habitation or to manufacture lithic implements (e.g. see O'Rourke, 1997)

10.6 SUMMARY OF ARCHAEOLOGICAL SIGNIFICANCE

The following significance assessment is based on the scientific or research value and is not based on the insight of Aboriginal people for their cultural significance assessment of these sites. The registered Aboriginal parties have been requested to provide comment on the cultural significance of the Project area and the recorded sites throughout the consultation process (Section 10.2). The Project area has the potential to provide archaeological information as it contains stone artefact scatters and isolated finds. The overall Project area is assessed as containing low to moderate significance due to the number of sites present and the way in which this information contributes to the nature of Aboriginal land use in the region. Table 15 provides significance ratings for known Aboriginal sites within the Project area.

Table 15: Significance Ratings for Recorded Sites

Site Name	Site Code (refer Figures 4 and 5)	Significance Rating for Individual Criterion				Overall Archaeological Significance Rating (Local)[1]
		Scientific	Aesthetic	Social	Historical	
Concentrations of Aboriginal Objects – Project Mining Area						
VCP-OS-001	OS-1	Moderate	Low	Low	Low	Low-Moderate
VCP-OS-009	OS-2	Low	Low	Low	Low	Low
VCP-OS-011	OS-3	Moderate	Low	Low	Low	Low-Moderate
VCP-OS-014	OS-4	Low	Low	Low	Low	Low
VCP-OS-021	OS-5	Moderate	Low	Low	Low	Low-Moderate
VCP-OS-036	OS-6	Low	Low	Low	Low	Low
20-4-0009	20-4-0009	Moderate	Moderate	Moderate	Low	Moderate
VCP-OS-046	OS-7	Moderate	Low	Low	Low	Low-Moderate
VCP-OS-049	OS-8	Moderate	Low	Low	Low	Low-Moderate
VCP-OS-051	OS-9	Low	Low	Low	Low	Low
VCP-OS-055	OS-10	Low	Low	Low	Low	Low
VCP-OS-056	OS-11	Moderate	Low	Low	Low	Low-Moderate
VCP-OS-057	OS-12	Low	Low	Low	Low	Low
VCP-OS-058	OS-13	Low	Low	Low	Low	Low
20-4-0065	20-4-0065	Moderate	Low	Low	Low	Low-Moderate
16-4-0002	16-4-0002	Moderate	Low	Low	Low	Low-Moderate
20-4-0014	20-4-0014	Moderate	Low	Low	Low	Low-Moderate
VCP-OS-067	OS-14	Low	Low	Low	Low	Low
VCP-OS-069	OS-15	Low	Low	Low	Low	Low
Concentrations of Aboriginal Objects – Haul Road and Overpass Area						
NR-OS-001	OS-16	Low	Low	Low	Low	Low
NR-OS-002	OS-17	Low	Low	Low	Low	Low
NR-OS-003	OS-18	Low	Low	Low	Low	Low
NR-OS-004	OS-19	Low	Low	Low	Low	Low
20-4-0037	20-4-0037	Moderate	Low	Low	Low	Low-Moderate
NR-OS-006	OS-20	Moderate	Low	Low	Low	Low-Moderate
Isolated Finds of Aboriginal Objects – Project Mining Area						
VCP-IF-010	IF-1	Low	Low	Low	Low	Low
VCP-IF-014	IF-2	Low	Low	Low	Low	Low
VCP-IF-017	IF-3	Low	Low	Low	Low	Low
VCP-IF-018	IF-4	Low	Low	Low	Low	Low
VCP-IF-034	IF-5	Low	Low	Low	Low	Low
VCP-IF-040	IF-6	Low	Low	Low	Low	Low
VCP-IF-043	IF-7	Low	Low	Low	Low	Low
VCP-IF-055	IF-8	Low	Low	Low	Low	Low
VCP-IF-060	IF-9	Low	Low	Low	Low	Low
VCP-IF-070	IF-10	Low	Low	Low	Low	Low
VCP-IF-090	IF-11	Low	Low	Low	Low	Low
VCP-IF-095	IF-12	Low	Low	Low	Low	Low
VCP-IF-109	IF-13	Low	Low	Low	Low	Low
VCP-OS-007	IF-14	Low	Low	Low	Low	Low
VCP-OS-008	IF-15	Low	Low	Low	Low	Low

[1] Archaeological significance ratings are provided on a local scale. These ratings would be reduced if assessed on a regional scale.

11 IMPACT ASSESSMENT

In accordance with the *Guide to investigating, assessing and reporting on Aboriginal cultural heritage in NSW* (OEH, 2011), the principles of ecologically sustainable development (ESD) were considered in assessing the likely harm of the Project to Aboriginal objects

The Project could potentially directly and indirectly impact the Aboriginal cultural heritage of the Project area. Potential negative direct and indirect impacts may result from the proposed open cut, out-of-pit waste emplacements and ancillary infrastructure and could include the destruction of the sites via earthworks, burial by spoil or indirect physical affects (e.g. dust deposition) or aesthetic affects.

11.1 POTENTIAL DIRECT IMPACTS

The mining operation would disturb the current land surface and could directly impact archaeological material associated with the affected landforms and its landscape context. The Project would result in the direct disturbance of approximately 2,241 ha of land.

Such impacts on archaeological values typically fall into three categories:

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

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

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

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

11.2 POTENTIAL INDIRECT IMPACTS

In areas where the proposed works for the Project would not involve significant earthmoving, impacts may be limited to minor surface disturbance, limited disturbance of the associated substrates or landforms and no significant alteration of the landscape context.

Potential indirect impacts to archaeological sites could include the following:

- deposition of dust generated by mining;
- accidental disturbance by peripheral activities; and,
- inappropriate visitation including the unauthorized removal of Aboriginal objects.

11.3 CULTURAL HERITAGE POTENTIALLY IMPACTED BY THE PROJECT

Forty Aboriginal cultural heritage sites comprising 25 stone artefact scatters and 15 isolated finds of stone artefacts have been identified during the field surveys of the proposed Project area. The impact of the Project on these sites is determined by the development of the Vickery Coal Mine and the degree of harm this will cause. The type of harm defined in this assessment is direct and therefore the consequence of harm is a total or a partial loss in value. A total loss in value would occur when the entire site is impacted by the Project. A partial loss of value would occur when only part of the site (such as in the case of an artefact scatter) is impacted by the Project.

The Project would result in a total loss of value for 24 known sites and a partial loss of value for a further eight known sites (Table 16). Eight known sites would not be directly impacted by the Project (Table 16).

Six sites are located in close proximity to the proposed waste emplacements, open-cut or road realignments. To be conservative these sites have been assessed in this report as being impacted. Subject to final post approval engineering designs, it is possible that these sites may not be impacted.

Disturbance associated with the haul road and overpass area would be limited to surface and near surface material as construction would not require substantial sub-surface disturbance. In these areas, impacts to sites would be limited to surface artefacts with avoidance of substantial disturbance to sub-surface deposits, if present.

The grinding grooves at Site 20-4-0009 would not be directly impacted (i.e. subject to surface disturbance) by the Project. However, the rock platform on which the grinding grooves are located may be susceptible to damage from blast vibration. Wilkinson Murray has undertaken a noise and blasting assessment for the Project. As part of the blast assessment for the Project, Wilkinson Murray has calculated that the vibration levels at the grinding grooves would be less than 5 millimetres per second (mm/second) over the entire life of the Project (Wilkinson Murray, 2012). In the absence of a regulatory criteria in Australia for assessing vibration impacts to archaeological features, Wilkinson Murray have used the Australian Standard 2187.2-2006 criteria of 10 mm/second above which structural damage to a building may possibly occur. Based on the vibration levels predicted at the grinding groove site (i.e. less than 5 mm/second), Wilkinson Murray have concluded that no vibration-induced damage will occur at the grinding groove site.

Blast vibration monitoring would be undertaken as part of the Project and would be detailed in the Blast Management Plan. Blast monitoring would be undertaken at potentially sensitive receptors located around the mine site. The grinding groove site would be considered as a potential monitoring location. Notwithstanding the results of the blast monitoring would be used to calibrate the blast vibration predictions at the grinding groove site.

Table 16: Impacts on Recorded Sites

Site Number	Site Code (refer Figures 4 and 5)	Type of Harm	Degree and Consequence of Harm
Concentrations of Aboriginal Objects – Project Mining Area			
VCP-OS-001	OS-1	Direct	Total loss of value
VCP-OS-009	OS-2	Direct (Partial)	Partial loss of value
VCP-OS-011	OS-3	Nil	No loss of value
VCP-OS-014	OS-4	Direct (Partial)	Partial loss of value
VCP-OS-021	OS-5	Nil	No loss of value
VCP-OS-036	OS-6	Direct	Total loss of value
20-4-0009	20-4-0009	Direct (Partial)	Partial loss of value
VCP-OS-046	OS-7	Direct	Total loss of value
VCP-OS-049	OS-8	Direct (Partial)	Partial loss of value
VCP-OS-051	OS-9	Direct	Total loss of value
VCP-OS-055	OS-10	Direct	Total loss of value

Site Number	Site Code (refer Figures 4 and 5)	Type of Harm	Degree and Consequence of Harm
VCP-OS-056	OS-11	Direct	Total loss of value
VCP-OS-057	OS-12	Direct	Total loss of value
VCP-OS-058	OS-13	Direct	Total loss of value
20-4-0065	20-4-0065	Direct	Total loss of value
16-4-0002	16-4-0002	Direct	Total loss of value
20-4-0014	20-4-0014	Direct	Total loss of value
VCP-OS-067	OS-14	Direct	Total loss of value
VCP-OS-069	OS-15	Direct	Total loss of value
Concentrations of Aboriginal Objects – Haul Road and Overpass Area			
NR-OS-001	OS-16	Direct (Partial)	Partial loss of value
NR-OS-002	OS-17	Nil	No loss of value
NR-OS-003	OS-18	Direct (Partial)	Partial loss of value
NR-OS-004	OS-19	Nil	No loss of value
20-4-0037	20-4-0037	Direct (Partial)	Partial loss of value
NR-OS-006	OS-20	Direct (Partial)	Partial loss of value
Isolated Finds of Aboriginal Objects – Project Mining Area			
VCP-IF-010	IF-1	Nil	No loss of value
VCP-IF-014	IF-2	Nil	No loss of value
VCP-IF-017	IF-3	Direct	Total loss of value
VCP-IF-018	IF-4	Direct	Total loss of value
VCP-IF-034	IF-5	Direct	Total loss of value
VCP-IF-040	IF-6	Direct	Total loss of value
VCP-IF-043	IF-7	Direct	Total loss of value
VCP-IF-055	IF-8	Direct	Total loss of value
VCP-IF-060	IF-9	Direct	Total loss of value
VCP-IF-070	IF-10	Direct	Total loss of value
VCP-IF-090	IF-11	Direct	Total loss of value
VCP-IF-095	IF-12	Direct	Total loss of value
VCP-IF-109	IF-13	Direct	Total loss of value
VCP-OS-007	IF-14	Nil	No loss of value
VCP-OS-008	IF-15	Nil	No loss of value

11.4 POTENTIAL FOR PREVIOUSLY UNIDENTIFIED ABORIGINAL CULTURAL HERITAGE TO OCCUR IN THE PROJECT AREA

All of the Project area was inspected for cultural heritage sites during the field surveys. It is possible that some archaeology was obscured by grass or soil. Such previously unidentified features, should they occur, would probably be additional isolated finds or low-density concentrations of stone artefacts (based on the predictive model outlined in Section 7.1 and informed by the results of the current survey, summarized in Sections 8.3 and 9.1).

Further sites of a type or significance not previously encountered in the Project area are improbable. This is partly attributable to the degree of land surface modification that has occurred since European settlement, as such past disturbance associated with pastoralism, agriculture and coal mining may have obliterated many archaeological features, had they occurred previously. For example, previous tree clearing and land levelling could have destroyed scarred trees and earthen features such as mounds and hearths and stone arrangements including ceremonial rings. Shell middens were not encountered because they primarily occur within 100 m of sources of permanent freshwater. Aboriginal stone quarry sites and other stone features such as rock shelters and rock art sites are also definitely not represented in the Project area as suitable rock outcrop is lacking.

The shallow and stony soils of the gently undulating higher and lower slopes that comprise almost all of the Project mining area, coupled with the degree of past disturbance from land clearing and soil stripping for pastoralism, agriculture and mining, means that *in situ* subsurface cultural deposits are improbable. Poor stratigraphic integrity is similarly expected on the floodplain of the Namoi River as flooding (and subsequent erosion and deposition processes) would have resulted in disruption of the cultural sequence. Artefacts comprising the stone assemblage sites in the Project area generally form a lag deposit on eroded land surfaces, which are still degrading.

The Project area does not contain culturally sensitive landforms such as lunettes or source-bordering sand dunes where subsurface Aboriginal cultural deposits (e.g. burials) have been recorded previously.

A strategy for managing any newly identified Aboriginal objects during the life of the project is outlined in Section 12.3.1.

11.5 POTENTIAL CUMULATIVE IMPACTS OF THE PROJECT

Considering the nature and scale of previous and ongoing land disturbance processes in the region, predominately due to past pastoral, agricultural and mining activities; the nature and extent of identified Aboriginal heritage sites and archaeological potential in the Project area and the nature and scale of impacts associated with the Project; it is considered that the Project would not substantially increase cumulative impacts to Aboriginal heritage in the region.

11.6 FLEXIBILITY OF THE PROJECT DESIGN

The locations of the proposed mine components associated with the Project are currently within their optimum design locations, having already been reduced in footprint to minimise disturbance to alluvium, drainage lines and threatened ecological communities, offering limited additional opportunity to avoid the cultural heritage sites within these areas.

12 MANAGEMENT STRATEGIES FOR CULTURAL HERITAGE

12.1 INTRODUCTION

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

Based on the known and predicted Aboriginal heritage values within the Project area, it is concluded that impacts to Aboriginal heritage as a result of the Project can be effectively managed or mitigated through the following actions and strategies. A Heritage Management Plan would be developed for the Project in consultation with the Aboriginal community and the OEH to define, develop and formalise the management and mitigation measures described in Sections 12.2, 12.3 and 12.4. The Heritage Management Plan would be developed prior to any Project related works that would harm Aboriginal cultural heritage sites.

The measures presented below are considered best practice in the mining industry. Their effectiveness and reliability is demonstrated by their continued use and inclusion in management plans and strategies developed in consultation with the Aboriginal community and to the satisfaction of government departments.

12.2 MANAGEMENT OF CULTURAL HERITAGE WITHIN THE DISTURBANCE AREAS

The location of the proposed mine components, which would disturb the Aboriginal cultural heritage sites, are relatively inflexible, as they have already been optimised based on environmental constraints/considerations. Engineering and resource constraints mean that these mine components cannot be relocated away from the cultural heritage sites to avoid disturbance. Additionally, any such relocation would not remove threats to the sites from indirect disturbance.

This assessment has concluded that the Aboriginal cultural heritage sites are not of high scientific significance and do not have high social or cultural value (Section 10). Representatives of the registered Aboriginal parties visited the cultural heritage sites, where options for their management were discussed.

Based on the results of these discussions with representatives of the registered Aboriginal parties, it is recommended that the following measures be undertaken to manage the impact of surface disturbance on Aboriginal heritage sites within the Project area:

- Whitehaven maintains a record of known Aboriginal heritage sites and marks these sites on site plans and relevant Project documentation and implement a protocol for surface works to reduce the risk of accidental damage to known sites.
- Where practicable, known Aboriginal heritage sites be avoided during Project construction and operation works.
- The location of known Aboriginal heritage sites be considered during final detailed engineering designs of the road realignments and ancillary infrastructure such as pipelines.
- Where avoidance of known Aboriginal heritage sites is not practicable, site(s) are subject to baseline recording in consultation with representatives of the Aboriginal community prior to disturbance and artefacts salvaged for safekeeping in consultation with the Aboriginal community.

It is anticipated that the Aboriginal community would provide advice on the storage of collected artefacts and management of artefacts at the completion of Project activities (e.g. artefact replacement onto the post-mining landscape).

12.3 GENERAL RECOMMENDATIONS

12.3.1 Introduction

It is recommended that the following general approach be taken to manage Aboriginal cultural heritage during the life of the Project:

- Ongoing consultation with the Aboriginal community over the life of the Project. Appropriate Aboriginal representation during archaeological fieldwork (e.g. collection of artefacts prior to disturbance).
- Whitehaven to provide opportunities for Aboriginal community members to access known Aboriginal sites located on Whitehaven owned land (e.g. for cultural reasons or as part of scheduled field activities) in accordance with Occupational Health and Safety requirements.
- Erosion and sediment control works be undertaken in accordance with the requirements of the Project Approval and in consideration of other Aboriginal cultural heritage management measures.
- Any new Aboriginal heritage sites identified during the development of the Project be registered with the OEH in consultation with the Aboriginal community.
- A record of known Aboriginal heritage sites, their status and location be maintained by Whitehaven.

12.3.2 Heritage Management Plan

The optimal means of coordinating and implementing the proposed management strategies is to integrate them into a single programme and document in the form of a Heritage Management Plan (HMP). The HMP would reflect the proposed management of the cultural heritage sites within the Project area. The HMP would cover all relevant actions and requirements to be conducted at the Project area. The HMP will remain active for the life of the Project and define the tasks, scope and conduct of all Aboriginal cultural heritage management activities.

12.3.3 Role of the Local Aboriginal Community

Whitehaven is committed to involving the local Aboriginal community as an integral participant in the management of Aboriginal cultural heritage values in the Project area. The strategies outlined in this report have incorporated the views of community representatives and the HMP should be drafted in consultation with the registered Aboriginal parties (Section 4.2.1).

The recording, collection, curation, storage and replacement of salvaged Aboriginal objects would occur with the invited participation of local Aboriginal community representatives.

12.3.4 Site Management and Cultural Awareness Training

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

It is proposed to provide training to all on-site personnel regarding the Aboriginal Cultural Heritage Management Plan strategies relevant to their employment tasks.

12.4 SUMMARY RECOMMENDATIONS

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

- Whitehaven arrange to salvage the Aboriginal objects at the 32 Aboriginal cultural heritage sites located within the mine and ancillary infrastructure disturbance areas. A suitably qualified archaeologist and representatives of the local Aboriginal community should be engaged to record and collect the Aboriginal objects. These items should be properly curated and stored in a "Keeping Place" at the Red Chief Local Aboriginal Land Council office. Following the relinquishment of the mining lease for the mine, artefacts should be replaced within rehabilitated areas in consultation with local Aboriginal groups and the OEH.
- In the unlikely event that human skeletal remains are encountered during the course of the development associated with the Project, all work with the potential to impact the remains must cease. Remains must not be handled or otherwise disturbed except to prevent further disturbance. If the remains are thought to be less than 100 years old the Police or the State Coroner's Office (tel: 02 9552 4066) must be notified. If there is reason to suspect that the skeletal remains are more than 100 years old and Aboriginal, Whitehaven should contact the OEH's Environmental Line (tel: 131 555) for advice. In the unlikely event that an Aboriginal burial is encountered, strategies for its management would need to be developed with the involvement of the local Aboriginal community.
- Whitehaven should coordinate and implement these proposed management strategies by integrating them into a single programme and document in the form of an HMP. The HMP should remain active for the life of the Project and define the tasks, scope and conduct of all Aboriginal cultural heritage management activities. The HMP should be developed in consultation with the registered Aboriginal parties.
- Whitehaven should provide training to all on-site personnel regarding the HMP strategies relevant to their employment tasks.
- Whitehaven should continue to involve the registered Aboriginal parties and any other relevant Aboriginal community groups or members in matters pertaining to the Project. In particular, the recording, collection, curation, storage and replacement of Aboriginal objects should occur with the invited participation of local Aboriginal community representatives.

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