



APPENDIX G

ABORIGINAL CULTURAL HERITAGE ASSESSMENT

**WILPINJONG COAL MINE, CENTRAL TABLELANDS
OF NEW SOUTH WALES – EXTENSION PROJECT:
ABORIGINAL CULTURAL HERITAGE ASSESSMENT**

A report to

Wilpinjong Coal Pty Limited

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by

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EXECUTIVE SUMMARY

The Wilpinjong Coal Mine is an existing open-cut coal mining operation situated approximately 40 kilometres north-east of Mudgee, within the Mid-Western Regional Council Local Government Area, in the Central Tablelands of New South Wales. The Wilpinjong Coal Mine is owned and operated by Wilpinjong Coal Pty Limited (WCPL), a wholly owned subsidiary of Peabody Energy Australia Pty Limited.

The Wilpinjong Coal Mine was approved under Part 3A of the NSW *Environmental Planning and Assessment Act 1979* (EP&A Act) in February 2006 (Project Approval 05-0021).

WCPL plans to seek approval from the Minister for Planning under Division 4.1 of Part 4 the EP&A Act for proposed extensions to the Wilpinjong Coal Mine mining operations and development of associated supporting infrastructure and facilities. Referred to as the "Extension Project", the main activities would include open cut pit extensions and a new pit, ancillary development and infrastructure.

This report has been prepared by South East Archaeology for WCPL to address the potential impacts of the proposed Extension Project on Aboriginal cultural heritage.

Essentially, the additional development associated with the Extension Project can be categorised within three zones that relate to the potential nature and extent of impacts:

- ❑ Zone 1 (Open Cut Extensions): Areas totalling approximately 798 hectares in which extensions to the open cut pits are proposed (outside of existing approved development areas);
- ❑ Zone 2 (General Ancillary Development and Infrastructure Extensions): An area of approximately 477 hectares outside of the open cut pit limit in which land disturbance for ancillary mining infrastructure and relocation of public infrastructure may occur (such as relocation of public roads, electricity transmission lines and services, water management structures and dams, highwall drilling clearance area, pipelines, access roads, hauls roads and mining support services and ancillary facilities), noting that direct impacts are expected to be confined to approximately 50% of this total area; and
- ❑ Zone 3 (Other Ancillary Development): An area encompassing the extent of the Development Application area, excluding Zones 1 and 2, in which additional ancillary land disturbance may occur as subsequently identified during detailed design (including post-approval), such as from water management infrastructure, access tracks, environmental monitoring equipment, telecommunications and minor ancillary infrastructure. Excluding Zones 1 and 2, the area of Zone 3 is approximately 4,416 hectares. If the approved Open Cut and Contained Infrastructure Area (which has largely been developed) is also excluded, the area of Zone 3 is approximately 2,425 hectares.

The heritage investigation area (for detailed assessment) comprises Zones 1 and 2, which involves nine spatially separate areas fringing the existing approved development area and the Slate Gully extension area to the east in EL 7091. The total area of Zones 1 and 2 measures 1,275 hectares (12.75 square kilometres).

The investigation proceeded with reference to standard Department of Planning and Environment (DP&E) and Office of Environment and Heritage (OEH) policies, including the 2005 *Guidelines for Aboriginal Cultural Heritage Assessment and Community Consultation*, 2011 *Guide to Investigating, Assessing and Reporting on Aboriginal Cultural Heritage in NSW* and 2010 *Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales*.

Consultation was undertaken with the Aboriginal community in accordance with the OEH policy entitled *Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010*.

A comprehensive field survey sampling almost the entire 1,275 hectare investigation area (for detailed assessment) was undertaken by South East Archaeology over 17 days between March and June 2014, assisted on every day by representatives of the registered Aboriginal parties.

At the conclusion of the survey, a total of 293 Aboriginal sites or Potential Archaeological Deposits (PADs) are known to occur directly within or immediately adjacent to the Extension Project investigation area (development Zones 1 and 2), primarily open artefact sites and rock shelters with PADs. Contemporary cultural values associated with the investigation area have also been identified by the registered Aboriginal parties, including:

- ❑ In general terms, the use of subsistence or other resources;
- ❑ In general terms, the traditional use of the area by north-eastern Wiradjuri people, and an ongoing cultural and spiritual connection to the land and resources of the study area by the north-eastern Wiradjuri; and
- ❑ In 'Area G', the hill with extensive rock formations situated in the valley floor of Slate Gully.

The significance of the Aboriginal heritage evidence was assessed. It is noted that all Aboriginal heritage is of interest and contemporary value to the Aboriginal community. Aboriginal heritage evidence represents a tangible link with the traditional past and with the lifestyle and values of community ancestors. Three sites/values (the Slate Gully rocky hill site complex/cultural values, and the rock shelter with artefacts and art, WCP578, and rock shelter with artefacts and ochre quarry, WCP579, on the rocky hill) were assessed as being of high significance within a local context. Three sites were assessed as being of moderate significance within a local context. However, much of the identified evidence was assessed as being of low significance within a local context.

The potential impacts of the proposed Extension Project on each of the Aboriginal sites and cultural areas/values within or immediately adjacent to the investigation area for detailed assessment (Zones 1 and 2) has been assessed. The level of impacts will be reduced to some extent by the implementation of various mitigation measures and management strategies. Impacts will vary substantially between the three 'development Zones':

- ❑ In Zone 1, impacts will be total and substantial across a development impact area of approximately eight square kilometres, including to any Aboriginal sites or cultural values within this zone;
- ❑ In Zone 2, impacts will be total within an estimated 50% of this approximately 4.8 square kilometre development zone, but prior to detailed design, the specific impacts on individual Aboriginal sites or cultural values are not currently known with certainty. There is potential within Zone 2 for avoidance of impacts to significant heritage sites and other sites of lower significance, depending on the nature of the infrastructure and/or level of significance. Aboriginal sites within this zone may be subject to total impacts, partial impacts or no impacts; and

- ❑ In Zone 3, the extent of impacts within the area of 4,416 hectares is not known and is subject to future detailed design of ancillary works. Until detailed design occurs, the specific impacts on individual Aboriginal sites will not be known. There is a high potential within Zone 3 for avoidance of impacts to significant heritage sites and other sites of lower significance, depending on the nature of the infrastructure and/or level of significance. Aboriginal sites within this zone may be subject to total impacts, partial impacts or no impacts, but for many sites the probability of impacts is assessed as unlikely.

In overall terms, impacts are expected to occur to approximately 31% of the identified Aboriginal heritage sites and cultural values, while impacts are not expected to occur to 22% of the identified heritage sites, and the remaining 47% of the identified heritage sites may or may not be subject to total or partial impacts, depending upon the detailed design of ancillary infrastructure.

Impacts will occur to a broad area, totalling over ten square kilometres, much of which is of low potential for sub-surface deposits of artefacts that may be of high research value. Within the impact area (development Zones 1 and 2), the potential for other forms of heritage evidence to occur (for example, additional rock shelters, scarred trees, stone arrangements or grinding groove sites), that have not already been identified, is generally very low or negligible (given the comprehensive nature of the survey coverage, the sampling strategy and the typically obtrusive nature of these site types).

However, while a number of open artefact sites, possible scarred trees, waterhole/wells and rock shelters with artefacts and rock shelters with PADs of low heritage significance may be subject to impacts, several cultural values, zones of heritage potential and identified sites of higher heritage significance may also be subject to impacts, particularly:

- ❑ Small portions of development Zones 1 and 2 that are located closer to a third or higher-order watercourse or other areas of possible water retention that may be characterised as being within a secondary resource zone, where there is a moderate or high potential for sub-surface deposits of artefacts to occur, including deposits that may be of research value;
- ❑ The contemporary cultural values identified by the Aboriginal stakeholders, including those associated with the entire investigation area (relating to traditional land use and ongoing cultural and spiritual connections to the land) and the use of subsistence and other resources; and
- ❑ The visually prominent hill with extensive rock formations in the valley floor of Slate Gully, which hosts a rock shelter with artefacts and art (WCP578) of high significance, a rock shelter with artefacts and ochre quarry (WCP579) of high significance, a rock shelter with PAD (WCP580) and a waterhole/well (WCP594), with an artefact scatter (WCP577) at the base. This rocky hill and site complex has also been identified by the registered Aboriginal parties as being of high cultural significance.

In the absence of appropriate management and mitigation measures, it is concluded that the impacts of the proposed Extension Project on Aboriginal heritage would be moderate to low within a local context and low within a regional context. With the implementation of mitigation measures, the impacts will be low within a local context and very low within a regional context.

The following recommendations are made on the basis of legal requirements under the EP&A Act and National Parks and Wildlife (NP&W) Act, the results of the investigation and consultation with the registered Aboriginal parties:

- 1) The existing Aboriginal Cultural Heritage Management Plan (ACHMP) for the approved Wilpinjong Coal Mine will be revised to incorporate the following provisions relating to Aboriginal heritage for the Extension Project. These provisions will be formulated in consultation with the registered Aboriginal parties and, subject to DP&E approval, will specify the policies and actions required to manage the potential impacts of the Extension Project on Aboriginal heritage within the Development Application area after approval is granted:
 - a) In order to mitigate the impacts of the Extension Project on scientific and cultural values and to retrieve and conserve samples of the heritage evidence, further investigation and mitigation measures will be implemented prior to any impacts occurring to specified sites, values and areas, including:
 - i) Management strategies for all identified Aboriginal sites and values as listed in Appendix 7 of this report ('Management Strategy - Recommended Strategy' column), guided initially where relevant by a reassessment of potential impacts for sites and areas within Zones 2 and 3 after detailed design plans are finalised;
 - ii) Systematic surface collection of the identified artefact evidence from open artefact sites as specified in Appendix 7, involving procedures outlined in Section 10.2.1 of this report;
 - iii) Test excavation, broad area hand excavation and surface scrapes with localised hand excavation of potential artefact deposits within areas of moderate to high heritage potential listed in Section 10.2.1 of this report if subject to potential development impacts (Survey Areas A9/11/12, A18, A41, B9/13, B15/16, C31/38, G65/97/98/118, G2-6 and H1-3), involving the systematic holistic approach, research aims and questions, sampling strategy, personnel and methods as outlined in Section 10.2.1;
 - iv) Salvage excavation of deposits within the Slate Gully rocky hill sites WCP578 and WCP579, involving the systematic approach, research aims and questions, sampling strategy, personnel and methods as outlined in Section 10.2.2 of this report. Surface collection of the identified artefact evidence, using similar procedures as specified for the open artefact sites, and detailed recording of the ochre quarry evidence and rock art (including by photography and accurate surveying, such as laser-scanning), and where feasible, removal of samples for further analysis (eg. chemical analysis and dating) will also occur;
 - v) Surface collection and salvage excavation of a sample of shelter deposits from sites WCP 118/119, including in areas adjacent to and forward of the driplines, to mitigate impacts and address locally relevant research questions;
 - vi) Archaeological survey of all potential impact areas that have not subject to systematic survey sampling, using the same methodology as for the present investigation, including:
 - The portions totalling approximately three hectares of Zone 2 that were not sampled, if impacts are proposed;
 - The portion of the northern revised alignment of the 330 kV electricity transmission line adjacent to Area H, if impacts are proposed, with all artefact evidence (including sites WCP174 and #36-3-0665) managed in accordance with the procedures specified in Section 10.2.1 and Appendix 7 of this report for sites WCP 457 and 458 and test and salvage excavation zone 'H1-3';

- Within Zone 3, any other potential impact areas that may be defined as detailed design of ancillary works progresses, where significant ground disturbance may be proposed or in which identified sites occur in the immediate vicinity of; and
 - Small portions of the 100 metre zone (from the margin of the Extension Project additional open cut pits) in which blasting impacts may occur, which have not been subject to archaeological survey coverage (minor areas along the western margin of Area B, south-western and south-eastern margins of Area C, western, southern and eastern margins of Area D, and the eastern margin of Area G east of Pit 3) in order to identify if any rock shelter sites are present and allow their management in accordance with procedures specified in the ACHMP;
- vii) Continued monitoring of the rock shelter with art sites WCP 72, 152 and 153 will occur under the approved Project in relation to dust from blasting activities, with the information used to identify the approximate distance from the open cut pits and other sources of mining related dust (such as haul roads) at which rock shelter with art sites may be susceptible to dust impacts. This information will assist to identify any potential zones which may be affected by dust and in which there is potential for rock shelters with art, with targeted surveys undertaken of areas not currently subject to heritage survey sampling. Any shelters identified can be managed in accordance with procedures specified in the ACHMP;
- viii) Verification of the on-ground location of all Kayandel (2006) sites/PADs (in the range WCP 289 - 376), that were reported as occurring within the Extension Project area but could not be identified in or within the immediate vicinity of the reported locations during the present survey, will occur. This will involve inspection of the alternative AMG (AGD) and MGA (GDA) locations and a sufficient radius around each to encompass margins of error that could be expected with a hand-held GPS unit, in order to identify the true site locations, correct the grid references within the WCPL Aboriginal Site Database, record the sites to an appropriate level of detail, assess significance and verify appropriate management strategies in accordance with the options outlined in Appendix 7 based on the refined site locations;
- ix) For any possible scarred trees that may be subject to impacts, verification of the precise location of the trees and nature of the scar and a reassessment of significance will occur. If the assessment determines that an Aboriginal origin for the scar is likely and the tree is of some heritage significance, procedures outlined in the approved ACHMP will be implemented. Unmitigated impact represents an appropriate strategy for all other trees (eg. where it is determined that the scar has probably derived from a non-Aboriginal cause);
- b) All heritage mitigation and monitoring measures undertaken for the Extension Project will be adequately documented with reference to relevant OEH guidelines and consistent with Section 10.2 of this report. Reports will be prepared and provided to relevant stakeholders (such as the DP&E and the OEH and the registered Aboriginal parties) within appropriate timeframes;

- c) All heritage evidence salvaged under the Extension Project will be curated in an appropriate manner, as determined in consultation with the registered Aboriginal parties and the OEH during preparation of the revised ACHMP. If required an application will be made to the OEH under Section 85A of the NP&W Act for the curation of any salvaged items that are removed from any heritage site. Temporary storage of items at locations off the mine site (for example, during analysis and recording) will be allowed;
- d) Where impacts from surface works will be avoided to identified heritage evidence, appropriate site-specific precautionary measures, such as informing relevant staff and contractors of the nature and location of the items and need to avoid impacts, potentially along with temporary protective fencing and signage, will be implemented where relevant for those sites within close proximity of the area of works;
- e) As a general principle, all relevant contractors and staff engaged on the Extension Project who are undertaking tasks on site that may give rise to any interactions with Aboriginal heritage will receive heritage awareness training prior to commencing work on-site. The existing training package for the Wilpinjong Coal Mine will be reviewed in consultation with the registered Aboriginal parties and include, but not be limited to, the presentation of information about the Aboriginal culture and history of the locality, nature of the identified and potential Aboriginal heritage evidence within the Extension Project area, heritage management measures, and legal obligations;
- f) The Aboriginal Site Database established for this project that lists known Aboriginal sites within the WCPL lease area, in both tabular and GIS form, will be updated following the Extension Project approval for the revised approved Development Application area, and will continue to be maintained and regularly updated, with hard copies of information made available to any registered Aboriginal party upon request;
- g) Aboriginal Site Recording Forms will be lodged in a timely manner with the OEH for any previously unrecorded Aboriginal heritage evidence that is identified within the Extension Project area during the course of operations and/or further heritage assessments, and Aboriginal Site Impact Recording Forms will be lodged for any site that is subject to salvage or development impacts;
- h) Provisions will be included to guide the assessment of any future alterations that may be proposed to the mine plan or ancillary works within the Development Application area. This will include an assessment of the potential impacts of any changes on the heritage resource, and formulation of management strategies consistent with procedures outlined in the ACHMP;
- i) Provisions will be included to guide the management of any previously unrecorded Aboriginal heritage sites within the Extension Project area that may be identified during future investigations or works. Management provisions will vary in relation to the nature of any evidence identified, its significance and the nature of the proposed impacts, and may include temporary protection, further investigation, longer-term conservation or avoidance of impacts, mitigation, monitoring or unmitigated impact;
- j) Should any skeletal remains be detected during the course of the Extension Project, work in that location will cease immediately and the finds will be reported to the appropriate authorities, including the Police, the OEH and the registered Aboriginal parties. Subject to the Police requiring no further involvement, the management of any Aboriginal skeletal remains will be determined in consultation with the DP&E, the OEH and the registered Aboriginal parties;

- k) Archaeological investigations will only be undertaken by archaeologists qualified and experienced in Aboriginal heritage, as specified in Section 10.2 of this report, in consultation with and with the involvement of the registered Aboriginal parties, and will occur prior to any development impacts occurring to those specific areas or sites;
 - l) Provisions will be included to ensure that Aboriginal community representatives are permitted access to any identified sites or cultural areas within WCPL controlled Extension Project area land when requested, in consideration of safety and operational requirements at the time;
 - m) The revised ACHMP will be regularly verified to establish that it is functioning as designed (ie. policies adhered to and actions implemented) to the standard required;
 - n) The protocol for the involvement of Aboriginal stakeholders specified in the ACHMP will be updated in consultation with all registered Aboriginal parties;
- 2) Under the terms of the NP&W Act it is an offence to harm or desecrate an object that the person knows is an Aboriginal object, or to harm an Aboriginal object ('strict liability offence'). Therefore, no activities or work should be undertaken within the Aboriginal site areas as described in this report without approval under Division 4.1 of Part 4 of the EP&A Act (or *in lieu* a valid Section 90 Aboriginal Heritage Impact Permit) and subsequent implementation of any relevant approval conditions;
- 3) Copies of this report should be forwarded to each of the registered Aboriginal parties and the DP&E and the OEH.

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ABBREVIATIONS

Term	Definition
ACHMP	Aboriginal Cultural Heritage Management Plan
AHD	Australian Height Datum
AHIMS	Aboriginal Heritage Information Management System
AHIP	Aboriginal Heritage Impact Permit
BP	Before Present
CHLSC	Cultural Heritage Liaison Sub-Committee
CMA	Catchment Management Authority
DEC	Department of Environment and Conservation
DECCW	Department of Environment, Climate Change and Water
DP&E	Department of Planning and Environment (NSW)
DP&I	Department of Planning and Infrastructure
EA	Environmental Assessment
EIA	Environmental Impact Assessment
EIS	Environmental Impact Statement
EL	Exploration Licence
EP&A Act	<i>Environmental Planning and Assessment Act 1979</i>
GDA	Geodetic Datum of Australia
GIS	Geographic Information System
GPS	Global Positioning System
ICOMOS	International Council on Monuments and Sites
kV	kiloVolt
LALC	Local Aboriginal Land Council
LGA	Local Government Area
MGA	Map Grid of Australia
MGATSIC	Murong Gialinga Aboriginal and Torres Strait Islander Corporation

Term	Definition
MLA	Mining Lease Application
Mtpa	Million tonnes per annum
ND	Non-Disclosure
NEWCO	North East Wiradjuri Company Ltd
NP&W Act	<i>National Parks and Wildlife Act 1974</i>
NPWS	National Parks and Wildlife Service
NSW	New South Wales
NTA	<i>Native Title Act 1973</i>
OEH	Office of Environment and Heritage (NSW)
PA	Project Approval
PAD	Potential Archaeological Deposit
RAP	Registered Aboriginal Party
RAPCC	Registered Aboriginal Parties' Consultation Committee
ROM	Run-of-mine
SEARs	Secretary's Environmental Assessment Requirements
SEA	South East Archaeology
WCPL	Wilpinjong Coal Pty Limited
WEP	Wilpinjong Extension Project
WNTCAC	Warrabinga Native Title Claimants Aboriginal Corporation
WVWAC	Wellington Valley Wiradjuri Aboriginal Corporation

1. INTRODUCTION

1.1 Background and Overview of Proposed Extension Project

The Wilpinjong Coal Mine is an existing open-cut coal mining operation situated approximately 40 kilometres north-east of Mudgee, near the village of Wollar, within the Mid-Western Regional Council Local Government Area, in the Central Tablelands of New South Wales (NSW) (Figure 1).

The Wilpinjong Coal Mine is owned and operated by Wilpinjong Coal Pty Limited (WCPL), a wholly owned subsidiary of Peabody Energy Australia Pty Limited.

The Wilpinjong Coal Mine was approved under Part 3A of the NSW *Environmental Planning and Assessment Act 1979* (EP&A Act) by the then NSW Minister for Planning in February 2006 (Project Approval 05_0021). It has since been modified on five occasions.

The mine has been operating since 2006, and is currently approved to produce up to 16 million tonnes per annum (Mtpa) of run-of-mine (ROM) coal from six open cut pits. Mining is undertaken within Mining Lease (ML) 1573 (Figure 2). The currently approved open cut and contained infrastructure area at the mine measures 1,991 hectares, and is situated within a broader approved Project area of 4,042 hectares (Figure 2).

The Wilpinjong Coal Mine produces both washed and unwashed coal products. The coal handling and processing infrastructure has been designed to accommodate the processing of raw coal and the handling of raw (bypass) and washed product coal. Project Approval (PA) 05_0021 currently allows for the rail transport of up to 12.5 Mtpa of thermal coal. Products from the mine are transported by rail to domestic customers for use in electricity generation and to port for export.

WCPL plans to seek approval from the Minister for Planning under Division 4.1 of Part 4 the EP&A Act for proposed extensions to the Wilpinjong Coal Mine mining operations and development of associated supporting infrastructure and facilities. Referred to as the "Extension Project", the main activities would include (refer to Figure 3):

- ❑ Open cut mining of ROM coal from the Ulan Coal Seam and Moolarben Coal Member in ML 1573 and in new Mining Lease Application (MLA) areas in Exploration Lease (EL) 6169 and EL 7091;
- ❑ Approximately 800 hectares of open cut extensions including;
 - Approximately 500 hectares of incremental extensions to the existing open cut pits in areas of ML 1573 and EL 6169; and
 - Development of a new open cut pit of approximately 300 hectares in EL 7091 (Pit 8 - 'Slate Gully');
- ❑ Production of up to 16 Mtpa of ROM coal;
- ❑ Continued use of the Wilpinjong Coal Mine Coal Handling and Preparation Plant and general coal handling and rail loading facilities and other existing and approved supporting mine infrastructure;
- ❑ Rail transport of approximately 13 Mtpa of thermal product coal to domestic and export customers (within existing maximum and annual average daily rail limits);

- ❑ Relocation of a section of the TransGrid Wollar to Wellington 330 kiloVolt (kV) electricity transmission line to facilitate mining in Pit 8;
- ❑ Various local infrastructure relocations to facilitate the mining extensions (for example, realignment of the Ulan - Wollar Road and associated rail level crossings, and relocation of local electricity transmission lines and services);
- ❑ Construction and operation of additional mine access roads from the Ulan - Wollar Road to service new mining facilities located in Pits 5 and 8;
- ❑ Construction and operation of new ancillary infrastructure in support of mining, including mine infrastructure areas, ROM pads, haul roads, electricity supply, remote crib huts, upslope diversions, light vehicle roads, access tracks, dams, pipelines and other water management structures;
- ❑ Extension of the approved mine life by approximately seven years (ie. from approximately 2026 to 2033);
- ❑ A peak operational workforce of approximately 625 people;
- ❑ Ongoing exploration activities; and
- ❑ Other associated minor infrastructure, plant and activities.

South East Archaeology Pty Ltd has been engaged by WCPL to undertake an Aboriginal Cultural Heritage Assessment for the proposed Wilpinjong Extension Project.

Further details on the Extension Project description are provided in Section 2 of the main text of the Environmental Impact Statement (EIS).

Essentially, the additional development associated with the Extension Project can be categorised within three zones that relate to the potential nature and extent of impacts (refer to Figures 3 and 4):

- ❑ Zone 1 (Open Cut Extensions): Areas totalling approximately 798 hectares in which extensions to the open cut pits are proposed (outside of existing approved development areas¹);
- ❑ Zone 2 (General Ancillary Development and Infrastructure Extensions): An area of approximately 477 hectares outside of the open cut pit limit² in which land disturbance for ancillary mining infrastructure and relocation of public infrastructure may occur (such as relocation of public roads, electricity transmission lines and services, water management structures and dams, highwall drilling clearance area, pipelines, access roads, hauls roads and mining support services and ancillary facilities), noting that direct impacts are expected to be confined to approximately 50% of this total area; and

¹ Noting that some of the open cut extensions will overlay currently approved ancillary development areas that are not encompassed within the Open Cut and Contained Infrastructure Area footprint.

² This area comprises the balance of the detailed heritage investigation area outside of the 'Zone 1' open cut pit limits (refer to Figure 4).

- ❑ Zone 3 (Other Ancillary Development): An area encompassing the extent of the Development Application area (which totals approximately 5,691 hectares, inclusive of existing approved and developed land³), excluding Zones 1 and 2, in which additional ancillary land disturbance may occur as subsequently identified during detailed design (including post-approval), such as from water management infrastructure (including water pipelines, bores and associated electricity supply), access tracks, environmental monitoring equipment, telecommunications and minor ancillary infrastructure. Excluding Zones 1 and 2, the area of Zone 3 is approximately 4,416 hectares. If the approved Open Cut and Contained Infrastructure Area (which has largely been developed) is also excluded, the area of Zone 3 is approximately 2,425 hectares.

The heritage investigation area (for detailed assessment) comprises Zones 1 and 2, which involves nine spatially separate areas fringing the existing approved development area and the Slate Gully extension area to the east in EL 7091. The total area of Zones 1 and 2 measures 1,275 hectares (12.75 square kilometres).

The additional 4,416 hectares of Zone 3, an area in which minor ancillary works may occur following future detailed design and project approval, has also been subject to consideration within this assessment. However, in the absence of any defined development plans, detailed heritage survey was not warranted as a component of the present investigation. It is noted that while some development works related to the Extension Project may occur within the approved Open Cut and Contained Infrastructure Area of 1,991 hectares (refer to Figure 2), the existing Project Approval (05_0021) and Aboriginal Cultural Heritage Management Plan (ACHMP) are sufficient to address any such development impacts without the requirement for further detailed investigation as a component of the present assessment (refer to Section 10 for further discussion). For the purposes of this assessment, Zone 3 principally refers to the area of the Development Application area outside of Zones 1 and 2 and the approved Open Cut and Contained Infrastructure Area (refer to Figure 4).

Essentially, the heritage investigation area has been categorised and referred to throughout this report within eight 'Areas' (refer to Figure 4 and detailed mapping in Appendix 3):

- ❑ Area A: An area of 331.6 hectares within ML1573 and EL6169 bordering the north-western margin of the approved Open Cut and Contained Infrastructure Area;
- ❑ Area B: An area of 65.7 hectares within ML1573 bordering the western margin of the approved Open Cut and Contained Infrastructure Area;
- ❑ Area C: An area of 125.9 hectares within ML1573 and EL6169 bordering the south-western margin of the approved Open Cut and Contained Infrastructure Area;
- ❑ Area D: An area of 26.6 hectares within ML1573 and EL6169 bordering the southern margin of the approved Open Cut and Contained Infrastructure Area;
- ❑ Area E: An area of 18 hectares within ML1573 and EL6169 bordering the southern margin of the approved Open Cut and Contained Infrastructure Area;
- ❑ Area F: Two areas totalling 83 hectares within ML1573 and EL6169 bordering the southern margin of the approved Open Cut and Contained Infrastructure Area⁴;

³ The Development Application area of the original Project Approval (05_0021) measures 4,042 hectares as shown on Figure 2 and is located wholly within the proposed Extension Project Development Application area. The currently approved Open Cut and Contained Infrastructure Area measures 1,991 hectares and is located wholly within the approved Project area (Figure 2).

⁴ Revisions subsequent to completion of the heritage survey had the effect of separating Area F into two spatially separate areas, rather than the contiguous zone it was at the time of the survey.

- ❑ Area G: An area of 621.3 hectares mostly within EL7091 and partially within ML1573 and EL6169 bordering the eastern margin of the approved Open Cut and Contained Infrastructure Area and including the 'Slate Gully' extension area; and
- ❑ Area H: An area of 3.2 hectares mostly within EL6169 bordering the northern margin of the approved Open Cut and Contained Infrastructure Area.

1.2 Study Purpose

This Aboriginal cultural heritage assessment of the proposed Extension Project has been prepared by South East Archaeology Pty Ltd for WCPL.

The Secretary's Environmental Assessment Requirements (SEARs) for the proposed Extension have been obtained from the NSW Department of Planning and Environment⁵ (DP&E) (refer to Appendix 1).

Heritage is a key issue for the EIS, with the SEARs specifying that it must include "an assessment of the likely Aboriginal and historic heritage (cultural and archaeological) impacts of the development, having regards to the Office of Environment and Heritage (OEH)⁶ requirements". The SEARs of particular relevance to Aboriginal heritage include:

- ❑ A description of the existing environment, using sufficient baseline data;
- ❑ An assessment of the likely impacts of all stages of the development, including cumulative impacts, taking into consideration any relevant laws, environmental planning instruments, guidelines, policies, plans and industry codes of practice;
- ❑ A description of the measures that would be implemented to mitigate and/or offset the likely impacts of the development, and an assessment of whether these measures are consistent with industry best practice and represent the full range of reasonable and feasible mitigation measures that could be implemented, the likely effectiveness of these measures and whether contingency plans would be necessary to manage any residual risks;
- ❑ A description of the measures that would be implemented to monitor and report on the environmental performance of the development if it is approved; and
- ❑ Consultation with relevant government authorities and community groups, with a description of the consultation that was carried out, any issues raised and how those issues have been addressed.

In relation to Aboriginal heritage, the guidelines and policies specifically mentioned in Appendix 1 of the SEARs (refer here to Appendix 1) include:

- ❑ International Council on Monuments and Sites (ICOMOS) *Burra Charter* - relevant to the assessment of heritage significance (refer to Section 7 of this report);

⁵ Previously the Department of Planning and Infrastructure (DP&I).

⁶ Prior to April 2011 the NSW Office of Environment and Heritage (OEH) in the Department of Premier and Cabinet was known as the Department of Environment, Climate Change and Water (DECCW), and previously as the Department of Environment and Climate Change (DECC), Department of Environment and Conservation (DEC) and National Parks and Wildlife Service (NPWS).

- ❑ *Draft Guidelines for Aboriginal Cultural Heritage Assessment and Community Consultation* (DEC 2005) - this effectively involves an assessment in accordance with the *Aboriginal Cultural Heritage Standards and Guidelines Kit* (DEC 1997) and *Interim Community Consultation Requirements for Applicants* (DEC 2004), notwithstanding that the latter policies have now effectively been superseded by the *Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales* (DECCW 2010b) and the *Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010* policy (DECCW 2010c). This assessment has been prepared with reference to the latter policies (DECCW 2010b and 2010c), but in a manner that also addresses the draft DEC (2005) guidelines;
- ❑ *Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010* policy (DECCW 2010c) - this policy has been implemented for this Project (refer to Section 6 of this report);
- ❑ *Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales* (DECCW 2010b) - this Code has been implemented for this Project;
- ❑ *Due Diligence Code of Practice for the Protection of Aboriginal Objects in New South Wales* (DECCW 2010a) - due to the presence of identified Aboriginal objects and areas of heritage potential, along with the other SEARs, the Due Diligence Code is not of relevance for this assessment and a more detailed and thorough assessment and consultation has been undertaken in accordance with the DECCW (2010b and 2010c) policies;
- ❑ *NSW Heritage Manual* - only of relevance to the non-indigenous heritage assessment; and
- ❑ *Statements of Heritage Impact* - only of relevance to the non-indigenous heritage assessment.

The OEH's requirements (refer to Appendix 1) include:

- ❑ Attachment A, Requirement 2: Identify and describe the tangible and intangible Aboriginal cultural heritage values that exist across the whole area that will be affected by the Extension Project and document these. This may include the need for surface survey and test excavation and should be guided by the *Guide to Investigating, Assessing and Reporting on Aboriginal Cultural Heritage in NSW* (OEH 2011a) and consultation with OEH regional officers (this effectively involves an assessment following the *Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales* and Aboriginal community consultation in accordance with the *Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010* policy, which have been implemented for this Project);
- ❑ Attachment A, Requirement 3: Where Aboriginal cultural heritage values are identified, consultation must be undertaken and documented in accordance with the *Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010* policy (this policy has been implemented for this Project - refer to Section 6). The significance of cultural heritage values for Aboriginal people who have a cultural association with the land must be documented (refer to Sections 5 and 7 of this report);
- ❑ Attachment A, Requirement 4: Impacts on Aboriginal cultural heritage values are to be assessed and documented (refer to Section 9 of this report). The EIS must demonstrate attempts to avoid impact upon cultural heritage values and identify any conservation outcomes (refer to Section 10). Where impacts are unavoidable, the EIS must outline measures proposed to mitigate impacts (refer to Section 11). Any objects recorded as part of the assessment will be documented and notified to the OEH; and

- ❑ Attachment B, Requirement C: Consider any intangible cultural values that have been documented for the broader Wilpinjong, Moolarben and Ulan coal precinct and whether those values are potentially at threat from the proposed extension (refer to Sections 5, 7, 9 and 10 of this report).

Attachment D (guidance material) of the OEH's requirements include the guidelines and policies noted above, and in addition:

- ❑ *Aboriginal Site Recording Form* - forms for all new sites identified during the Extension Project have been completed and lodged with the OEH (and refer to Section 11 for potential recording of previously unidentified sites);
- ❑ *Aboriginal Site Impact Recording Form* - as impacts to Aboriginal sites have not been caused during the conduct of this investigation, lodgement of such forms is not required (however refer to Section 11 in relation to potential future impacts);
- ❑ *Aboriginal Heritage Information Management System (AHIMS)* - searches were undertaken of the AHIMS register (refer to Section 3.1); and
- ❑ *Care Agreement Application form* - as objects have not been removed from Aboriginal sites during the conduct of this investigation, lodgement of such an application is not required (however refer to Sections 10 and 11 in relation to the potential future salvage of Aboriginal objects).

The primary aims and tasks of this Aboriginal cultural heritage assessment have therefore been to:

- ❑ Building on the studies completed to date (Navin Officer 2005, 2006a and 2006b, Kuskie 2013a), undertake heritage register searches, research, Aboriginal community consultation and an archaeological survey, and where required excavations, to identify and record any Aboriginal heritage evidence or areas of potential evidence or cultural values within the investigation area;
- ❑ Assess the potential impacts of the proposed Extension Project upon any identified or potential Aboriginal heritage evidence or cultural values;
- ❑ Assess the significance of any Aboriginal heritage evidence or cultural values identified;
- ❑ Provide details of any Aboriginal heritage evidence in accordance with the OEH requirements;
- ❑ Consult with the Aboriginal community as per the OEH policy entitled *Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010* (DECCW 2010c);
- ❑ Present recommendations for the management of any identified Aboriginal heritage evidence and potential heritage resources or cultural values; and
- ❑ Prepare an archaeological report to meet the requirements of WCPL, the DP&E and the OEH (primarily with reference to the *Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales* {DECCW 2010b}, *Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010* {DECCW 2010c}, *Guide to Investigating, Assessing and Reporting on Aboriginal Cultural Heritage in NSW* {OEH 2011a} and draft *Guidelines for Aboriginal Cultural Heritage Assessment and Community Consultation* {DEC 2005}).

For the purposes of this Aboriginal cultural heritage assessment, the investigation area for detailed assessment totals 1,275 hectares, inclusive of Areas A - H and development Zones 1 and 2 as marked on Figure 4.

This report builds on the previous heritage assessments of Navin Officer (2005, 2006a and 2006b) and Kuskie (2013a) and does not seek to repeat background information contained within those reports.

1.3 Authorship

This assessment has been prepared by Peter Kuskie, an archaeologist with a BA (Honours) degree in Aboriginal archaeology and over 24 years experience in the conduct of Aboriginal cultural heritage assessments throughout Australia, including numerous similar projects.

The field investigation was undertaken by Peter Kuskie, Birgitta Stephenson, Corey O'Driscoll and Jason Barr. Birgitta Stephenson holds a first class BA (Honours) degree in archaeology from the University of Queensland, along with a Bachelor of Pharmacy degree and has over three years experience in the conduct of Aboriginal heritage surveys, excavations and use-wear and residue analysis. Corey O'Driscoll holds a first class BA (Honours) degree in archaeology from the University of Queensland and has over three years experience in the conduct of Aboriginal heritage surveys and excavations. Jason Barr holds a first class BA (Honours) degree in archaeology from the University of New England and has over four years experience in the conduct of Aboriginal heritage surveys and excavations.

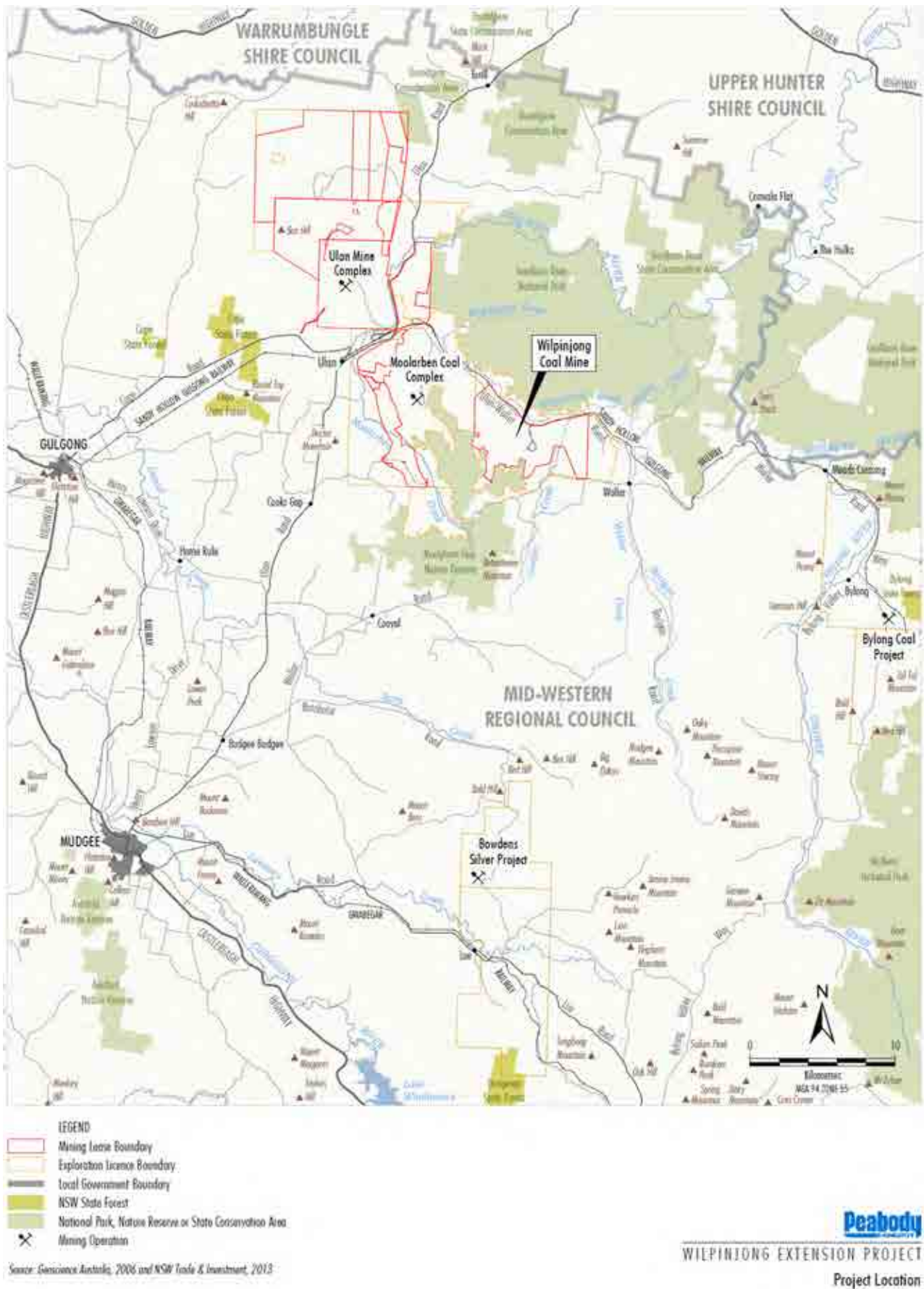
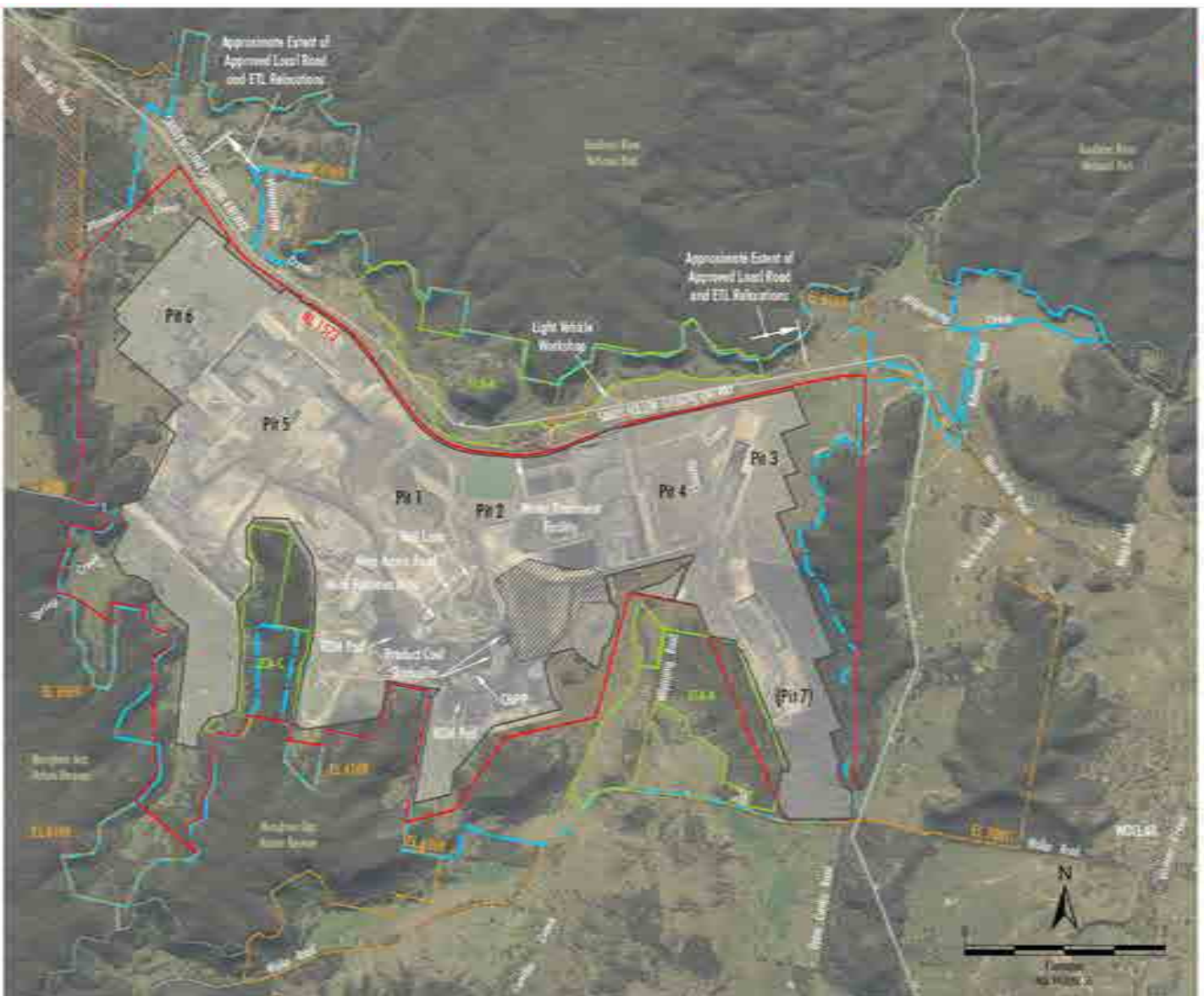


Figure 1: Location of Wilpinjong Coal Mine (courtesy Resource Strategies).

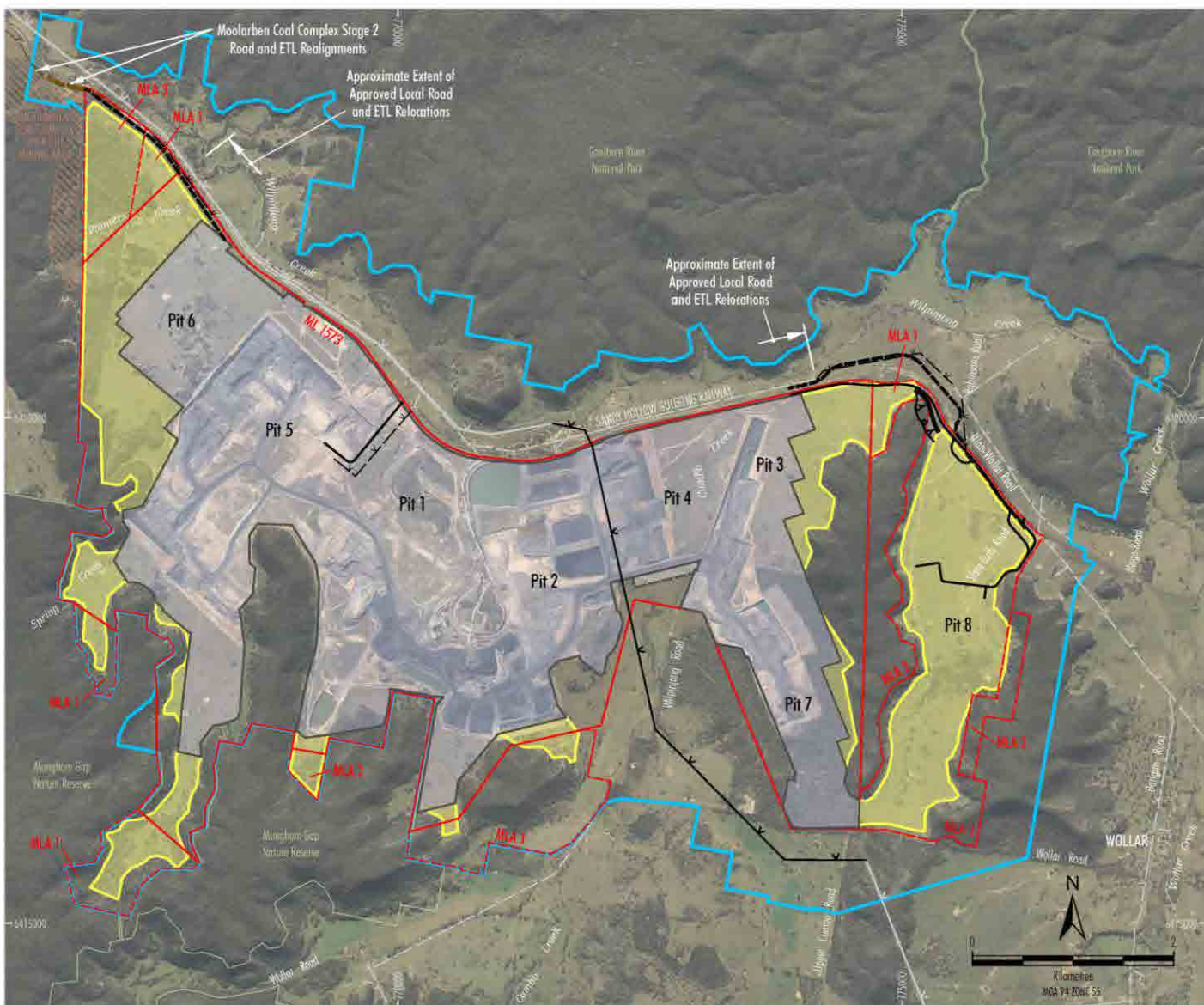


Peabody
WILPINJONG EXTENSION PROJECT
 General Arrangement of the
 Approved Wilpinjong Coal Mine

Figure 2: General arrangement of approved Wilpinjong Coal Mine (courtesy Resource Strategies).

- LEGEND**
- ▬ Development Application Area
 - ▬ Mining Lease Boundary
 - ▬ Mining Lease Application Boundary
 - ▬ Approved/Existing Open Cut and Contained Infrastructure Area
 - ▬ Relocated Black Bank and Cumbo Creek Disturbance Area
 - ▬ Proposed Open Cut Extension Area
 - ▬ Proposed Public Road Realignment
 - ▬ Proposed Pit 3/8 Haul Road
 - ▬ Proposed Service Road
 - ▬ Proposed Local ETL Realignment/Relocation
 - ▬ Proposed Relocated TransGrid 330 kV ETL
 - ▬ Existing Local ETL
 - ▬ Existing TransGrid 330 kV ETL

Source: WCPL (2015); NSW Dept of Industry (2015)
Orthophoto: WCPL (Jun 2015; Jun 2014)



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Figure 3: General arrangement of Wilpinjong Coal Mine incorporating the proposed Extension Project (courtesy Resource Strategies).



- Wilpinjong Extension Project Proposed Development Application Area Boundary
- Currently Approved Open Cut and Contained Infrastructure Area
- Wilpinjong Extension Project Proposed Open Cut Pits (= 'Zone 1' Development Area)
- Wilpinjong Extension Project Heritage Investigation Area (Detailed Assessment) (= 'Zone 1' and 'Zone 2' Development Areas)

Note: 'Zone 2' Development Area = Wilpinjong Extension Heritage Investigation Area excluding the Proposed Open Cut Pits ('Zone 1')

'Zone 3' Development Area = all areas within the Proposed Development Area Boundary, apart from Zones 1 and 2.

Figure 4: Heritage investigation area for Wilpinjong Extension Project (one kilometre MGA grid; aerial photograph courtesy WCPL).

2. ENVIRONMENTAL CONTEXT

The investigation area is located in the Central Tablelands region of NSW. The heritage investigation area (for detailed assessment) extends between MGA Zone 55 grid reference eastings 766600 and 776400 and northings 6415100 and 6423400 on the Wollar 8833-2N 1:25,000 topographic map (refer to Figure 5)⁷. Moolarben Coal Mine is situated immediately to the west of the Wilpinjong Coal Mine, and Ulan Coal Mine is located further to the north-west. The village of Wollar is located between one and two kilometres east of the eastern boundary of the investigation area, Munghorn Gap Nature Reserve is located immediately to the south and west of the Extension Project, and the Goulburn River National Park is located to the north of the Extension Project.

The heritage investigation area (for detailed assessment) has been categorised and referred to throughout this report within eight 'Areas' labelled A to H (refer to Section 1, Figures 4 and 5, and detailed mapping in Appendix 3). These spatially separate areas fringe the existing approved development area, and measure 1,275 hectares in total area.

The investigation area is located marginally east of the Great Divide, in the upper catchment of the Goulburn River. It comprises portions of the broad, open valleys associated with Wilpinjong Creek and its tributaries (such as Planters Creek, Spring Creek, Bens Creek, Cumbo Creek and the un-named drainage in Slate Gully), along with the margins of the more elevated sandstone terrain (refer to Figure 5).

In terms of the surface area of the 1,260 hectares of land subject to detailed archaeological survey sampling⁸ (as derived from two-dimensional base mapping), gently inclined slopes (1.45-5.45°, as per McDonald *et al* 1984) comprise 68.6% of this area, moderately and steeply inclined slopes (>5.45°) comprise 25.9% and level to very gently inclined slopes (<1.45°) comprise 5.6%. In relation to landform units, simple slopes occupy 71.9% of this investigation area, drainage depressions 18.2%, spur crests 5.7%, ridge crests 2.1% and 1% or less of valley flats, hillocks, benches, scarps, terraces and flats (refer to Table 4). Gentle simple slopes occupy 46.1% of the total area subject to survey sampling, and moderate/steep simple slopes (24%) and gentle drainage depressions (15.4%) also occupy substantial areas.

The investigation area is dominated by Late Permian age Illawarra Coal Measures in association with the broad open valleys, with undifferentiated quartz-lithic sandstone, mudstone (sporadically carbonaceous), claystone, coal, torbanite, rhyolitic tuff and some lenses of polymictic conglomerate. Elevated portions of the investigation area (fringing the valleys) include Triassic era Narrabeen Group pebbly lithic-quartz to quartz sandstone, red-brown to green mudstone, and sporadic lenses of quartz paraconglomerate. Quaternary alluvial deposits (alluvium, gravel, sand, silt and clay) are reported around Wilpinjong Creek. Conglomerate, sandstone, shale and siltstone or claystone of the Shoalhaven Group are also present around Cumbo Creek in the vicinity of portions of 'Area F' (Dubbo SI-55-4 1:250,000 geological map).

Sandstone rock formations occur within the investigation area, including boulders and scarps. These can host evidence of Aboriginal occupation, such as deposits of artefacts and cultural material in rock shelters or overhangs, rock art on surfaces of shelters or overhangs, and grinding grooves on exposed bedrock (open surfaces) or on isolated cobbles/boulders.

⁷ A figure showing Lot and DP boundaries is available in Section 1 of the EIS.

⁸ While the total archaeological survey coverage was located wholly within development Zones 1-3, due to revisions to the heritage investigation area boundary (Area F) subsequent to commencement of the survey, the coverage includes 25.5 hectares outside of the final heritage investigation area (for detailed assessment).

The presence of tuff within the geology of the Illawarra Coal Measures and quartz and quartzose rich conglomerates indicates that stone materials suitable for manufacturing Aboriginal artefacts may occur in various locations throughout the investigation area. The Dubbo 1:250,000 mapsheet and portion of the Singleton SI-56-1 mapsheet immediately to the east indicate the widespread occurrence of tuff, rhyolite and quartz, with minor occurrences of lithic sandstone, chert and quartzite (although the latter two materials are often available as pebbles within larger conglomerates).

Much of the investigation area, particularly the broad open valleys, lies within the Ulan Soil Landscape. This contains yellow podzolic soils on lower slopes and drainage lines with patches of yellow solodic soils in association with salt sands. Yellow and brown earths are also present on footslopes with minor areas of earthy sands (Murphy and Lawrie 1998).

Portions of the investigation area, particularly along Cumbo Creek and through Slate Gully, lie within the Barigan Creek Soil Landscape. The Barigan Creek Soil Landscape contains yellow podzolic soils on lower slopes and along drainage lines. Red podzolic soils occur on colluvial slopes, benches and rises (Murphy and Lawrie 1998).

Portions of the investigation area, particularly the slopes fringing the valleys, are within the Lees Pinch Soil Landscape. The Lees Pinch Soil Landscape contains shallow sandy soils, extensive rock outcrops, sandstone cliffs and debris slopes. It also includes grey and yellow earths and yellow podzolic soils on lower slopes (Murphy and Lawrie 1998).

The investigation area comprises areas that are anticipated to be both depositional and erosional contexts. It is noted that soil formation processes are complex and can vary over time in any locality (for example, episodes of major erosion in a typically depositional context). These processes can both remove, obscure or affect the integrity of archaeological evidence (particularly stone artefacts) (refer to Kuskie 2000b).

Mitchell (2005) notes that the soil mantles in the Ulan Soil Landscape typically have texture contrast profiles, with a colluvial loam or fine sandy loam topsoil (A unit), over unrelated pedal clays formed by *in situ* weathering of bedrock (B unit or horizon). Red clay B-horizons are evident on crests and upper slopes, while yellow or brown tones are present on the lower slopes indicate poorer drainage or accumulation of organic matter in sometimes saturated soil. Mitchell (2005) observes that in such texture-contrast soils the A unit is not related to the B unit, as it is a biomantle formed from colluvial processes (bioturbation and rainwash).

Mitchell (2005) noted several locations of hill crests with deep sands and abundant quartz gravel (for example, near the Mittaville homestead adjacent to Area A), and although uncertain of the origin, concluded that the crests are probably capped by completely weathered basal Triassic Wollar sandstone and conglomerate.

Mitchell (2005) also noted that:

- ❑ The main tributary streams of the broad open valleys often have long profiles. For example, Spring Creek has three reaches: the first a partial gorge section with a rapid fall from the sandstone plateau through cliffs to the base of the steep debris slope; the second with a reduced gradient and ephemeral stream channel present and terraces 3 - 4 metres above the flat; and the third lower reach a reduced gradient with no defined channel;
- ❑ Terraces are best developed in the narrow upper valleys immediately below the cliffs and steep debris slopes;

- ❑ In the upper valleys up to 15 metres of sediment may be present, where alluvial fans from tributaries on either side of the valley merge with alluvial sediments from the main stream to completely fill the valley floor. However, this sediment is very porous such that standing water is not generally retained;
- ❑ Groundwater seeps to the surface at the lower reaches of the tributaries near Wilpinjong Creek (and creates salt scalds);
- ❑ Minimal post-European settlement soil erosion or gully development has occurred (in contrast to the nearby Hunter Valley); and
- ❑ Cumbo Creek differs to the main tributary streams of the broad open valleys in that it has a swampy channel floor with large reed filled pools, comparable to 'grassy or swampy meadows' and a 'chains of ponds'. Post-European erosion has not created a continuous channel.

The climate of the locality is characterised by warm to hot summers with dry electrical storms and cold winters with frequent frosts. The Wilpinjong climate is comparable to meteorological data from Gulgong. Average daily summer temperatures range between 21.3 and 22.4 degrees Celsius (°C), with the highest monthly average daily temperature occurring in January (22.4°C). The average daily temperatures in winter vary between 8.3 and 9.6°C and the lowest monthly average daily temperature occurs in July (9.2°C). Average annual rainfall is approximately 630 millimetres (mm), with a slight increase in rain during the summer months. While slight to moderate droughts in the area occur infrequently, severe and prolonged droughts have been recorded in the past.

Native vegetation has been removed from much of the investigation area, particularly the broad open valleys, and these areas tend to be dominated by grasses and used for pastoral purposes. Portions of the investigation area, particularly the side-slopes fringing the valleys, retain forest and woodland with Ironbark, Rough-barked Apple, Stringybark, Box and Black Cypress Pine trees prevalent. A number of mature native trees are present, although significant timber extraction has occurred in historical times.

Vegetation communities identified during the EIS within the forested areas include Shrubby White Box Woodland, Rough-barked Apple Woodland, Rough-barked Apple - Black Cypress Pine Woodland, Red Ironbark Forest, Narrow-leaved Ironbark Forest, Grey Gum - Narrow-leaved Stringybark Forest, Slaty Box Forest, Western Grey Box Woodland, Shrubby Blakely's Red Gum Woodland, Grassy Yellow Box Woodland, Fuzzy Box Woodland, Typha Wetland, Grassy Blakely's Red Gum Woodland, Grassland and Shrubby Regeneration.

The cover of vegetation acts to reduce ground surface visibility and thereby reduces the potential to identify archaeological evidence during a field survey. Nevertheless, where mature native trees are present, the potential occurrence of carved or scarred trees cannot be discounted.

Much of the investigation area only comprises a single resource zone (woodland/forest) in which higher-order watercourses are absent. However, portions of the investigation area are located closer to a third or higher-order watercourses or other possible areas of water retention (for example, billabongs, swamps or marshes), which are likely to have been significant factors in relation to Aboriginal occupation of the locality (refer to Section 3). These areas include:

- ❑ Portions of Areas A, H and G close to Wilpinjong Creek and its associated creek flats;
- ❑ Portion of Area A close to the lower section of Planters Creek;

- ❑ Portions of Area B close to the third order Spring Creek;
- ❑ Portions of Area C close to the third order Spring Creek tributary;
- ❑ Portions of Area F close to the higher order Cumbo Creek; and
- ❑ Portions of Area G close to the lower section of the un-named watercourse in Slate Gully.

Consideration of climactic and associated landscape changes over time is important in relation to understanding the nature of Aboriginal occupation. In the late Pleistocene, during the last glacial maximum from about 24,000 to 17,000 years ago, the climate was cooler (possibly 6-10°C) and drier than at present. Potable water was probably not frequently available in the locality. In terms of subsistence resources and potable water, the investigation area would generally not have represented an environment conducive to Aboriginal occupation.

After temperatures rose in the late Pleistocene/early Holocene, potable water may have been more frequently available in the locality, particularly in the higher-order watercourses such as Wilpinjong Creek and Cumbo Creek. As such, the general locality was more conducive to occupation in the Holocene period, although as discussed in Section 3, occupation may have been more focused outside of much of the immediate investigation area in locations where conditions were more favourable.

Non-indigenous settlement has resulted in impacts to the investigation area, most noticeably from vegetation removal, timber harvesting, pastoral activities (including opportunistic cropping), rural settlement (including residences and other infrastructure such as buildings and farm dams), and mining and infrastructure (such as the Wilpinjong Coal Mine, Gulgong - Sandy Hollow Railway, Ulan - Wollar Road, Wilpinjong Road, Wollar Road, Slate Gully Road, Wollar-Wellington 330kV electricity transmission line, several quarries and other powerlines, telecommunication cables, essential services and roads).

In general however, disturbance levels are low across much of the investigation area and should sub-surface deposits of artefacts occur, mostly they may exhibit reasonable integrity. Approximately 78% of the area subject to detailed heritage survey sampling was assessed as exhibiting low levels of ground disturbance, with 3% assessed as low to moderate, 18% moderate and less than 1% high. Approximately 39 hectares (3%) of the heritage investigation area for detailed assessment has been totally modified by previous land use, such that negligible potential for Aboriginal heritage evidence remains. These areas were associated with the Ulan - Wollar Road, Gulgong - Sandy Hollow Railway, Wollar Road, Slate Gully Road and existing Wilpinjong Coal Mine works.

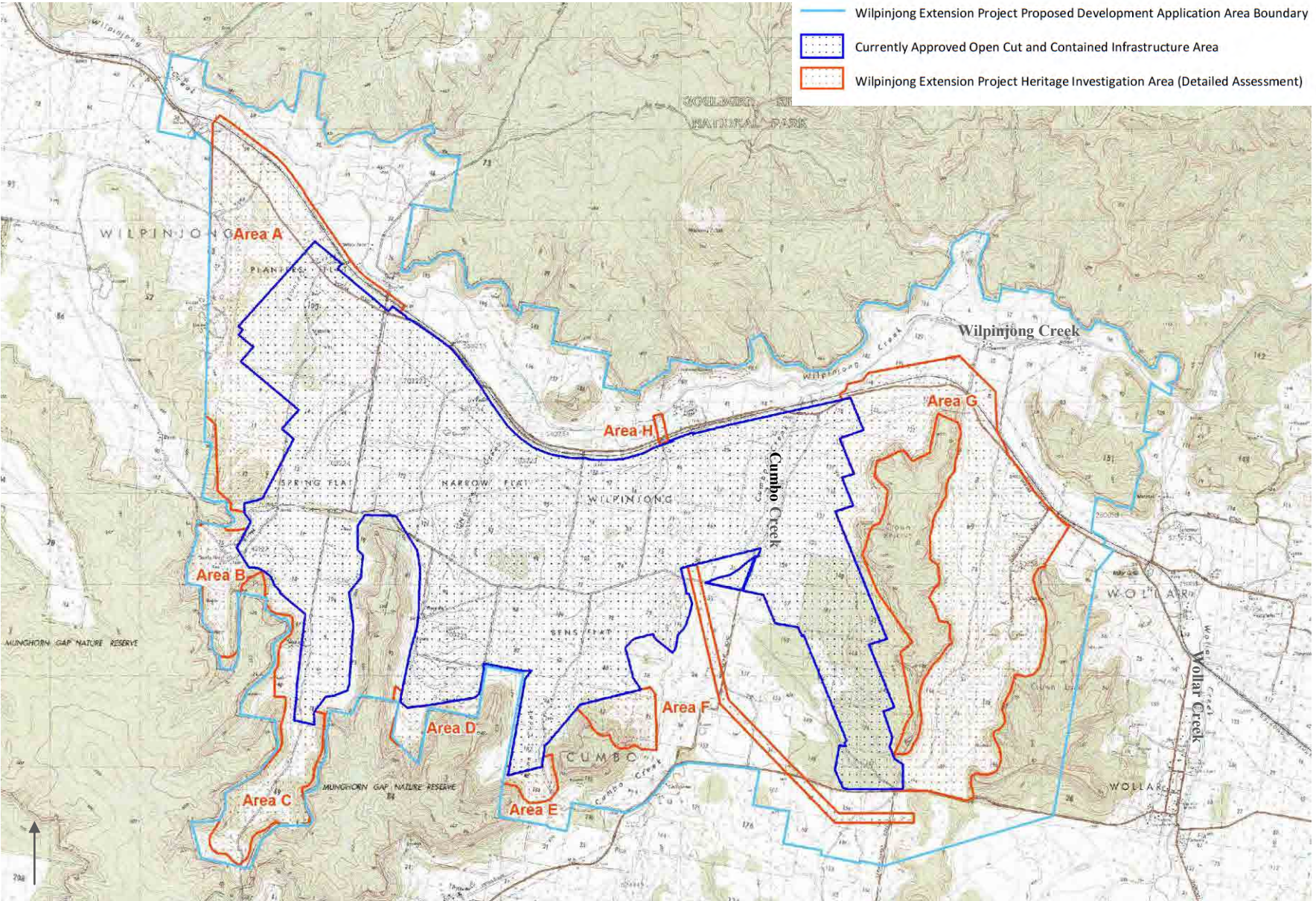


Figure 5: Topographic context of investigation area (Wollar 8833-2N AMG 1:25,000 topographic map).

3. ABORIGINAL ARCHAEOLOGICAL CONTEXT

3.1 Heritage Register Searches

Searches were undertaken on 6 November 2013 of the OEH AHIMS, between MGA (GDA Zone 55) grid coordinates 766000 and 777000 east and 6415000 and 6424000 north (#116091 - 116093). A supplementary search (#148450) of the area bounded by 777000 and 777700 east and 6418900 and 6421100 north was undertaken on 20 September 2014 to include a minor variation to the proposed Development Application Area.

A total of 337 Aboriginal sites and/or Potential Archaeological Deposits (PADs) were listed on the OEH register within this area of 100.5 square kilometres, which encompasses the entire proposed Development Application Area and current heritage investigation area (for detailed assessment), along with adjacent land. The sites identified in the broad search area are predominantly open artefact sites, but also include a number of scarred trees and rock shelters.

Numerous sites (particularly those recorded by Navin Officer 2005) are listed by the OEH AHIMS with the incorrect grid reference datum. A number of sites recorded in subsequent surveys and salvages by Kayandel Archaeological Services (Kayandel) are yet to be listed on the OEH AHIMS register. There are other inaccuracies, such as sites with incorrect grid references (for example, the #36-3-916 easting should read 764017 instead of 766017).

To address these issues South East Archaeology prepared a revised Aboriginal Site Database for WCPL, based on information currently known from various sources (including the OEH AHIMS register, Navin Officer reports and site records, and data provided by Kayandel). The database current at the commencement of this investigation for the Extension Project (Version 3, November 2013), identified the known heritage resources within the area bounded by MGA Zone 55 eastings 766000 - 777000 and northings 6415000 - 6424000. The locations of these 475 Aboriginal sites and PADs are marked on Figure 6 and a summary is presented in Table 1.

A total of 156 Aboriginal sites/PADs were known to occur inside or within approximately 100 metres of the heritage investigation area (for detailed assessment), prior to conduct of the Extension Project heritage survey. Details of these sites/PADs are presented in Appendix 2 and a summary is presented in Table 2. These sites, along with newly identified sites, PADs and cultural values, are discussed further in Sections 7, 9 and 10 in relation to their significance, potential impacts of the Extension Project and potential management strategies (refer also to Appendix 7). Detailed location plans of every site are available in Appendix 3.

No Aboriginal heritage sites are listed within the Extension Project investigation area on any other heritage registers or planning instruments, including the *Mid-Western Regional Local Environmental Plan 2012*, *Aboriginal and Torres Strait Islander Heritage Protection Act 1984* or the *EPBC Act 1999* (Commonwealth Heritage List or National Heritage List).

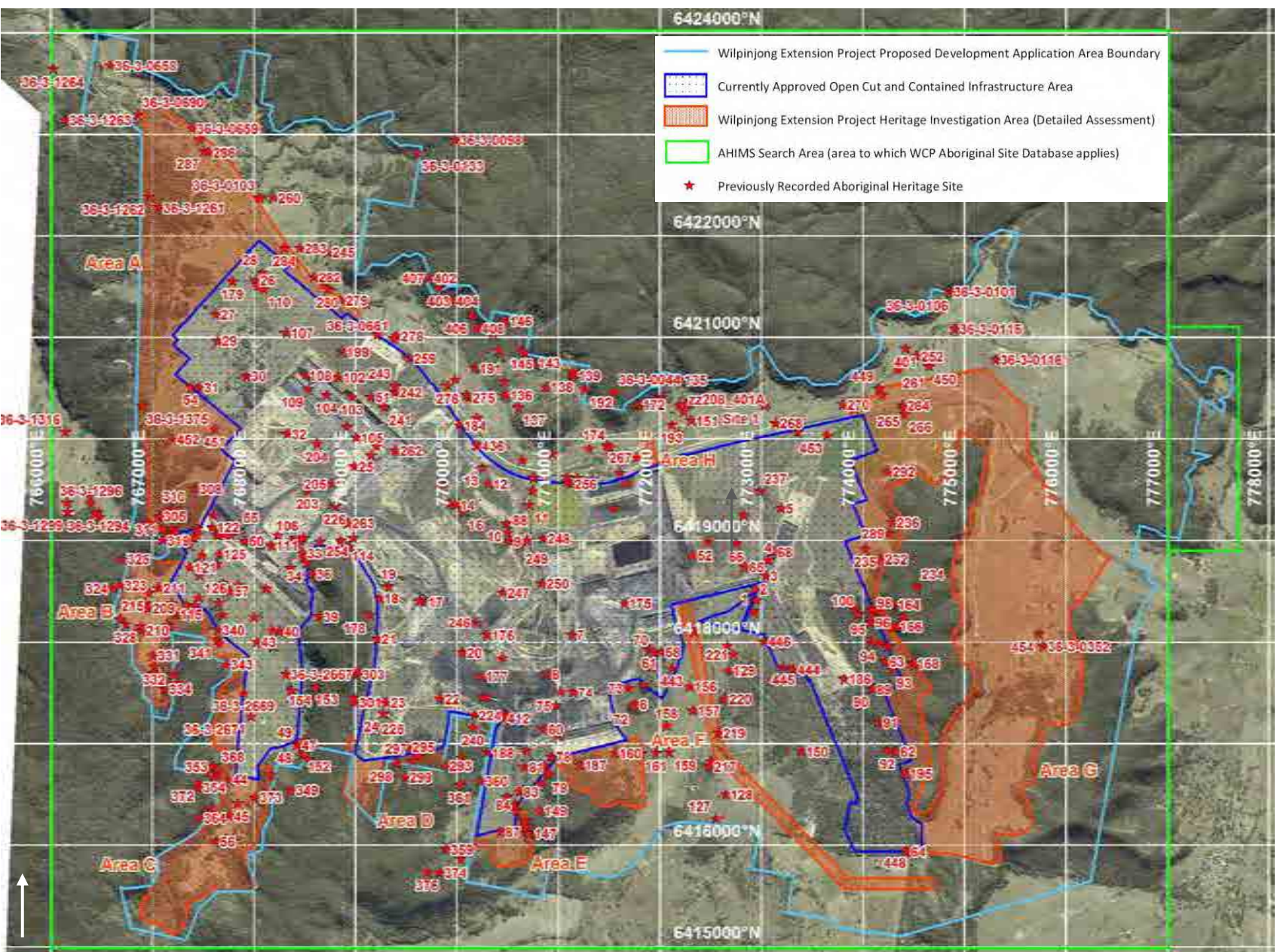


Figure 6: Previously recorded Aboriginal heritage sites at the commencement of the present investigation (Aboriginal site data from Wilpinjong Aboriginal Site Database Revision 3, November 2013; aerial photograph courtesy WCP, one kilometre MGA grid) (refer to Appendix 3 for detailed mapping).

Table 1: Summary of known Aboriginal sites within the Wilpinjong Coal Mine and adjacent land (MGA Zone 55 eastings 766000 - 777000 and northings 6415000 - 6424000) at the commencement of the Extension Project heritage investigation (based on WCPL Aboriginal Site Database Revision 3, November 2013)⁹.

Aboriginal Site Type	Total
Bora/ceremonial site and carved tree	1
Grinding grooves	2
Grinding grooves and open artefact site	1
Lithic quarry	1
Non-Aboriginal mounds	1
Open artefact site	283
PAD	2
Possible cultural value/association	2
Rock shelter with art	4
Rock shelter with art and PAD	2
Rock shelter with artefacts	25
Rock shelter with artefacts and art	1
Rock shelter with artefacts and waterhole/well	1
Rock shelter with PAD	80
Scarred tree	8
Scarred tree (possible Aboriginal)	45
Scarred tree (possible European)	4
Uncertain	2
Waterhole (possible)	3
Waterhole/well	7
Total	475

Table 2: Summary of known Aboriginal sites inside or within approximately 100 metres of the heritage investigation area (for detailed assessment) at the commencement of the Extension Project heritage investigation (based on WCPL Aboriginal Site Database Revision 3, November 2013).

Aboriginal Site Type	Total
Open artefact site	73
Rock shelter with artefacts	9
Rock shelter with artefacts and waterhole/well	1
Rock shelter with PAD	51
Scarred tree	2
Scarred tree (possible Aboriginal)	18
Waterhole/well	2
Total	156

⁹ No Aboriginal sites had been previously recorded within the supplementary search area bounded by MGA Zone 55 777000 and 777700 east and 6418900 and 6421100.

3.2 Previous Archaeological Research

A number of Aboriginal heritage investigations have been undertaken within the vicinity of the investigation area, principally for Environmental Impact Assessments relating to the Wilpinjong Coal Mine and the adjacent Moolarben Coal Mine and Ulan Coal Mine.

Brief discussion of the most relevant investigations will highlight the range of site types and variety of site contents in the region, identify typical site locations, and assist with the construction of a predictive model of site location for the investigation area.

3.2.1 Wilpinjong Coal Mine Environmental Impact Assessment

Navin Officer (2005) undertook heritage surveys over 17 days in 2004 and 2005 for the initial Wilpinjong Coal Mine EIS. Samples were surveyed across the 2,510 hectare Project area, involving teams of archaeologists and representatives of the Aboriginal community. The Aboriginal stakeholders for the Project included the Mudgee Local Aboriginal Land Council (LALC), Warrabinga Native Title Claimants Aboriginal Corporation ('Warrabinga' or WNTCAC) and Murong Gialinga Aboriginal and Torres Strait Islanders Corporation (MGATSIC).

Navin Officer (2005) recorded a total of 224 Aboriginal sites and PADs. These included several artefact scatters with over 500 artefacts, numerous other artefact scatters and isolated artefacts (135 open artefact occurrences in total), rock shelters with artefacts (19 in total), rock shelters with PADs (21), rock shelters with art (three), scarred trees (39 'possible' and 'probable' Aboriginal causes), places of Aboriginal cultural significance (two), open context PADs (two) and waterhole/wells (three).

However, a number of the recorded items comprise scarred trees of only 'possible' Aboriginal origin and other places/values (such as natural springs/'waterholes'), that do not comprise Aboriginal objects under the NSW *National Parks and Wildlife Act 1974*, were also included in this total.

Significantly, Navin Officer (2005) do not define any 'definite' Aboriginal scarred trees within the project area. Navin Officer (2005) reported 15 'probable' Aboriginal scarred trees, which conform to certain criteria indicative of an Aboriginal made scar but for which a natural origin could not be excluded. Navin Officer (2005) reported 24 'possible' Aboriginal scarred trees, for which the scar conformed to all or most criteria for an Aboriginal origin, but was thought to have derived from non-indigenous human (eg. surveyors) or natural origin. The scars were typically recorded on Grey Box or White Box trees (59%), followed by Ironbark (13%), unspiciated dead trees (13%), Yellow Box (8%), "Smooth-Barked" (5%) and Stringybark (2%) (Navin Officer 2005).

Open artefact sites tended to be located in valley floor contexts (58% of artefact scatters and 72% of isolated finds) and basal valley slopes (35% of artefact scatters and 17% of isolated finds), compared to mid or upper valley slopes. Rock shelters with artefacts, art and/or PADs were located in a range of contexts, including valley floors (21%), basal valley slopes (19%), mid valley slopes (46%) and upper slopes (14%). Valley floor contexts dominated the investigation area (refer to Figure 7).

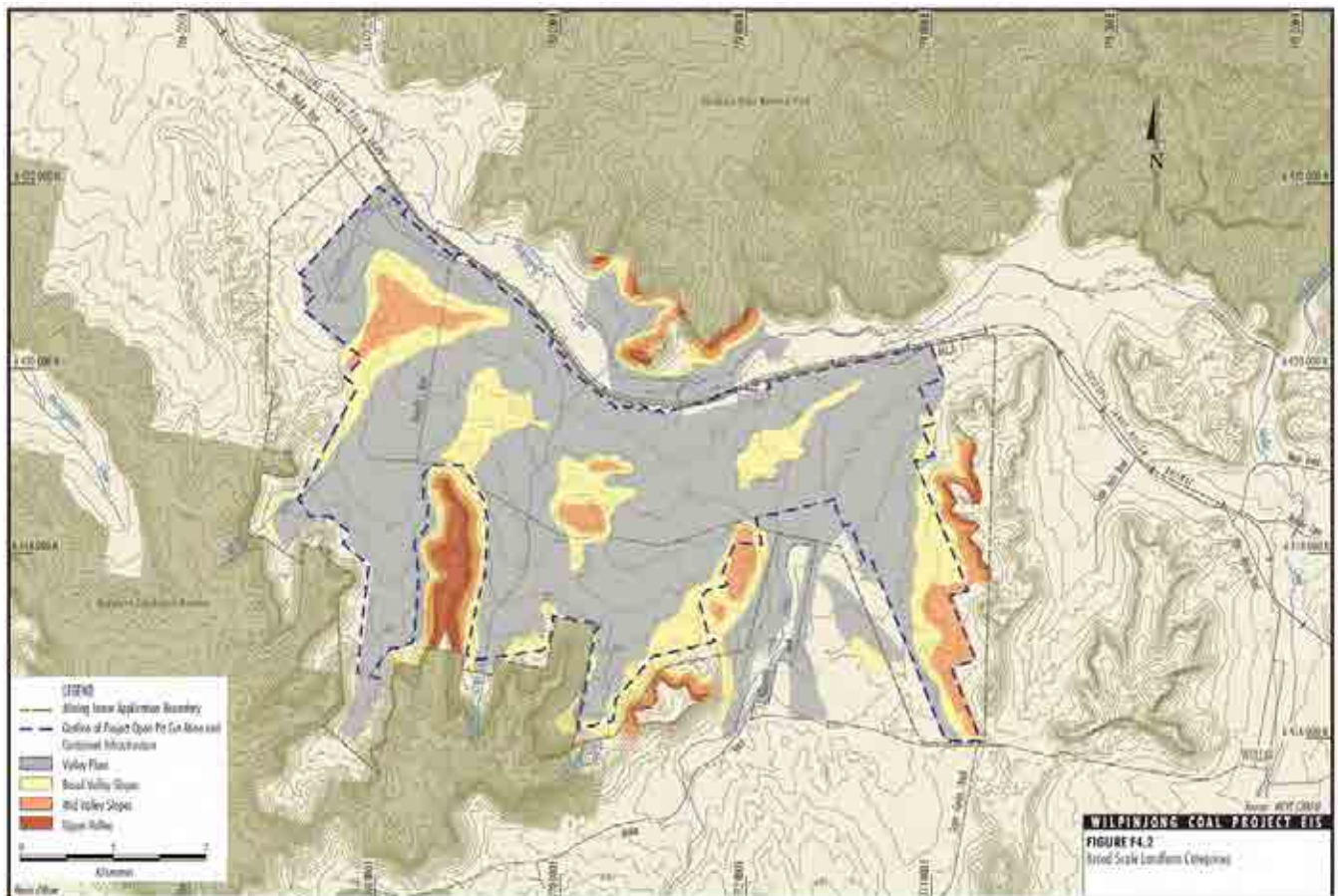


Figure 7: Landform patterns as reported by Navin Officer (2005: Figure F4.2).

Typically up to only ten artefacts were recorded at each scatter, with counts made of other items. Larger sites with over 100 artefacts were all located in valley floor and basal valley slope contexts, with the two sites of over 500 artefacts occurring adjacent to Wilpinjong Creek. Although detailed artefact descriptions or summaries of the combined assemblage are not available, Navin Officer (2005) noted that quartz was the most frequently occurring stone material, followed by tuff. Quantities and frequencies of stone material and artefact types were not reported, but cores, hammerstones, utilised flakes, microblades, backing flakes, hatchets and pebble cores were noted as occurring.

The two locations of Aboriginal cultural values comprised WCP58, a knoll reported as being of cultural significance to some female community members (but not all), and WCP59, a knoll reported as being of cultural significance to some male community members (but not all).

Detailed records or mapping of survey units were not presented by Navin Officer (2005). From the pattern of site recordings (refer to Figure 6) it is evident that the Navin Officer (2005) survey must have sampled some portions of the present investigation area, although it is inferred that much of the Extension Project area has not been systematically inspected, in particular to current OEH standards. The survey involved both pedestrian and vehicle based coverage.

Six of the sites recorded during the initial EIS were assessed as being of high significance, 59 sites of moderate to high significance and 48 sites of moderate significance (Navin Officer 2005). Impacts from the project were anticipated to occur to many of the sites, however others were situated outside of the proposed disturbance area, such as the three rock shelters with art (WCP 72, 152 and 153).

Navin Officer (2005) proposed a range of mitigation and conservation measures, including the development of an Aboriginal Cultural Heritage Management Plan (ACHMP) to manage interactions of the Project with the Aboriginal heritage resource under the Part 3A Project Approval. Over half of the sites identified were located directly within the project disturbance area, with a number more on the immediate periphery.

An ACHMP was subsequently developed for the Wilpinjong Coal Mine in consultation with the North East Wiradjuri Native Title Party (WCPL 2008). It incorporated commitments made with the North Eastern Wiradjuri Native Title Party under a separate Ancillary Agreement. Management of Aboriginal heritage within the approved Project area has subsequently occurred with reference to this ACHMP (refer below).

The ACHMP incorporated procedures such as:

- ❑ Establishment and operation of the Cultural Heritage Liaison Sub-Committee (CHLSC) with the Native Title Party (Section 2.4);
- ❑ Protocols for ongoing consultation with other Aboriginal stakeholders (Section 2.5);
- ❑ *Ancillary Disturbance Area Protocol* for surveys of ancillary works prior to impacts occurring and avoidance or salvage of any sites identified (Section 4.1);
- ❑ Salvage of a sample of surface archaeological evidence, including systematic recovery of all evident surface artefacts from a representative sample of open artefact scatters and from selected isolated finds at known sites within the Project disturbance area (Section 4.2.1);
- ❑ Salvage of a sample of sub-surface archaeological evidence, with the requirement for and scope of any sub-surface salvage excavation to be determined in the field by the archaeologist in consultation with the Aboriginal community representatives (Section 4.2.2, with methods for hand excavation and surface scrapes specified in Attachment A);
- ❑ *An Excavation Program Designed to Test for the Presence of Deep Archaeological Deposits* (Section 4.2.2, with methods specified in Attachment A);
- ❑ Salvage of select 'probable' Aboriginal scarred trees, based upon an assessment of heritage value, age and origin (Section 4.2.3);
- ❑ Processes for designation of areas as 'cleared for site disturbance' (Section 4.2.5);
- ❑ A keeping place (Section 4.3);
- ❑ An artefact replacement program (Section 4.4);
- ❑ Additional surveys of escarpment areas potentially subject to impacts from blasting (Section 4.6);
- ❑ Detailed recording, monitoring and management of the three rock art sites (WCP 72, 152 and 153) (Section 4.7);
- ❑ General land management measures to protect heritage (Section 4.8);

- ❑ Aboriginal community access (Section 4.9);
- ❑ Heritage awareness training (Section 4.10);
- ❑ Reporting (Section 5); and
- ❑ Review of the Plan (Section 6).

Subsequent to DP&E approval of Modification 5 (refer to Kuskie 2013a), the ACHMP (*WI-ENV-MNP-007*) has been revised and updated in consultation with the registered Aboriginal parties. The revised ACHMP was lodged with the DP&E for approval in 2014 and pending approval, will form the basis for ongoing management of Aboriginal heritage within the Wilpinjong Coal Mine area. Consequently, this Plan will be of greater relevance to the Extension Project than the previously approved ACHMP.

Based on Heritage Management Plans developed by South East Archaeology, the revised ACHMP (*WI-ENV-MNP-007*) incorporates procedures for:

- ❑ Aboriginal consultation and involvement, including the CHLSC, Registered Aboriginal Parties' Consultation Committee (RAPCC), access and ceremonies (Sections 3.1 - 3.3), rostering and allocation of employment associated with heritage investigations (Section 3.5), notification procedures (Section 3.6), review and input into draft heritage reports (Section 3.7) and participation in Aboriginal cultural heritage meetings (Section 3.8);
- ❑ Cultural heritage awareness training and inductions (Section 3.4);
- ❑ Management strategies for identified Aboriginal sites, including *in situ* preservation and avoidance, unmitigated impact, and systematic archaeological salvage (Section 5.1 and Appendix 6);
- ❑ Management strategies for previously unrecorded Aboriginal sites (Section 5.2) and skeletal remains (Section 5.2.3);
- ❑ Curation of items in temporary and permanent locations (Sections 5.3 and 5.4);
- ❑ General land management measures to protect heritage (Section 5.5);
- ❑ Measurement and evaluation, including maintenance of a Geographic Information System (GIS) database that includes all cultural heritage places in the Mine, lodgement of site records with the OEH, monitoring of the three rock art sites (WCP 72, 152 and 153), and a verification program for sites with an uncertain status (Section 6);
- ❑ A complaints response protocol (Section 7);
- ❑ Reporting, annual reviews, independent environmental audits and website maintenance (Section 8); and
- ❑ Review and improvement (Section 9).

3.2.2 Wilpinjong Coal Mine Salvages and Additional Investigations

Numerous investigations relating to actions arising from the Project Approval and ACHMP (WCPL 2008), along with due diligence assessments of additional proposed works, have been completed within the broader approved Project area since 2006 (refer to Table 3). Key reports are discussed below.

Table 3: Summary of known Aboriginal heritage investigation reports within the Wilpinjong Coal Mine.

Author	Date	Title	Investigation Type	Details
Navin Officer	2005	<i>Wilpinjong Coal Project Appendix F: Aboriginal Cultural Heritage Assessment</i>	Survey for the original EA	Resulted in identification of 224 heritage sites and PADs.
Navin Officer	2005b	<i>Supplementary Archaeological Survey of Site Depot, Borrow Pit, ROM PAD and [Proposed] Radio Facility, Wilpinjong Coal Project</i>	Report on Cultural Heritage Works Program arising from EA	Supplementary archaeological survey of some infrastructure areas to determine if any Aboriginal had become visible since the original EIS. One additional site located in proximity to the Radio Facility.
Navin Officer	2006a	<i>Wilpinjong Coal Project: Archaeological Salvage and Post EIS Investigations</i>	Report on Cultural Heritage Works Program arising from EA	Detailed report on the salvage of sites within the "Pit 1" area, initial infrastructure areas, Bungalla Road and new disturbance area; survey of additional disturbance areas not covered in the original EIS.
Navin Officer	2006b	<i>Baseline Recording of Three Aboriginal Rock Art Sites WCP72, 152 and 153, at Wilpinjong, NSW: Wilpinjong Coal Project Aboriginal Cultural Heritage Management Program</i>	Report on Cultural Heritage Works Program arising from EA	Baseline recording of three rock art sites beyond the area of direct mine impact; carried out as part of a monitoring program, as required under the Project Approval and Native Title Agreement Ancillary Deed.
Navin Officer	2006c	<i>Wilpinjong Coal Project: Archaeological Salvage and Post EIS Investigations: Interim Summary Report</i>	Report on Cultural Heritage Works Program arising from EA	Final report detailing outcomes from the salvage of sites within the "Pit 1" area, initial infrastructure areas, Bungalla Road and new disturbance area; survey of additional disturbance areas not covered in the original EIS.
Navin Officer	2006d	<i>Archaeological Survey. Three Proposed Fence-Line Alignments and Two Power Pole Locations, Wilpinjong Coal Project</i>	Summary report on Cultural Heritage Works Program arising from EA	Archaeological survey of three proposed fence-lines and two power poles required for pastoral stock management and installation of site offices.
Kayandel	2006	<i>Wilpinjong Coal Project Aboriginal Cultural Heritage Survey: Supplemental Survey of Escarpment Areas and Report of Findings</i>	Report on Cultural Heritage Works Program arising from EA	Survey of the escarpment area beyond the area of direct mine impact to identify sites that may be susceptible to indirect impacts (such as through blasting).
Kayandel (Hubschmann and Markus)	2011	<i>Archaeological Excavation and Salvage: WCP33, October 2009 and December 2010 – January 2011</i>	Report on site WCP33 Cultural Heritage Investigations	Draft report on details of salvage of site WCP33 undertaken under approved ACHMP.
Kayandel (Syme, Zaghloul and White)	2013	<i>WCP216 Archaeological Excavations: Test and Open Area. Main Report and Associated Appendices</i>	Draft report on site WCP216 Cultural Heritage Investigations	Draft report on details of salvage of site WCP216 undertaken under approved ACHMP.
Brennan	2013	<i>Wilpinjong Coal Mine, Rock Art Conservation and Monitoring Project: Field Inspection Report and Recommendations</i>	Report on Rock Art Monitoring	Report on three rock art sites beyond the area of direct mine impact; carried out as part of the monitoring program undertaken under the approved ACHMP (WCPL 2008).

Table 3 (continued):

Author	Date	Title	Investigation Type	Details
Kuskie	2013a	<i>Wilpinjong Coal Mine, Central Tablelands of New South Wales Modification: Aboriginal Cultural Heritage Assessment</i>	Survey for Mod 5	Survey of additional disturbance areas not covered in the original EIS as part of the Mod 5 EA.
Kuskie	2013b	<i>Wilpinjong Coal Mine - Pit 3 Clearance Areas: Preliminary Discussion Paper Regarding Aboriginal Heritage Management Strategies for Sites WCP 5, 65, 68 and 237</i>	Report on Cultural Heritage Works Program arising from EA	Advice on Pit 3 clearance areas.
Kuskie	2013c	<i>Wilpinjong Coal Mine - Pit 3 Clearance Areas: Additional Advice Regarding Aboriginal Heritage Management Strategies for Sites WCP 5, 65 and 237</i>	Report on Cultural Heritage Works Program arising from EA	Advice on Pit 3 clearance areas.
Kuskie	2013d	<i>Wilpinjong Extension Project - Preliminary Report on Aboriginal Heritage Due Diligence Survey of Soil Test Pit and Drilling Areas</i>	Due diligence	Due diligence of soil test pits and drilling areas.
Kuskie	2014a	<i>Wilpinjong Coal Mine - Aboriginal Heritage Salvage of Sites WCP 1, 65 and 237: Interim Status Report, July 2014</i>	Report on Cultural Heritage Works Program arising from EA and Modification.	Salvage excavation of sites WCP 1, 65 and 237. Interim report.
Kuskie	2014b	<i>Wilpinjong Coal Mine - Preliminary Report on Aboriginal Heritage Due Diligence Survey of Cumbo Creek Sediment Dams</i>	Due diligence	Due diligence of Cumbo Creek sediment dams.
Kuskie	2014c	<i>Wilpinjong Extension Project - Report on Aboriginal Heritage Due Diligence Survey of Drilling Areas</i>	Due diligence	Due diligence of drilling areas.
Kuskie	2014d	<i>Wilpinjong Mine - Preliminary Report on Aboriginal Heritage Due Diligence Survey of Proposed Piezometer Near Wollar</i>	Due diligence	Due diligence of piezometer.
Apex Archaeology	2013a	<i>Wilpinjong Coal EL Exploration Drilling - Exploration Lease 7091 Due Diligence</i>	Due diligence	Due diligence of drilling areas.
Apex Archaeology	2013b	<i>Wilpinjong Coal Exploration Drilling - Mining Lease 1573 Due Diligence</i>	Due diligence	Due diligence of drilling areas.
Apex Archaeology	2013c	<i>Wilpinjong Coal Ancillary Works - Due Diligence</i>	Due diligence	Due diligence of piezometers, tree corridor, soil testing areas and water gauging station.
Apex Archaeology	2013d	<i>Wilpinjong Pit 5 - Mining Lease 1573 Surface Collection</i>	Report on Cultural Heritage Works Program arising from EA	Surface collection of sites within Pit 5 under ACHMP.
Apex Archaeology	2014a	<i>Wilpinjong Pit 7 SOW – Mining Lease 1573 Excavation Report</i>	Report on Cultural Heritage Works Program arising from EA	Report on excavations carried out at site WCP92 in the Pit 7 area, in compliance with the existing ACHMP.
Apex Archaeology	2014b	<i>Wilpinjong Coal: Cumbo Creek Salvage Works and Surface Collection of WCP2 and WCP447 Salvage Report</i>	Report on Cultural Heritage Works Program arising from EA	Surface collection of sites WCP2 and WCP447 and test excavations at Cumbo Creek under ACHMP.

Table 3 (continued):

Author	Date	Title	Investigation Type	Details
Apex Archaeology	2014c	<i>Wilpinjong Coal: Removal of Modified Tree WCP 122 Salvage Report</i>	Report on Cultural Heritage Works Program arising from EA	Salvage of modified tree WCP122 under ACHMP.
Navin Officer	2015	<i>Wilpinjong Coal Aboriginal Rock Art Monitoring and Assessment Program: Report on December 2014 Site Inspection.</i>	Report on Rock Art Monitoring	Report on three rock art sites beyond the area of direct mine impact; carried out as part of the monitoring program undertaken under the approved ACHMP (WCPL 2008).

Navin Officer (2006a) undertook a salvage program primarily focused on the Pit 1 and initial infrastructure areas, but included surveys of additional areas. The program included:

- ❑ Collection of surface artefacts from 40 sites;
- ❑ Surveys of areas to be impacted by initial construction and ground disturbance, resulting in the recording of 24 new sites (mostly small open artefact sites), of which a number were salvaged;
- ❑ Surface scrapes of small sample areas within site WCP11, the 'Rail Borrow Area' and the 'Select Borrow Area'; and
- ❑ Mechanically excavated test pits (eight in total) at site WCP11, the 'Rail Borrow Area' and the 'Select Borrow Area'.

Only 319 artefacts were recovered, and of those, only 266 from 24 different locations were subject to analysis. These results indicate that much of the salvage activities occurred in locations of low heritage potential or the sampling strategy was insufficient to identify and recover the heritage evidence present. The combined assemblage was dominated by quartz (74%). Flake portions (34%), flakes (29%) and lithic fragments (17%) were the most frequent types.

Navin Officer (2006b) also undertook a comprehensive baseline recording of the rock shelter with art sites WCP 72, 152 and 153.

Kayandel Archaeological Services (Kayandel 2006) reported on surveys undertaken within 'escarpment areas' within 500 metres of the open cut pits to satisfy Section 4.6 of the ACHMP (2008). During a five day survey an additional 88 sites or PADs were identified, including 55 rock shelters with PADs, seven 'rock shelter complexes' (comprising 21 individual shelters), three 'boulder rock shelters', five isolated artefacts, nine artefact scatters, two scarred trees and eight waterholes.

A number of these sites or PADs were reported with grid references indicating that they are located in the Extension Project area. However, review has established that many grid references reported for these sites/PADs are erroneous. Where the actual reported site has not been able to be relocated (including by virtue of being outside of the investigation area), it has been problematical to correct the grid references and therefore many of the Kayandel (2006) sites/PADs remain with mapped locations that are probably incorrect (refer to Appendix 3). For a number of sites/PADs, this places them inside the Extension Project area, when in fact this is not the case (for example, direct field inspection in the reported locations yielded no evidence of the reported site).

For several examples it was established by physical inspection that the Kayandel (2006) site had been reported with the incorrect grid reference datum (AMG instead of MGA), such as WCP307 which corresponds to WCP480 recorded during the present survey. It is possible that the entire series of sites WE1 - WE88 (WCP 289 - 376) has been reported by Kayandel (2006) with the incorrect datum (AMG/AGD instead of MGA/GDA). Due to the limited information (such as measurements, descriptions and photographs) presented in the Kayandel (2006) site records, it is problematic to resolve this issue for each site without on-ground verification (through inspection of the alternative AMG and MGA locations and a sufficient radius around each to encompass margins of error that could be expected with a hand-held GPS unit in 2006). This was not feasible in the current investigation (for locations outside of the investigation area). However, alternative mapping is presented in Appendix 3 showing the Extension Project Zones 1 - 3 and the Kayandel (2006) sites mapped with their reported datum and with a potentially corrected datum.

Kayandel (Hubschmann and Markus 2011) prepared a draft report documenting the results of the salvage under the ACHMP of site WCP33, in the southern portion of Pit 5. Up to ten 0.5 x 0.5 metre 'shovel probes' were excavated at ten metre intervals along thirteen transects of test units, over a three week period in 2009 (refer to Figure 8). Only 20 artefacts were recovered, predominantly of quartz.

At site WCP33, 36 artefacts were collected from the surface and fifteen 1 x 1 metre units were excavated on transects, over four days in December 2010. The excavations were only taken to a maximum depth of 0.2 metres, but most appear to be less than 0.1 metres. Only six artefacts were recovered. Five scarred trees were also recorded, but examination of the photographs and descriptions indicate that none appear to be of Aboriginal origin. Five small open artefact sites were also recorded (Hubschmann and Markus 2011).

Kayandel (Syme, Zaghoul and White 2013) prepared a draft report documenting the results of test and salvage excavations at site WCP216 (Figure 8). A surface collection was undertaken in August 2011 (with 44 items recovered) followed by test excavations in October and November 2011. A total of 48 test units, each measuring 0.5 x 0.5 metres, were excavated at ten metre intervals along three transects, with subsequent extensions of four units. Units were not excavated at each ten metre interval however. Only 97 artefacts were reported, inclusive of lithic fragments (Syme *et al* 2013). These occurred at a very low density of 8.1 artefacts per conflated square metre. Almost all artefacts were identified in the upper 0.4 metres of deposit. The artefacts were typically quartz (68%) items indicative of non-specific stone knapping (eg. flakes, flake portions and lithic fragments).

A large salvage excavation of 57 m² was undertaken from January to May 2012, expanding on the test unit A180, in which seven artefacts had been initially identified. Contiguous units measuring one square metre were excavated, typically to a maximum depth of 1.1 metres. Syme (*et al* 2013) report that 55% of artefacts were recovered from the 0.05 metre spits 5-11 (equivalent to a depth below surface of 0.25 - 0.55 metres). Only 624 artefacts (including lithic fragments) were recovered, at a very low mean density of 10.9 artefacts per conflated square metre. The artefacts were predominantly of quartz (85%) and representative of non-specific stone knapping (eg. flakes, flake portions and lithic fragments).

Kayandel has also undertaken a number of surveys at Wilpinjong for ancillary works prior to impacts occurring, under Section 4.1 of the ACHMP, and issued 'Cultural Heritage Clearance Forms' for these locations. Collation or reporting of these results is pending.

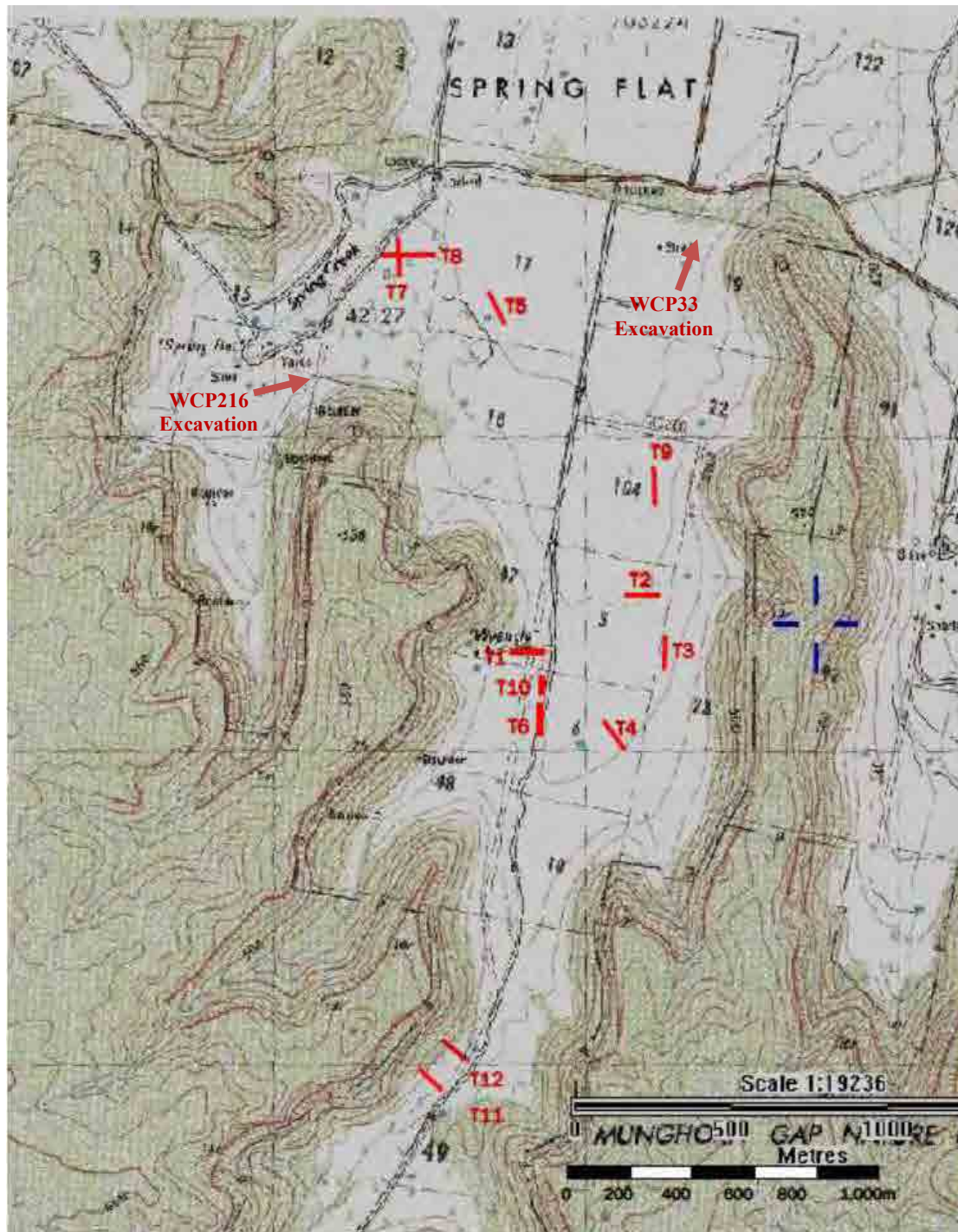


Figure 8: Location of test excavations of Kayandel (T1 - T12) in Pit 5, site WCP33 salvage and site WCP216 salvage (Hubschmann and Markus 2011, Syme *et al* 2013).

South East Archaeology (Kuskie 2014a) undertook the salvage of sites WCP1, WCP65 and WCP237 over 26 days in January and February 2014. Salvage of sites WCP65 and WCP237 proceeded in accordance with the ACHMP (WCPL 2008) and agreements with the Native Title Party in accordance with Section 4.2.2 of the ACHMP. Essentially, this involved the conduct of mechanical surface scrapes over a 40 x 30 metre area at site WCP65 and a 45 x 25 metre area at site WCP237. Salvage of site WCP1 proceeded in accordance with the ACHMP (WCPL 2008) and Modification assessment (Kuskie 2013a), with surface collection over an area of approximately 27,800 m², a broad area hand excavation of a 40 x 1 metre trench (with an additional 8 m² of extensions) and mechanical surface scrapes over a total area of approximately 7,950 m². Numerous artefacts were salvaged and detailed recording and analysis of these items has been conducted (Kuskie 2014a, in prep.).

South East Archaeology (Kuskie 2013b - d, 2014 b - d) and Apex Archaeology (2013 a - c) have also prepared other advice, clearance reports and undertaken due diligence inspections of works both within the approved Project area and in the proposed Extension Project area (refer to Table 3).

Apex Archaeology (2013d) undertook surface collections at 15 sites within the Pit 5 area, under the ACHMP (WCPL 2008). A total of 134 artefacts were recovered. Test excavations were conducted within site WCP92 in Pit 7, with eleven 1 x 1 metre units excavated over six days in September 2013, for the recovery of just two artefacts (Apex Archaeology 2014a). Further excavations and collections of sites WCP2 and WCP447 were undertaken by Apex Archaeology (2014b) in April 2014.

3.2.3 Wilpinjong Coal Mine Modification 5

South East Archaeology (Kuskie 2013a) investigated Modification 5 at Wilpinjong Coal Mine. The investigation area measured 70 hectares in total and comprised a number of spatially separate areas (classified as 'Area 1' through to 'Area 6') fringing the then approved Open Cut and Contained Infrastructure Area (refer to Figure 9).

A comprehensive field survey sampling the entire 70 hectare investigation area was undertaken over five days in January and March 2013, with representatives of the registered Aboriginal parties (Kuskie 2013a). A total of 27 Aboriginal sites, PADs or values were identified or had been previously recorded in the area, predominantly open artefact sites. The nature of the evidence was consistent with the results from the previous heritage assessment (Navin Officer 2005).

No specific aspects of the heritage evidence located within the Modification investigation area were considered to be rare or unique within a local or regional context, although site WCP1 was a less commonly reported example of a larger site in a secondary resource zone, with a relatively high number of artefacts and broad range of types and stone materials (Kuskie 2013a).

One of the open artefact sites was assessed as being of high significance within a local context (WCP1), four as being of low to possibly moderate significance (WCP 2, 213, 216 and 438), sixteen of low significance and one of nil significance. The rock shelter with PAD (WCP340), purported water hole (WCP61) and scarred trees (WCP 64 and 124) were assessed as being of low heritage significance. Notwithstanding the cultural value to the Aboriginal stakeholders of the investigation area, flora/fauna resources, site WCP58 and the identified Aboriginal objects, the size of the impact area was relatively small within a regional context and these places/values were not unique or rare within the region. However, the feature known locally as 'Castle Rock' adjacent to Area 4 was identified by all Aboriginal parties involved in the survey as being of high contemporary cultural significance.



Figure 9: Location of South East Archaeology's (Kuskie 2013a) Modification investigation area (Note: Previously approved Open Cut and Contained Infrastructure Area subject to heritage surveys by Navin Officer {2005}).

The potential impacts of the proposed Modification on each of the Aboriginal sites and cultural areas/values within or immediately adjacent to the investigation area was assessed. In the absence of appropriate management and mitigation measures, it was concluded that the impacts of the proposed Modification on Aboriginal heritage would be low within a local context and very low within a regional context (Kuskie 2013a).

The key recommendations were that the existing ACHMP for the approved Project would be revised to incorporate provisions relating to Aboriginal heritage for the Modification area, particularly surface collection, surface scrapes and broad area hand excavation of site WCP1 (Kuskie 2013a).

3.2.4 Other Relevant Investigations Adjacent to the Wilpinjong Coal Mine

OzArk (2005) conducted a survey of the Wollar to Wellington 330 kV electricity transmission line, which passes through the Wilpinjong locality, immediately to the north of the Ulan - Wollar Road and the Wilpinjong Coal Mine. The survey occurred over 14 days, with inspection made of various tower locations and access tracks, excluding those areas for which property access was not available. Nineteen artefact scatters, seven isolated artefacts and two PADs were identified during the survey, including 13 close to the Wilpinjong Coal Mine around Wilpinjong Creek (WC-OS 12-18, WC IF 2-5 and WC PADs 1-2). Test excavation was recommended for a number of sites, along with monitoring, collection and avoidance of impacts (OzArk 2005). OzArk (2008) subsequently conducted test excavations at four tower locations along Wilpinjong Creek, at sites WC PAD 1, WC PAD 2 and WC-OS-17. Only one 'definite' artefact was recovered from Tower 37 and two artefacts from Tower 53.

A number of sites have been recorded by Kayandel (2006b) in the area immediately north of the Wilpinjong Coal Mine and the Gulgong - Sandy Hollow Railway, in relation to the survey of an Essential Energy (formerly Country Energy) 66 kV powerline route. A total of 32 sites were identified, with 12 listed on the OEH register in the Wilpinjong location, primarily open artefact sites and PADs.

Besant and Wyatt (2011) report on a survey of a two kilometre long rail passing loop along the Gulgong - Sandy Hollow Railway, immediately north of Wilpinjong Coal Mine. Three small open artefact scatters and an isolated artefact were located. A Section 90 Aboriginal Heritage Impact Permit (AHIP) was subsequently obtained for this evidence and the passing loop has been constructed.

Maynard (2011) inspected a small section of the Ulan - Wollar Road at the Cumbo Creek crossing on behalf of the Mudgee LALC and Mid-Western Regional Council in relation to a proposal to replace the causeway. Three artefacts were reported as site 'WR1'.

3.2.5 Moolarben Coal Mine

Moolarben Coal Mine is located immediately west of the Wilpinjong Coal Mine and has been subject to several detailed heritage investigations.

The Aboriginal heritage assessment of the Stage 1 project area of 3,480 hectares was prepared by Hamm (2006a, 2006b). Hamm (2006a) conducted an archaeological survey sampling portions of Stage 1 and identified 222 Aboriginal sites. In the Environmental Assessment (EA) (Wells Environmental Services 2006), it is stated that 302 Aboriginal sites were recorded, with 1,598 Aboriginal objects, comprising 219 isolated artefacts, 63 artefact scatters, 18 rock shelters with artefacts and/or art, one scarred tree and one grinding groove site, along with 14 PADs. Hamm (2006a) noted that the most concentrated occupation areas were the central Moolarben Creek and Bora Creek alluvial flats and the northern ridge lines.

Hamm (2006a) recommended a range of mitigation measures for the sites that may be impacted by Stage 1, including surface collection for 51 sites, test excavation and salvage for 43 sites, intensive recording and salvage for three sites, subsidence monitoring for ten sites, and subsidence monitoring and intensive recording for 13 sites, with the remainder to be left *in situ* to be either impacted or subject to conservation.

An Aboriginal Heritage Management Plan (AHMP) was prepared by Hamm (2008b) for the Stage 1 Main Infrastructure Area (MIA) and Open Cut 1 (OC1) and mitigation measures within this area of 530 hectares were subsequently completed (Hamm and Foley 2010). The salvage activities included:

- ❑ A preliminary geomorphological assessment;
- ❑ Additional surface survey of minor areas for the rail loop expansion, resulting in the identification of three sites (six others were recorded during another investigation for a Modification to the Stage 1 Approval);
- ❑ Surface collection (generally within a grid of 20 x 20 metre collection units) of 34 open artefact sites within the MIA and 32 open artefact sites within OC1;
- ❑ Surface scrapes (each measuring approximately 50 x 4 metres) at 12 locations in the MIA, 17 locations within the rail loop development and 12 locations within OC1;
- ❑ Hand excavation, including three shovel test pit locations within the MIA and two within OC1;
- ❑ Assessment of the scarred tree S1MC1 by an arborist;
- ❑ Artefact analysis and reporting; and
- ❑ Recommendations for further implementation of the Stage 1 AHMP conditions and additional recommendations arising from the results of the salvage investigation.

In total, an approximate surface area of 13,700 m² was subject to controlled mechanical exposure (surface scrapes) and 271 m² excavated by hand in the shovel testing, resulting in the recovery of 2,643 artefacts and identification of 35 new open artefact sites (Hamm and Foley 2010).

The Aboriginal heritage assessment of the Stage 2 project area of 3,700 hectares was prepared by Hamm (2008a). Hamm (2008a) employed a similar survey strategy to Stage 1, using transects that sampled portions of this area over a period of 40 days in late 2006 and early 2007, with additional surveys in June 2008. The survey resulted in coverage of approximately 20% of Stage 2, with effective survey coverage of about 1.9%.

Hamm (2008a) identified 258 Aboriginal sites in Stage 2 (in addition to several previously recorded sites within the area), comprising 102 isolated artefacts and 150 artefact scatters, five rock shelters with artefacts and one grinding groove site. Hamm (2008a) also reported 33 PADs (associated with the open artefact sites, not rock shelters). A total of 4,825 stone artefacts were recorded during the sample survey. Hamm (2008a) identified the "most concentrated occupation areas" as being:

- ❑ The central and southern portions of Murrumbidgee Creek, within 100 metres of the channel;
- ❑ Eastern Creek, a tributary of Wilpinjong Creek, within 100 metres of the channel;
- ❑ The headwaters of the Wilpinjong North Creek catchment, within 100 metres of the creek; and
- ❑ Moolarben Ridge, south of Carr's Gap, and "Trig Station eastern flank of the ridge".

Substantial impacts were anticipated to occur from the open cut mine and infrastructure, with potentially 173 sites affected. Hamm (2008a) recommended a range of mitigation measures for the sites which may be impacted, including surface collection of 133 sites, test excavation and salvage of 34 sites, and intensive recording for six of those sites.

South East Archaeology (Kuskie 2013e) subsequently undertook a survey of a 178 hectare area for a modification to the Stage 1 approval (Stage 1 Optimisation Modification). Almost the entire investigation area was sampled over nine days in November 2012. Five Aboriginal sites (three isolated artefacts and two rock shelters with artefacts) and 28 rock shelters with PADs were reported to occur directly within or immediately adjacent to the investigation area.

3.2.6 Ulan Coal Mine

Comprehensive details of the archaeological investigations undertaken to date at Ulan Coal Mines Limited (UCML), several kilometres north-west of the Wilpinjong Coal Mine, are presented by Kuskie (2009). The investigation of the North 1 Panels Modification and test excavation of three rock shelter sites within the North 1 Panels are reported by Kuskie (2010, 2012).

Haglund and Associates had completed many of the heritage assessments at UCML prior to the year 2000 and South East Archaeology has undertaken investigations at UCML since that date. The key investigations are noted below (refer to Kuskie 2009 for further details):

- ❑ Haglund's (1980a) initial work involved a preliminary archaeological survey of the Ulan Colliery and No. 2 Underground Mine areas (lease CCL741). This survey resulted in the identification and recording of six sites and numerous isolated finds, largely within the area proposed for open cut mining;
- ❑ Further studies were conducted of this area by Haglund between 1980 and 1981 (Haglund 1981a, 1981b). These studies involved the collection of historical and ethnographic information for the region, an intended minimum 50% survey coverage of areas to be affected by the proposed open cut mining and associated works, sampling of sites to be directly impacted by the mining activities, and test excavations of rock shelters and other sites;
- ❑ Corkill (1991) surveyed a four kilometre route of a coal conveyor between the ROM stockpile and just east of the Underground Office, and a 400 x 150 metre area to be impacted by mine infrastructure development northwest of the Underground Office, within CCL741. A proposed diversion channel for Ulan Creek was also investigated. Two artefact scatters and one isolated find were located;
- ❑ Haglund (1992) undertook further surveys in relation to a preliminary investigation of a northward extension of the No. 3 underground mine, a basalt quarry, a new access road and other infrastructure. Sixteen Aboriginal sites were recorded during these investigations, which included "intensive" survey of the areas of proposed surface facilities and access routes and "reconnaissance" inspection of the underground extension area;
- ❑ A shelter site recorded during Haglund's (1992) investigation, ID# 116 (OEH #36-3-177), was subsequently the focus of a salvage excavation (Haglund 1996a), which remains one of the few rock shelters to be excavated within the locality. The salvage excavation was undertaken in February 1996 with a total area of 20 m² excavated and 765 artefacts recovered at a density equating to 139 artefacts/m³;

- ❑ Haglund (1996b) recorded eight rock shelter sites and three artefact scatters during a survey of longwall panels 11 and 12 and associated surface infrastructure;
- ❑ Edgar (1997) surveyed longwall panels 13-17 in the Spring Gully area in 1996 and recorded an additional 16 sites (to those previously recorded by Haglund), including a number of rock shelters and an ochre quarry;
- ❑ The SG5 (Spring Gully 5) rock shelter site (ID# 132), above longwall panel 13, was subject to an extensive salvage excavation in May 1998, prior to undermining. The results were reported by Haglund (2001a, 2001b) and White (2001a, 2001b), with a section on use-wear and residue analysis by Therin (2000). A total of 37 m² was subject to salvage excavation and 10,002 stone artefacts recovered. Radiocarbon dates were obtained for a number of charcoal samples, including one of 4,147 ± 60 years Before Present (BP) (NZA 10766), which equates to an age calibrated to two standard deviations of 4840 - 4446 calBP;
- ❑ Further surveys were undertaken by Haglund from November 1995 to December 1997 as part of the preparation of an EIS for a second longwall mine (Ulan West) and additional lease area, now ML1468 (Haglund 1999a, 1999b). The survey focused on areas susceptible to subsidence impacts and areas of high archaeological potential, but the overall coverage involved a relatively small sample. A total of 59 rock shelters with archaeological deposits were found and at least seven shelters with rock art were also recorded (Haglund 1999a, 1999b). Five rock shelters were associated with grinding grooves, both portable and permanent. Sixteen artefact scatters were located, along with a grinding groove site in an open context;
- ❑ Haglund (1999c, 1999d) conducted further investigations for infrastructure in the northern longwall panels, an irrigation area, earthworks at the aircraft landing strip south of Ulan Road and additional highwall trenches and associated water management measures west of the open cut mine (Open Cut Extension). A number of artefact scatters and potential Pleistocene creek terrace deposits were reported;
- ❑ Kuskie (2000a) investigated the grinding groove site Bobadeen 5 (BO5, ID# 202), within Longwall Panels 25 and 26 and an offset site, Bobadeen 13 (ID# 323);
- ❑ A proposed basalt quarry was investigated in 2002 (Kuskie 2002);
- ❑ In 2003, as part of a proposal to consolidate existing development consents, South East Archaeology prepared a two volume report (Kuskie and Clarke 2003, Kuskie 2004) focused on the assessment of new works and a comprehensive review of all of the previous heritage assessments at Ulan, along with preparation of a revised site database;
- ❑ Further investigations of the area west of the open cut were conducted by South East Archaeology (Kuskie 2004, Kuskie and Clarke 2005a), locating mainly open artefact sites, including evidence of tuff quarries;
- ❑ Kuskie and Clarke (2005a) undertook further investigations of the Open Cut Extension and irrigation area, confirming the probable presence of contexts suitable for the preservation of Pleistocene age evidence of Aboriginal occupation;
- ❑ Kuskie and Webster (2001) undertook a comprehensive survey of longwall panels 18-22, with direct coverage of 57.8 hectares (12% of the 498 hectare study area) and 56 open artefact sites, one rock shelter with archaeological deposit and one ochre quarry located;
- ❑ Kuskie and Clarke (2005b) undertook a comprehensive survey of longwall panels 23-26 and W1, with direct coverage of 85.8 hectares (10% of the 840 hectare study area) and 52 open artefact sites, seven rock shelters with artefacts, three grinding groove and artefact scatter sites, two other grinding groove sites and one scarred tree being recorded;

- ❑ Kuskie and Clarke (2007) undertook a comprehensive survey of longwall panels W2 and W3, with direct coverage of 75.8 hectares (21% of the 351 hectare study area) and 22 open artefact sites, two rock shelters with grinding grooves and artefacts, two rock shelters with grinding grooves, and two rock shelters with artefacts reported (including several previously recorded sites);
- ❑ Kuskie (2009) investigated a large portion of the Ulan lease for the Continued Operations Project. An extensive field survey was conducted over 104 days in 2008, sampling an area of 4,785 hectares, and resulting in the development and refinement of a detailed model of occupation for the locality. During the survey 8,774 stone artefacts were recorded in detail and in total 709 Aboriginal sites and 296 rock shelters with PADs were recorded within the study area. These sites comprised 558 open artefact sites, nine open grinding groove sites, 128 rock shelters with artefacts, art and/or grinding grooves, five scarred trees, five stone arrangements, two ochre quarries, a waterhole/well and a combined groove and artefact scatter site. Overall, artefacts occurred at a very low mean density of 0.0176 per square metre of effective survey coverage and the spatial distribution and nature of evidence was inferred to be largely consistent with background discard, interspersed by occasional focalised areas of higher artefact density where activities or repeated activities occurred. This evidence indicated that Aboriginal utilisation of the study area was generally of a low intensity, which was inferred to relate to the limited presence of higher order watercourses within the analysis area (being situated on and around the crest of the Great Divide) (Kuskie 2009);
- ❑ Kuskie (2010) investigated the North 1 Panels, in relation to a modification to the Continued Operations Part 3A Project approval. A comprehensive field survey sampling almost the entire 236 hectare investigation area was undertaken in 2010, with 32 rock shelters with PADs, nine rock shelters with artefacts, one rock shelter with art, one rock shelter with grinding grooves and artefacts and seven open artefact sites recorded;
- ❑ Test excavation of rock shelter sites ID# 104, 105 and 1420 within the North 1 Panels was undertaken by South East Archaeology (Kuskie 2012). A total of 2,896 stone artefacts were retrieved in the three square metres of test excavations, comprising 1,709 artefacts from ID# 104, 904 artefacts from ID# 105 and 283 artefacts from ID# 1420. An Aboriginal fireplace in ID# 105 was radiocarbon dated to around 3,200 to 3,500 years ago;
- ❑ Salvage excavation of rock shelter sites ID# 104 and 105 within the North 1 Panels was undertaken by South East Archaeology in 2012, with excavation of 2 m² in ID# 105 and 6.75 m² in ID# 104;
- ❑ Test excavation by South East Archaeology of 12 rock shelter sites within longwall panels W3 and W4 has been partially completed; and
- ❑ Numerous ongoing activities have occurred under the Part 3A approved Heritage Management Plan, including surveys along roads, pipeline corridors, conveyor routes and other infrastructure locations with surface collections of artefact sites where required, surveys of areas previously not subject to inspection, blast monitoring of rock shelter sites, and salvage by collection and excavation of sites within the Open Cut Extension area.

3.2.7 Other Relevant Regional Investigations

In the broader region, there have been a number of relevant archaeological investigations, as listed below:

- ❑ Initial surveys in the Gulgong - Ulan - Cassilis area were undertaken by the Australian Museum in the period 1965 - 1967. A small rock shelter, BOB/1 (OEH #36-3-0005), was excavated in 1967, with the results reported by Moore (1970). The site is located along Bobadeen Creek, north of its junction with the Goulburn River. A relatively high number of artefacts (16,609 in total) were recovered from the small shelter, at a density of around 4,260 artefacts/m³. Moore (1981) concluded that occupation of the site began about 6,000 years BP;
- ❑ Pearson (1981) undertook a broad-ranging PhD study of Aboriginal settlement in the Bathurst - Mudgee - Wellington region and more recent non-indigenous settlement. This included sample surveys for Aboriginal sites in various locations, including the "Mudgee - Cooyal area", extending across the Moolarben, Cooks Gap and Cooyal localities, along with test excavation of the Botobolar 5 rock shelter;
- ❑ McBryde conducted an archaeological survey that sampled portions of an area of 5,000 km² in the region of Dunedoo, Gulgong, Wollar and Coolah. Thirty Aboriginal heritage sites were located during this investigation, which was part of research focusing on rock art within the western slopes of the New England region (Haglund 1981a);
- ❑ Haglund (1980b, 1981c) undertook a heritage study for the Kerrabee Dam proposal, across much of the area that is now conserved as the Goulburn River National Park. Located between Mudgee and Sandy Hollow, it covers an area of 70,161 hectares, with the adjoining Munghorn Gap Nature Reserve covering a further 5,935 hectares (DEC 2003). Surveys focused on sampling some of the alluvial flats and lower slopes associated with major watercourses that were likely to be inundated by the proposed dam. A total of 343 Aboriginal sites were recorded, including rock shelters with deposits and/or art, artefact scatters and grinding grooves. Several rock shelters were excavated to reveal deposits with a variety of organic materials (eg. bones of macropods, potoroo, rat, skink, birds, bandicoot and fish, shell, fur and burnt wood) (Haglund 1981c);
- ❑ Haglund (1985) undertook a desktop assessment of the Aboriginal heritage resources of Mudgee Shire; and
- ❑ Purcell (2002) undertook a broad regional cultural heritage study of the Brigalow Belt South Bioregion, which stretches west from the Wilpinjong area to Dubbo and north to Moree and measures over 52,000 square kilometres in area. In a wide-ranging project, over 110 oral history interviews were conducted, 60 traditionally used plant species documented, extensive landform mapping was undertaken, and 1,110 Aboriginal sites were located and recorded. From the oral historical research, Purcell (2002:35-38) identified a number of broad themes, such as the role of plants and animals in Aboriginal life, forests, rivers, movement, living places, aspects of community life and activities, control and suppression through the historical period, work, land management, heritage and attachment to country.

3.2.8 Synthesis

Several archaeological surveys and salvage programs have been undertaken within portions of the current investigation area, or in the immediate surrounds, primarily in relation to the Wilpinjong Coal Mine (Navin Officer 2005, 2006a, 2006b, Kayandel 2006, Kuskie 2013a).

The extent of existing archaeological survey coverage directly within the current investigation area is not known, as it has not been reported in several of the previous investigations, however it is assumed to have been relatively limited. Prior to the conduct of the present investigation, approximately 156 Aboriginal sites/PADs were known to occur inside or within approximately 100 metres of the heritage investigation area (for detailed assessment) (refer to Figure 6, Table 2 and Appendix 2).

Archaeological investigations at the Wilpinjong, Moolarben, Ulan coal mines and elsewhere in the locality have resulted in the identification of a large number of rock shelter sites with archaeological deposits and/or rock art or grinding grooves, along with many shelters with potential deposits. The large numbers of shelter sites partly reflects the focus of the underground mining related surveys, which have predominantly targeted sandstone rock formations within elevated terrain. These sites have been identified in isolated rock formations and more commonly along more extensive rock formations. The shelter sites vary widely in terms of topographical context (eg. distance to watercourse, size/order of watercourse and aspect), contents, nature (eg. size of shelter and extent of habitable floor area) and potential (eg. depth and extent of potential artefact deposits). Apart from several major sites such as the "Hands on Rock" complex (approximately 14 kilometres north-west of the Wilpinjong Coal Mine), rock art occurs relatively infrequently in the recorded shelters and tends to comprise red ochre hand stencils (Kuskie 2009).

Numerous open artefact occurrences have also been identified in the locality. The numbers of artefacts vary from minor scatters and numerous isolated finds, for which details have not often been recorded in earlier studies, to dense concentrations of lithic material with hundreds of artefacts present. A conservative conclusion is that artefact evidence is distributed in a widespread manner across the locality, in generally low densities equating to background discard (manuport and artefactual material which is insufficient either in number or in association with other material to suggest focused activity in a particular location; *cf.* Rich 1993, Kuskie and Kamminga 2000), with occasional higher densities representing more focused occupation (eg. encampments, or events of longer duration or involving larger numbers of people) or repeated occupation in favourable environmental contexts. Such contexts appear to include elevated, well-drained and low gradient flats, terraces, spur crests, ridge crests and simple slopes adjacent to watercourses, particularly higher order watercourses and/or multiple subsistence resource zones.

The identified artefact evidence tends to predominantly comprise items associated with non-specific stone flaking, on quartz and to a lesser extent tuff, chert and other stone materials. Other activities are also represented, such as microblade and microlith production, discard of microliths and discard of non-microlith tools, many of which are associated with working of plant and/or animal materials, food preparation or tool maintenance (Kuskie 2009).

Grinding groove sites in the locality are typically located in sedimentary bedrock along watercourses, but also occur on open surfaces of sandstone in other contexts (eg. simple slopes) and on smaller sandstone slabs or surfaces in rock shelters.

Other Aboriginal site types have been recorded in low numbers within the locality, including scarred trees, ochre quarries, lithic quarries, stone arrangements, waterhole/wells and a possible burial. Sites of traditional or historical cultural significance to Aboriginal people (excluding the contemporary significance attached to the site types noted above), have also been reported within the locality.

Excavations of rock shelters provide valuable information about the nature and chronology of Aboriginal occupation in the locality. Moore's (1970, 1981) investigations of the Bobadeen 1 site provide a basal date of about 6,000 years BP for the locality, while Pearson (1981) recovered an occupation date of 5,500 years BP from a shelter at Botobolar, towards Mudgee. Nevertheless, a number of contexts have been identified within the locality that could host older evidence of Aboriginal occupation extending back into the Pleistocene period (ie. over 10,000 years of age), including creek terrace deposits covered by colluvial slopewash and rock shelter sites.

3.3 Local Aboriginal Culture

The investigation area lies within the north-eastern portion of the territory of the Wiradjuri people as defined by Tindale (1974) and Horton (1994, 2000), close to the boundary with the Kamilaroi to the north, and the Geawegal and Wonnarua further to the east (refer to Figure 10).

Pearson (1981:75-76) inferred from the ethnohistorical evidence of Gunther, Lawson, Cox and others, that the upper Macquarie was inhabited by large localised groups of Aboriginal people, who in the normal course of life were divided into small groups of up to 20 people. These groups could easily come together for short periods for subsistence, ceremonial or social reasons and form larger groups of 80 to 150 people.

Pearson (1981:81) inferred that the Wiradjuri in the Upper Macquarie River region was probably subdivided into three groups, one centred in the general Mudgee-Rylstone area and the others in the general areas of Bathurst and Wellington. Haglund (1999a) noted that these groups may have comprised several clans each, with descendants of one of at least two clans in the Mudgee-Rylstone group still living in the locality. Pearson's (1981:81a) map of the hypothetical group distributions places the Mudgee-Rylstone group in the vicinity of the Wilpinjong locality, albeit on the fringe of other (probable Kamilaroi) territory to the north.

Haglund (2001a) noted in relation to Howitt's (1904) claim that one group of Kamilaroi lived in the Munmurra Creek area, north of Wollar, that this group may have formed a buffer between the Wiradjuri and Geawegal and Wonnarua. However, the reliability of Howitt's evidence is questionable, due to the late period in which it was obtained and admissions to knowing very little about this region. At the time of non-indigenous contact, there was both friendly and hostile contact between the north-east Wiradjuri and the Kamilaroi and Wonnarua people. Cassilis Gap was a known travel route.

A wide variety of subsistence resources were available in the past to the local Aboriginal people. Ethnohistorical and other evidence suggests that the diet of the local Aboriginal people would have included amongst other foods, possum, kangaroo, wallaby, wombat, kangaroo rat, platypus, lizards, snakes, goanna, tortoise, fish, mussels, crayfish, various birds, insects, and various plants (Pearson 1981:335).

Predominantly within the immediate vicinity of the areas that are the subject of the present investigation it was the subsistence resources of forest and woodland environments that were available for exploitation. However, portions of the investigation area are located closer to a third or higher-order watercourses or other possible areas of water retention (for example, billabongs, swamps or marshes), where more reliable potable water and subsistence resources would have been available. These areas include:

- ❑ Portions of Areas A, H and G close to Wilpinjong Creek and its associated creek flats;
- ❑ Portion of Area A close to the lower section of Planters Creek;

- ❑ Portions of Area B close to the third order Spring Creek;
- ❑ Portions of Area C close to the third order Spring Creek tributary;
- ❑ Portions of Area F close to the higher order Cumbo Creek; and
- ❑ Portions of Area G close to the lower section of the un-named watercourse in Slate Gully.

The material culture of the local Aboriginal population would have included a range of items related to subsistence, cultural and social activities and shelter. However, in the archaeological record, few of these items are preserved. Stone, bone and shell are the materials most frequently represented in archaeological sites.

The influx of non-indigenous settlers into the region had profound effects upon the Wiradjuri, as the newcomers sought to gain the land for agricultural and pastoral utilisation and later for mining the valuable mineral resources present (Clayton and Barlow 1997). In the Ulan area, fighting between non-indigenous and Aboriginal people occurred in the 1820s as settlers sought to establish grazing runs, with hostilities peaking between 1824 and 1826 (Haglund 1999a). The dramatic increase in the number of non-indigenous settlers around Mudgee, Bathurst and Gulgong from the 1850s to the 1870s, during the gold rush, resulted in the displacement of the Aboriginal people and further incidents of warfare (Burless 1997).

Despite all this, the Wiradjuri people survived. Many Wiradjuri families lived apart from the Aboriginal Stations, and no Stations had been established in the late 1800s in the north-eastern Wiradjuri area (Burless 1997). A vibrant Aboriginal population remains in the region today and takes an active interest in the management of their heritage (refer to Section 6 for details of consultation with the Aboriginal community in relation to the present assessment).

In terms of ethnohistorical references, few relate directly to the Wilpinjong locality.

The outlaw, Jimmy Governor (1875 - 1901), who was born on the Talbragar River and received some schooling at Gulgong, worked at Wollar prior to becoming a police tracker at Cassilis from July 1896 to December 1897 (Walsh 1983). After returning to Wollar he married a non-indigenous woman at Gulgong. Jimmy worked hard to assimilate himself in white society, but tensions associated with his employment with John Mawbey near Gilgandra preceded Governor's killing of the Mawbey family. In the ensuing 14 weeks across NSW, revenge was sought on various people, with the killing of Keiran Fitzpatrick near Wollar on 26 July 1900 one of several to occur (Walsh 1983).

The Mt Gambier *Border Watch* (1 August 1900) reports Jimmy Governor as hiding out in the Wollar locality at that time, with 300 armed men giving search between Ulan and Wollar. Ellinghaus (2006) observes that by Jimmy Governor exerting his independence (by marrying a white woman, insisting on proper payment for employment, and by using violence to protest his treatment), he tested and was then caught in the competing demands of the ideology of assimilation that were current in NSW at that time.

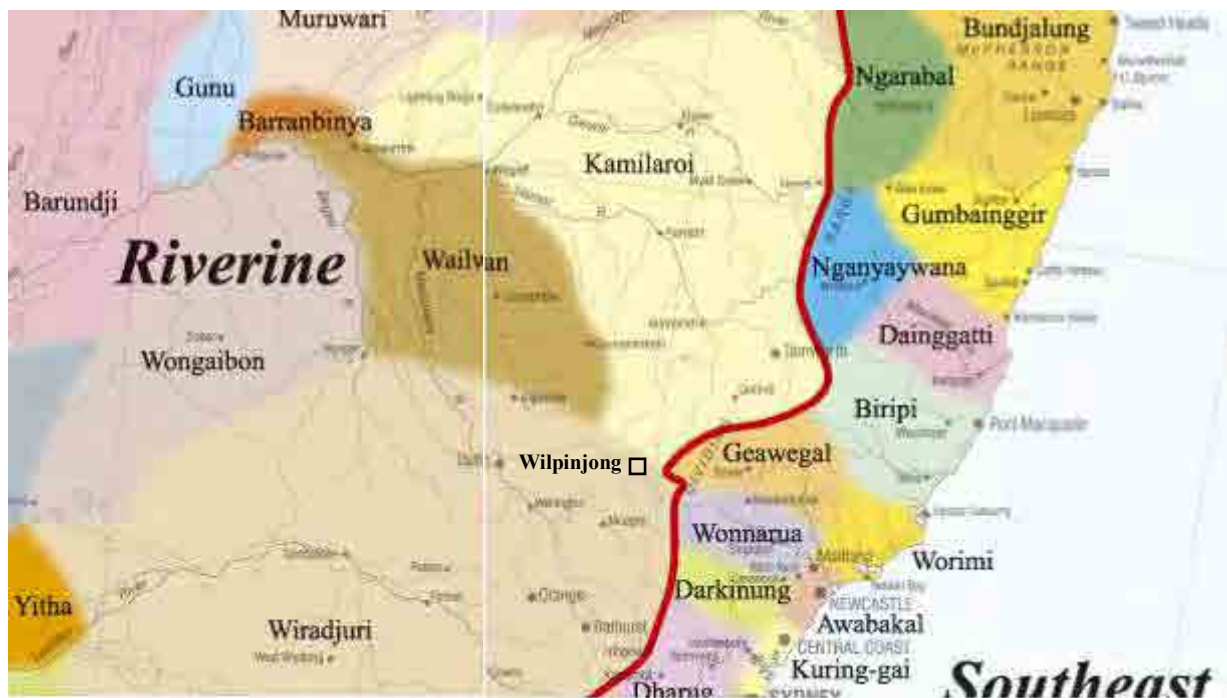
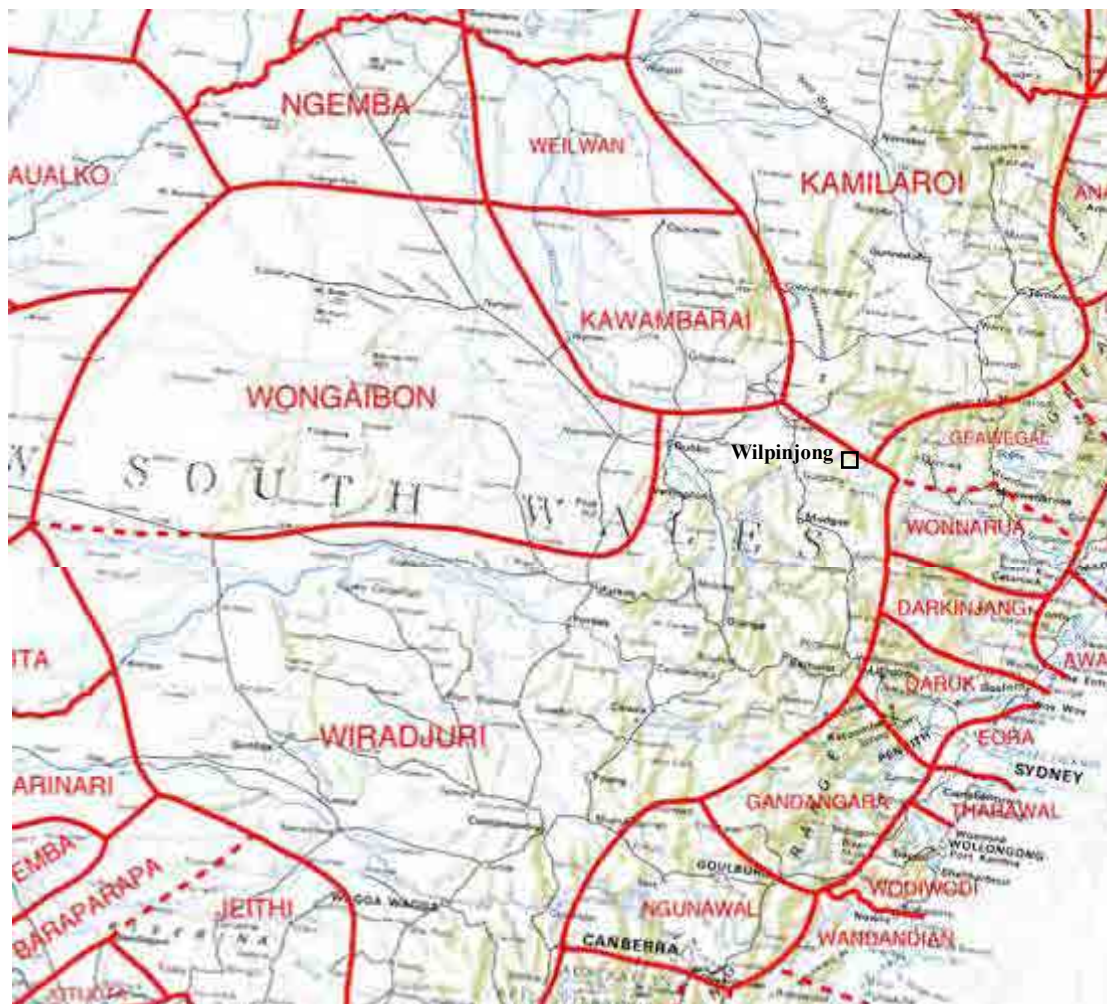


Figure 10: Cultural group boundaries in the Wilpinjong Coal Mine locality (Tindale 1974 above and Horton 2000 below).

Accounts of Jimmy Governor note the presence of an Aboriginal camp at Wollar. The *Bathurst Free Press and Mining Journal* (21 August 1900) reports men, women and children were camped at the Mechanics Institute at Wollar. As a reaction to the Governor killings, and in fear that either Jimmy and his associates would return to Wollar, or Jacky Governor of Wollar would attempt to join his brothers, stricter controls were placed over the Aboriginal people at Wollar and Police initially removed young, able bodied Aboriginals to Mudgee. Five men noted in the *Bathurst Free Press and Mining Journal* (21 August 1900) report were charged with vagrancy and jailed for eight days (an action for which the legality was questioned). Subsequently, the entire Wollar Aboriginal community was forcibly relocated to the Brewarrina Mission (Ellinghaus 2006).

Navin Officer (2005) report that the Aboriginal camp at Wollar may have existed for a significant part of the late 19th Century and into the early 20th Century. Navin Officer (2005) cite an undated extract from a local Wollar correspondent published by the Wollar Centenary Publications Committee (McDermott 1985):

By 1896 it was a rare sight, to see a colony of Aborigines, as most have long since died out in these parts – Wollar has such a small colony who have cosy quarters on the creek bank, living peaceably and happily enough and at times doing little jobs in the shape of ‘ringing’, burning off, and other things. The police are most particular about persons visiting the encampment without a permit, and he who infringes this rule runs the risk of incurring a substantial fine.’

Navin Officer (2005) report that some Wollar residents talked in 1985 about their grandparent’s memory of the Aborigines "voices and laughter echoing across the creek in the night" and that the population was severely affected by an influenza epidemic in 1902 (McDermott 1985). Navin Officer (2005) document a local resident, Mrs Lyn Robinson (born 1906), as recalling how her mother-in-law remembered as a young child, local Aboriginal people passing through the valley and camping ‘around the rocks’. This information places Aboriginal people camping and passing through the valley in the early 20th Century (Navin Officer 2005). Mrs Robinson believed these people were not those that occupied the Aboriginal encampment at Wollar (Navin Officer 2005).

The surveyor R. H. Mathews (1894) describes a bora ceremonial ground near Wilpinjong Creek. Mathews inspected and recorded the bora ground in December 1893 with a local resident, Mr William Carr, who had resided there since childhood. Mr Carr is cited as knowing of the bora ground for more than 30 years and that several boras had been held there. Mr Carr also mentioned numerous marked trees (carved trees) but that most of them had been destroyed by bush fires (Mathews 1894). Mathews (1894) described the bora as comprising a larger circle separated from a smaller circle by a distance of ‘17 chains’ (c. 340 metres) by a winding track. The larger circle, on sandy soil, measures 50 feet (15 metres) in diameter, and the small circle on a gravelly, well-wooded ridge was better preserved. A raised earth outline of a human figure was also present (refer to Figure 11). The OEH AHIMS register lists the approximate location of this site (#36-3-0044) as being on the ridge several hundred metres north of Area H of the present investigation area and immediately adjacent to the Extension Project development application area boundary.

The Wollar Cemetery is thought to contain unmarked burials of Aboriginal people (Lyn Syme pers. comm., 2013; <http://austcemindex.com/cemetery.php?id=110>).

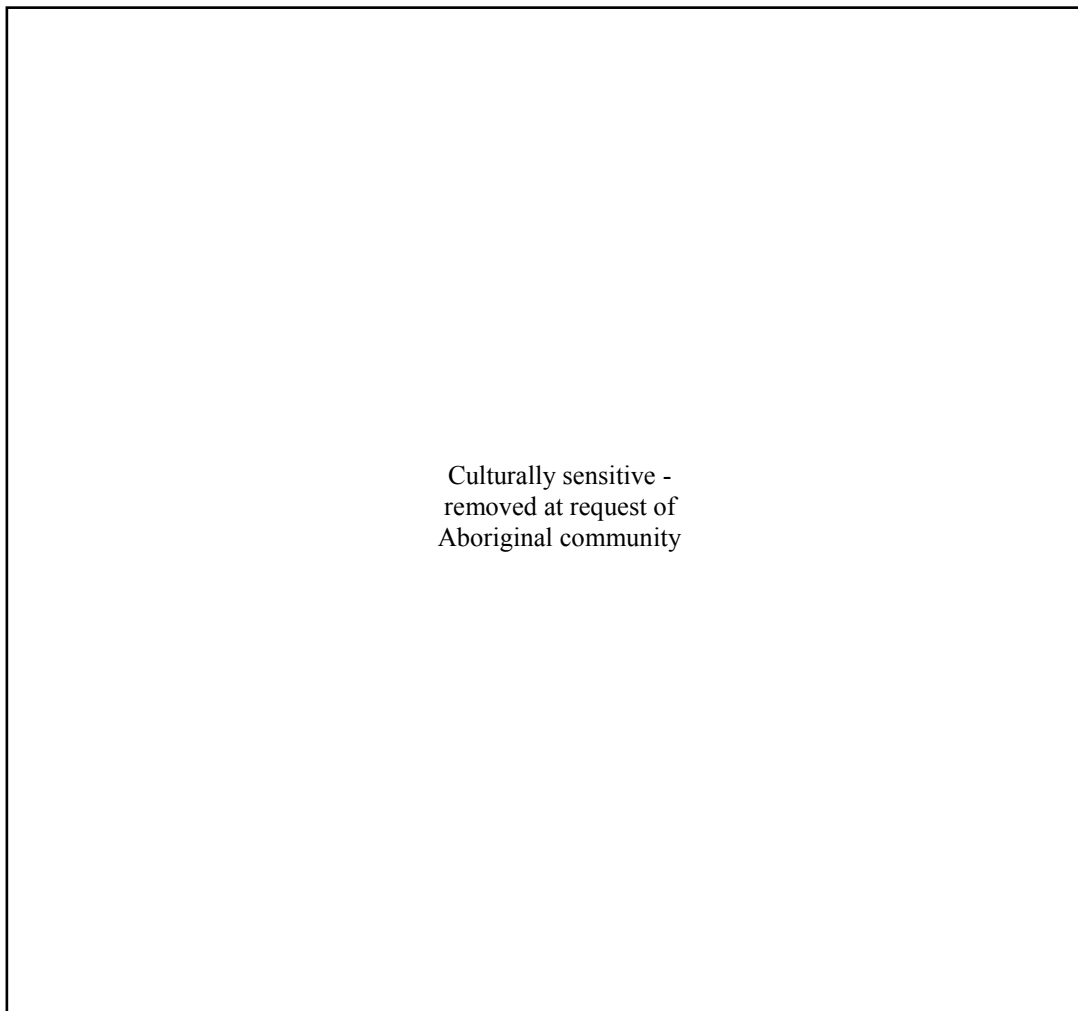


Figure 11: Wilpinjong bora site (Mathews 1894).

3.4 Occupation Model

In order for any investigation to contribute effectively to the management of the heritage resource, the following key elements of a research design (*cf.* Boismier 1991) are essential:

- 1) Identification of the specific environmental and cultural characteristics of the area;
- 2) Construction of a model of Aboriginal occupation for the locality;
- 3) Definition of the expected nature and distribution of evidence;
- 4) Formation of a methodology to test the predictive model and relevant research questions, in consideration of the expected nature and distribution of evidence; and
- 5) Analytical techniques for the evidence recovered that are appropriate to address the research questions and project objectives.

The environmental context of the investigation area has been outlined in Section 2, and the proposed methodology and analytical techniques are discussed in Section 4. The model of Aboriginal occupation for the locality and expected nature and distribution of evidence are discussed below and in Section 3.5.

Several occupation models or elements thereof have been proposed during archaeological studies at Ulan, primarily to explain the results from individual sites (eg. Edgar 1997, Haglund 1999a, 1999d, Witter 1994). These have tended to be narrowly focused on particular aspects of Aboriginal occupation, rather than on the development of a broader model of Aboriginal occupation for the Ulan locality. More recently, White (2001a) has discussed broader regional models of occupation (eg. Attenbrow 1987, Hiscock 1994, McDonald 1994) in relation to the ID# 132 salvage excavation at UCML, particularly with respect to changes over time. White (2001a:8-9, 144-146) presented a revised model of the Eastern Regional Sequence for the region:

- ❑ *Pre-Bondaian phase*: The region was visited sporadically from the end of the Late Pleistocene, probably by small groups of highly mobile people. Tool-kits are inferred to have been highly portable, but inter-site variation is expected in relation to the nature of locally available stone materials and tasks performed, potentially along with the duration and nature of occupation (eg. rare/occasional use of a site or more frequent use);
- ❑ *Early-Bondaian phase*: Occupation of the region increased in the Early Bondaian, but people remained highly mobile. Backed artefacts were more numerous than other retouched and/or utilised tools and were used for a variety of on-site and off-site tasks. Figurative pigment art and possibly open engraved art were developed at this time with increased social interaction (*cf.* McDonald 1994:348);
- ❑ *Middle-Bondaian phase*: Occupation of the region was well established, and people remained highly mobile. Backed artefacts were an integral part of the toolkit and still outnumbered other retouched and/or utilised tools. Backed artefacts were produced *en masse*, particularly in or in proximity to more open valleys. The high discard rate in shelter sites was probably a result of backed artefact production rather than more intensive occupation. McDonald (1994) identifies that pigment and engraved art were important for negotiating increased social interaction during this phase, and backed artefacts and their production techniques may also have related to social factors; and
- ❑ *Late-Bondaian phase*: Group mobility decreased markedly, with people occupying residential sites for longer periods of time, although not semi-permanently or in a sedentary manner. Toolkits changed (probably relating to a shift in emphasis towards the production and use of wooden items), with less discard of backed artefacts, increased discard of edge-ground artefacts, eloueras and grindstones, and increased use of bipolar flaking. McDonald (1994) argues that people stopped using shelters as residential sites (leading to a decline in artefact density), but began to live in larger groups and as such, preferred open site locations for residential camping, using shelters only to escape wet weather or on short-term trips by small numbers of people. White (2001a) however identifies that at ID# 132 lower artefact densities were also a result of the way stone technology was organised at the site.

Kuskie and Clarke (2005b, 2007) proposed several elements that may relate to a general model of occupation for the Ulan locality. Kuskie (2009) further developed this model and identified the nature of evidence required to test the model, so that ultimately through field survey and excavation the model could be refined.

The general model of occupation for the Ulan locality (applicable also to the Wilpinjong area) is outlined below (Kuskie 2009) with the nature of expected *archaeological* evidence to test the individual elements specified in *italics*:

- ❑ Members of the north-eastern clan of the Wiradjuri, that was centred around the Mudgee-Rylstone area, predominantly occupied the study area. Interactions with and visitation from members of neighbouring cultural groups (particularly the Kamilaroi) may also have sporadically occurred;
 - *No specific evidence expected of particular cultural groups.*
- ❑ Occupation primarily occurred within the past 5,000 years, but may have extended as far back as 30,000 - 40,000 years BP (although it is uncertain that any evidence for this may remain);
 - *Charcoal in a cultural context may be radiocarbon dated or other forms of dating may be used to establish the age of occupation.*
 - *Specific artefact types may also provide evidence on the age of occupation.*
- ❑ Occupation was predominantly focused on the relatively more abundant and diverse resource rich zones within the north-east Wiradjuri territory (eg. the junction of multiple resource zones) particularly along higher order watercourses (eg. the Goulburn River and Talbragar River). Within these *primary resource zones*, such occupation could include nuclear/extended family base camps, community base camps and occasional larger congregations of groups where resources permitted. Encampments in more favourable locations (eg. abundant resources and water) may have been the subject of stays of longer duration and more frequent episodes of occupation than in other areas (eg. *secondary resource zones*, refer below);
 - *Substantially higher counts and densities of artefacts and numbers of activity areas, along with a greater range of stone material and artefact types may occur in the primary resource zones than in other areas.*
 - *Encampments in more favourable locations used for longer durations and more often may exhibit greater superimpositioning of activity areas, greater quantity and density of evidence, and evidence of different episodes in the form of in situ deposits with stratified or vertically separated evidence of activity events and datable material.*
 - *Refer below for discussion of expected evidence for different occupation types.*
- ❑ Outside of the primary resource zones sporadic occupation of *secondary resource zones*, focused on the watercourses and swamps/wetlands, particularly within close proximity of higher order watercourses and associated flats and terraces (eg. the higher order portions of Cumbo Creek, Wilpinjong Creek, etc.). These zones were utilised for encampments by small parties of hunters/gatherers and nuclear/extended family groups during the course of the seasonal round. There was a strong preference for camping on level ground, adjacent to reliable water sources and more abundant subsistence resources. A greater range and frequency of activities were undertaken at the encampments, rather than in the surrounding landscape. Camp sites near the watercourses were occupied by these small groups of people for varying lengths of time (but of typically short duration), during both the course of the seasonal round and in different years. Occupation of these camp sites was predominantly sporadic, rather than continuous;
 - *Moderately higher counts and densities of artefacts and numbers of activity areas, along with a relatively broad range of stone material and artefact types may occur in the secondary resource zones than in other areas, but to a much lesser degree than in the primary resource zones.*
 - *Refer below for discussion of expected evidence for different occupation types and identifying whether occupation is sporadic or continuous.*

- Occupation outside of the primary resource zones and secondary resource zones tended to involve hunting and gathering activities by small parties of men and/or women and children, along with transitory movement between locations and procurement of stone materials. However, the utilisation of these areas (eg. typically simple slopes, ridge crests, spur crests and lower order watercourses) was far less intense than along the higher order watercourses or swamp margins where encampments were situated and potable water and more abundant resources present. These areas outside of the primary and secondary resource zones were probably typically exploited during the course of the normal daily round by inhabitants of encampments located in the primary or secondary resource zones, foraging within an area of up to ten kilometres radius from their campsites;
 - *Evidence of low intensity occupation that may include low to very low artefact counts and densities and low numbers of activity areas, along with dates/stratigraphy indicating sporadic occupation over time, not continuous occupation.*
 - *Refer below for discussion of expected evidence for different occupation types.*
- Occupation outside of the primary and secondary resource zones also involved special purpose journeys (eg. to procure stone or ochre from a known source or to access an area for ceremonial/spiritual purposes) and non-secular activities (eg. ceremonial activities);
 - *Evidence of lithic or quarry sites may occur at stone/ochre sources. More abundant evidence at a particular location may indicate repeated and special-purpose visits, as may the absence of evidence associated with other occupation types.*
 - *Refer below for discussion of expected evidence associated with ceremonial activities.*
- Thus, occupation extended over the entire tribal territory, with varying intensities and involving different activities, and occurring at different times of the year and different periods within the overall time-span of occupation;
 - *Evidence of occupation at different times of year may be tested only if specific seasonal plant/food evidence and/or associated tool types involved in their processing can be identified in association with occupation.*
 - *Identification of different episodes of occupation over time would require in situ deposits with stratified or vertically separated evidence of activity events and datable material.*
- Activities such as food procurement (hunting, gathering and land management practices such as burning-off), food processing, food consumption, maintenance of wooden and stone tools, production of stone tools (including systematic production of types such as backed artefacts, as well as hafting of implements and casual, opportunistic production of other items on an as needed basis), production of wooden tools and other implements, procurement of stone, erection of shelters, children's play, ceremonial activity, spiritual activity, human burials and social and political activity were among the types of pursuits engaged in by the local Aboriginal people across the tribal territory;
 - *Food procurement (including hunting, gathering and land management): minimal evidence expected for most types of food procurement, apart from the presence of stone artefacts such as eloueras, wooden implements where preserved, such as digging sticks, or food refuse (eg. shell and bone) in sites.*
 - *Food processing and consumption: evidence expected includes tools with specific use-wear/residues on cutting/chopping/pounding edges, specific tools that are related to processing certain foods (eg. eloueras, seed grinding slabs), evidence associated with hearths or ovens, and food refuse (eg. shell and bone) in sites.*
 - *Production and maintenance of wooden implements: expected evidence includes stone and shell tools with design and/or use-wear/residues consistent with working wood, and the presence of wooden implements in sites.*

- *Production of stone tools: evidence expected includes hammerstones, anvils and most abundantly knapping debitage (eg. cores, flakes, flake portions, microblades, etc), along with some of the finished tools themselves.*
 - *Production of backed artefacts: evidence expected includes finished microliths (unused), bondi point preforms, backing flakes, chimblers/hammerstones, high quantities of debitage including a high frequency of elongated flakes (microblades);*
 - *Maintenance of stone tools: expected evidence includes cutting-edge rejuvenation flakes (eg. flakes from utilised edges of eloueras or other tools), portable whetstones, and axe-grinding grooves in sandstone.*
 - *Procurement of stone: presence of stone sources and evidence for procurement at those sources (lithic quarry sites).*
 - *Ceremonial activity: presence of ochre in sites, and evidence of ceremonial sites (bora grounds, stone arrangements, carved trees, rock engravings, etc).*
 - *Spiritual, social and other activity: presence of ochre in sites, evidence of ceremonial sites (bora grounds, stone arrangements, carved trees, etc) and rock art and engravings.*
- ❑ Activities varied in frequency and occurrence within the landscape (and between the different occupation site types), probably in relation to numerous variables such as topography, distance to resource zones, distance to water, aspect, slope and cultural choice. However, few activities will be evident within the archaeological record other than those involving the use of stone, or where preservation conditions permit, other materials such as bone, shell and wood. The majority of evidence within an archaeological context will relate to the reduction of stone, but some evidence will exist of hearths, food processing, food procurement and ceremonial and other activities;
- *Predominance of stone artefacts as the surviving physical evidence of occupation.*
 - *Occasional evidence of hearths and other activities (refer elsewhere in this section).*
- ❑ The stone material quartz was favoured for stone working activities, largely because of its local availability. Tuff was also used, along with chert in lower frequencies, with the relatively intensity of use of each material dependent upon the proximity of local colluvial and alluvial and terrestrial outcrop sources;
- *Predominance of quartz within the artefact assemblages. Evidence of nature and location of stone sources and attributes on individual artefacts that can potentially be linked to sources (eg. cortex, size, extent of reduction).*
- ❑ Stone was typically procured during the course of normal daily and seasonal movements, without the need for special purpose trips. The conservation of the most commonly used stone materials was not a priority. However, high quality less commonly utilised materials may have been procured from more distant sources by special purpose journeys and/or trade;
- *Presence of stone sources and evidence for procurement at those sources (lithic quarry sites). More abundant evidence at a particular location may indicate repeated and special-purpose visits, as may the absence of evidence associated with other occupation types. Particular stone materials may be traced by chemical/physical tests.*
- ❑ Casual and opportunistic reduction of stone or selection of flakes to meet requirements on an 'as needed' basis was a widespread occurrence. Suitable flakes (sometimes after being retouched) were used in domestic tasks such as fashioning or repairing a wooden implement, while a higher proportion of flaked products were simply discarded at the site of their manufacture, without use;

- *Limited evidence of activity areas associated with microblade/microlith production, and presence of artefacts relating to non-specific knapping with a low proportion of items possessing retouch or use-wear may be expected.*
- ❑ A low frequency of items was knapped using bipolar technology. This technology is largely, although not entirely, restricted to the reduction of quartz. It is likely that this technology was mainly employed to reduce small pebbles rather than as strategy to prolong the use-life of existing cores;
 - *Presence of artefacts associated with bipolar knapping in relatively low frequencies, and mostly on quartz.*
- ❑ Exposed sandstone bedrock was used for the shaping and/or maintenance of ground-edge hatchets. This activity may have been occasional and incidental to transitory movement or short-term occupation during the course of the normal daily hunting/gathering round, rather than a result of special purpose visits;
 - *Sites with grinding grooves may exhibit evidence consistent with transitory movement or hunting/gathering without camping. Sites with extensive evidence of grinding and limited evidence of other activities will not occur.*
- ❑ Plant foods were processed and consumed at temporary hunter/gatherer encampments, at family base camps, and where larger groups of people congregated, as well as at the sites of procurement. A range of plant resources was available in the region. Women played a much larger role than men in obtaining and processing plant foods;
 - *Evidence relating to food processing and consumption occurring in association with evidence representative of these site types.*
- ❑ Animal foods were processed and consumed at temporary hunter/gatherer encampments, at family base camps, and where larger groups of people congregated, as well as at the sites of procurement. Men hunted for larger game, while women played a key role in obtaining smaller game.
 - *Evidence for consumption and processing of animal food located in association with evidence interpreted as representing these occupation types.*

The proposed model of occupation for the Ulan locality (Kuskie 2009) has been derived from archaeological, ethnographic, ethnohistorical and anthropological information. However, as these data are generally scant and subject to biases and other constraints, the proposed model is highly inferential and speculative in nature and subject to reassessment by more detailed future investigations throughout a wide range of environmental/cultural contexts in the region.

Much of the Extension Project investigation area is located in contexts that do not conform to primary or secondary resource zones. These areas are distant from higher order watercourses. According to the modelling above, occupation of these portions of the investigation area is therefore more likely to have related to hunting and gathering activities, along with transitory movement between locations and procurement of stone materials, and have been of a generally low intensity.

However, small portions of Areas A and G and all of the small Area H are located within 200 metres of Wilpinjong Creek, small portions of Area F are within 200 metres of Cumbo Creek, a small portion of Area A is along the lower portion of Planters Creek and a small portion of Area G is along the lower portion of Slate Gully. These areas possibly comprise secondary resource zones, where more reliable potable water and subsistence resources may have been available. According to the modelling above, occupation of these portions of the investigation area may have included camping by small parties of hunters/gatherers and nuclear/extended family groups, in addition to hunting and gathering and transitory movement between locations. Occupation of these areas is expected to have occurred at a higher intensity than in the surrounding areas.

In general terms, the nature of occupation at each site within the investigation area could represent a variety of circumstances (Kuskie and Kamminga 2000), for example:

- ☐ Transitory movement;
- ☐ Ceremonial activity;
- ☐ Hunting and/or gathering (without camping);
- ☐ Camping by small hunting and/or gathering parties;
- ☐ Nuclear/extended family base camp;
- ☐ Community base camp; or
- ☐ Larger congregation of groups.

The evidence could represent a single episode or multiple episodes of one or more of the above types of occupations. The episodes of occupations could have occurred at different times over the entire time-span of occupation in the region. Each episode of occupation could also have been for a different duration of time.

Unless the archaeological evidence for individual activity events is readily identifiable, it can be highly problematic to determine the types of occupation, number of episodes, and times and duration represented by evidence at a particular site. Suitable circumstances are rarely present in open sites, due to mixing of evidence by post-depositional processes and the superimpositioning of evidence caused by repeated episodes of occupation.

Listed below is a brief description of the nature of each type of occupation and the material circumstances or evidence that may relate to such occupation types within the present investigation area (*cf.* Kuskie and Kamminga 2000):

Transitory movement:

- ☐ May occur when an individual or group of people are moving between base camps, or from a campsite to resources or a ceremonial or other special purpose site;
- ☐ Duration would be less than a day and probably less than a few hours;
- ☐ Total numbers of people would generally be relatively low;
- ☐ Could occur on most topographical units and classes of slope, but possibly more frequently on ridge and spur crests and along watercourses and valley flats;
- ☐ Could occur in any type of rock shelter (ie. any size, topographic location, or distance from water source) where shelter may be sought from inclement weather;

- ❑ Proximity to potable water was probably not important;
- ❑ Proximity to food resources was probably not important;
- ❑ Evidence may represent accidental discard, repair of hunting or gathering equipment, children's play or knapping activity;
- ❑ Quantity and density of evidence and range of artefact and stone types are expected to be low, consistent with 'background discard', with few discrete activity areas unless repeated episodes have occurred causing superimpositioning.

Ceremonial activity:

- ❑ May occur when a group of people gathers at a particular location to perform a ceremony;
- ❑ Evidence may be present of ceremonial site features such as earthen rings or stone arrangements, or ochre;
- ❑ Evidence of large encampments (similar to that expected for the 'larger congregation of groups' listed below) may be present nearby, including in locations with an aspect towards the ceremonial site.

Hunting and/or gathering (without camping):

- ❑ May occur when an individual, or more likely a small group of closely related people, engage in hunting activities (more likely to be a party of men) or gathering activities (more likely to be women and children);
- ❑ Duration would be less than a day, with people returning to a base to sleep;
- ❑ Total numbers of people would be relatively small;
- ❑ Would be expected to occur where food resources were available, which for different foods may be a seasonal or annual occurrence;
- ❑ Could occur in any type of rock shelter (ie. any size, topographic location, or distance from water source) particularly where shelter may be sought from inclement weather;
- ❑ Proximity to potable water was probably not important;
- ❑ Evidence may represent accidental discard, loss during use, repair of hunting or gathering equipment, children's play or knapping activity;
- ❑ Quantity and density of evidence and range of artefact and stone types are expected to be low, consistent with 'background discard', possibly with a few discrete activity areas. Loss or discard of specific tool types may be a useful indicator (particularly items with use-wear/residue that are not in association with evidence of their manufacture or maintenance). Repeated visits to particularly food sources may cause a build up of unrelated evidence over a period of time in a specific location.

Camping by small hunting and/or gathering parties:

- ❑ May occur when an individual, or more likely a small group of closely related people, that are engaged in hunting activities (more likely to be a party of men) or gathering activities (more likely to involve women and children) camp overnight near the resource being procured;
- ❑ Duration would be one or several days;

- ❑ Total numbers of people would be relatively small;
- ❑ Would be expected to occur close to where food resources were available, which for different foods may be a seasonal or annual occurrence;
- ❑ Would be expected to occur in open contexts and also in rock shelters, particularly relatively larger rock shelters with sufficient habitable floor areas for activities and sleeping. Aspect of the rock shelter towards the rising or setting sun may have been important;
- ❑ Proximity to potable water probably was important, although temporary sources may have been sufficient;
- ❑ Evidence may represent accidental discard, repair of hunting or gathering equipment, children's play, stone knapping activity, food processing or temporary camp fires;
- ❑ Quantity and density of evidence and range of artefact and stone types are expected to be low to moderate, and distinguishable from 'background discard', with at least several activity areas. A reasonably broad range of artefact and stone types may be discarded (although not as diverse as expected at a base camp). Items likely to be cached for future use at a base camp, or unlikely to be carried around on a hunting or gathering journey (eg. grindstones) are not expected to occur. Time-consuming activities like construction and use of ovens or heat treatment pits are also unlikely to have occurred.

Nuclear/extended family base camp:

- ❑ May occur when a single nuclear family or extended family camps together;
- ❑ Duration uncertain but probably dependent on availability of food resources and potable water in the locality;
- ❑ Total numbers of people would be relatively small;
- ❑ In open sites, probably situated on level or very gently inclined ground, close to potable water and close to food resources;
- ❑ In rock shelters, probably occurred in shelters close to potable water (with greater potential near higher order sources), close to food resources and only in large rock shelters with sufficient habitable floor area for activities and sleeping. Aspect of the rock shelter towards the rising or setting sun may have been important;
- ❑ The encampment area in open contexts may consist of a several small huts, dispersed in a spatial patterning depending on the social mix of the people;
- ❑ Evidence may represent accidental discard, repair of equipment, children's play, stone knapping activity, food processing, campfires, heat treatment of silcrete and manufacturing of tools;
- ❑ Quantity and density of evidence and range of artefact and stone types discarded are expected to be high. Discrete activity areas should occur. Repeated visits to a camp site or stays of long duration may cause a build-up of evidence over a period of time in a specific location. Items are likely to have been cached for future use at a base camp. Specific artefact indicators include grindstones. Evidence of casual knapping and production of tools is expected to be common. The significant differences with a temporary hunter/gatherer's camp include the possible presence of features such as heat treatment pits and ovens, broader range of artefact and stone types, presence of specific artefact indicators, higher density of evidence (reflecting more activity and longer duration of use) and relatively common evidence for the production of tools.

Community base camp:

- ❑ May occur when a number of nuclear families camp together;
- ❑ Duration uncertain but probably dependent on availability of food resources;
- ❑ Total numbers of people could be relatively large (30+);
- ❑ Probably situated on level or very gently inclined ground in open contexts;
- ❑ Probably situated close to potable water;
- ❑ Probably situated close to food resources (eg. conjunction of wetlands and forest zones);
- ❑ The encampment area may exceed 100 m² and consist of a number of individual groups and huts, dispersed in a spatial patterning depending on the social mix of the groups;
- ❑ Quantity and density of evidence and range of artefact and stone types discarded are expected to be high. Spatially discrete evidence of individual camp sites would be expected (if the resulting evidence has not been affected by disturbance or superimpositioning). Items may not have been cached for future use. Specific artefact indicators include grindstones, relatively more common evidence of food processing and possibly ochre. Evidence of casual knapping and production of tools is expected to be common. However, features such as heat treatment pits may not occur.

Larger congregation of groups:

- ❑ May occur in relation to special events (eg. major ceremonies) or when a particularly desirable food was most abundant;
- ❑ Probably of short duration (eg. <1-2 weeks) but potentially for longer duration (eg. up to several months);
- ❑ Total numbers of people could vary widely, but possibly exceed 100;
- ❑ Probably situated on level or very gently inclined ground in open contexts;
- ❑ Probably situated close to potable water;
- ❑ Probably situated close to food resources;
- ❑ A large area or areas of encampments would be expected, possibly covering hundreds of square metres or more;
- ❑ Spatially discrete evidence of individual camp sites would be expected (if the resulting evidence has not been affected by disturbance or superimpositioning);
- ❑ Quantity and density of evidence and range of artefact and stone types discarded are expected to be high (similar to community base camp). Items may not have been cached for future use. Specific artefact indicators include grindstones, relatively more common evidence of food processing and possibly ochre, and possibly evidence of processing uncommon foods for which the gathering may be related. Evidence of casual knapping and production of tools is expected to be common. However, features such as heat treatment pits may not occur (Kuskie 2009).

To distinguish whether single or multiple episodes of occupation occurred, several factors can be examined. Multiple episodes of occupation would tend to exhibit superimpositioning of artefact evidence (eg. mix of unrelated stone materials and artefact types and activity areas). However, identifying which items belong to which activity events can be problematical. Also, distinguishing the effects of post-depositional disturbance from cultural superimpositioning is problematical (*cf.* Koettig 1994). The analysis of distributions of stone material and artefact types is of benefit in some circumstances. In a stratified deposit, multiple episodes of occupation would be indicated by evidence in different stratigraphic layers, particularly discrete activity areas to exclude the possibility that items have moved vertically through the deposit by bioturbation.

Another indicator of multiple occupation is an expectation of a relatively higher density of artefacts within a locality (combined with superimpositioning as discussed above). Larger areas of occupation may also result, when occupations only partially overlap (eg. Camilli 1989).

Identification of different episodes of occupation over time would require *in situ* deposits with stratified or vertically separated evidence of activity events and datable material (eg. charcoal or midden deposits).

Identification of the duration of individual episodes of occupation may prove very difficult. Where a single episode of occupation has occurred, a greater quantity of items, frequency of discrete activity events and size of contemporaneous shell midden deposit may be indicative of a longer stay.

Identification of the types of occupations when multiple episodes have occurred may prove highly problematical. Unless specific artefact indicators for different types of occupation are present, the superimpositioning of evidence from unrelated occupations (eg. transitory movement over a nuclear family base camp) may not be possible to determine.

3.5 Predictive Model of Site Location

A predictive model of site location is constructed to identify areas of archaeological sensitivity (ie. locations where there is a potential of archaeological evidence occurring), so it can be used as a basis for the planning and management of Aboriginal heritage. Predictive modelling involves reviewing existing literature to determine basic patterns of site distribution. These patterns are then modified according to the specific environment of the investigation area to form a predictive model of site location. A sampling strategy is employed to test the predictive model and the results of the survey used to confirm, refute or modify aspects of the model.

The use of land systems and environmental factors in predictive modelling is based upon the assumption that they provided distinctive sets of constraints that influenced Aboriginal land use patterns. Following from this is the expectation that land use patterns may differ between each zone, because of differing environmental constraints, and that this may result in the physical manifestation of different spatial distributions and forms of archaeological evidence (Hall and Lomax 1993:26).

The predictive model is based on information from the following sources:

- ❑ Identification of land systems and landform units;
- ❑ Previous archaeological surveys conducted within the region;

- ❑ Distribution of recorded sites and known site density;
- ❑ Traditional Aboriginal land use patterns; and
- ❑ Known importance of any parts of the investigation area to the local Aboriginal community.

In certain circumstances, such as where low surface visibility or recent sediment deposition precludes effective assessment of the potential archaeological resource, sub-surface testing may be a viable alternative for further testing the predictive model and assessing the investigation area.

The following is a brief description of the site types that may occur within the investigation area.

Artefact Scatters:

In most archaeological contexts, an artefact scatter has been defined as either the presence of two or more stone artefacts within 50 or 100 metres of each other, or a concentration of artefacts at a higher density than surrounding low density ‘background scatter’. The definition of an artefact scatter ‘site’ is often an arbitrary one, which can offer benefits from a heritage management perspective but is a source of theoretical/analytical debate for heritage practitioners.

Due to the nature of the underlying evidence, its identification only within exposures created by erosion or disturbance, and the limited suitability of existing definitions, artefact scatter sites are defined within this study as the presence of one or more stone artefacts within a *survey area* (cf. Kuskie 2000b). The boundaries of the site are defined by the boundaries of the visible extent of artefacts within the survey area. The survey areas are based on discrete, repeated environmental contexts termed *archaeological terrain units* (eg. a particular combination of landform unit and class of slope). It is generally assumed that there is a similar probability for comparable evidence to occur elsewhere within the same survey area. As such, while the visible site boundaries are defined by the extent of visible evidence (consistent with the definition of an Aboriginal object under the *National Parks & Wildlife Act 1974*), across the entire survey area in which a site is identified there exists a *potential resource* of comparable evidence.

An artefact scatter may consist of surface material only, which has been exposed by erosion, or it more typically involves a sub-surface deposit of varying depth. Other features may be present within artefact scatter sites, including hearths or stone-lined fireplaces, and heat treatment pits.

Artefact scatters may represent the evidence of:

- ❑ Camp sites, where everyday activities such as habitation, maintenance of stone or wooden tools, manufacturing of stone or wooden tools, management of raw materials, preparation and consumption of food and storage of tools has occurred;
- ❑ Hunting or gathering events;
- ❑ Other events spatially separated from a camp site (eg. tool production or maintenance); or
- ❑ Transitory movement through the landscape.

The detection of artefact scatters depends upon conditions of surface visibility and ground disturbance and whether recent sediment deposition has occurred (*cf.* Dean-Jones and Mitchell 1993). Vegetation cover and deposition of sediments generally obscures artefact scatter sites and prevents their detection during surface surveys. High levels of ground disturbance can also obscure or remove evidence of a site.

Artefact scatters are a common site type in the Ulan - Wilpinjong locality and the broader Central Tablelands region. There is potential for stone artefact evidence to occur in the investigation area wherever A unit soil is present, apart from in areas which have been substantially impacted by recent land-use (ie. areas in which the A unit or upper soil horizon has been totally removed). In general, the artefact evidence may be of a low to very low density consistent with background discard, as much of the investigation area is distant from higher order watercourses and not consistent with a *primary or secondary resource zone* under the model proposed by Kuskie (2009).

However, a higher artefact density and potentially deposits of research significance may occur where more focused occupation (eg. encampments, or events of longer duration or involving larger numbers of people) and/or repeated Aboriginal occupation has occurred. These contexts may comprise areas of low gradient close to Wilpinjong Creek, Cumbo Creek and the lower portions of Planters Creek and Slate Gully.

Bora/Ceremonial Sites:

Bora grounds are a type of ceremonial site associated with initiation ceremonies. They are usually made of two circular depressions in the earth, sometimes edged with stone. Bora grounds can occur on soft sediments in river valleys and elsewhere, although occasionally they are located on high, rocky ground where they may be associated with stone arrangements. Pearson (1981:104-105) identified that the location of ceremonial sites appears to have related to a desire to isolate the site in a secret or seldom visited location.

The potential for bora/ceremonial sites within the investigation area is assessed as being very low, but cannot be discounted. The presence of "Bora Creek" to the north-west of the investigation area and the bora/ceremonial ground on the ridge immediately north of Wilpinjong Creek (Mathews 1894) are noted.

Burials:

Human remains tended to be placed in hollow trees, caves, rock shelters or sand deposits. The location of burials may once have been marked by carved trees (eg. Etheridge 1918:85), although subsequent tree clearing and the long passage of time since the disruption of this practice has rendered these markers extremely rare. Pearson (1981:102-104) noted on the basis of recorded burials and ethnohistorical observations that burials in the region took place relatively close to encampments, due to the fact that most people unless killed by hunting accidents or in warfare tended to die in or close to camp, and movement of bodies over long distances by foot was problematic. A number of these observations (eg. by Reverend Gunther and Dr Curtis) identify burials within a mile of a campsite, in soft ground, with carved trees around.

Usually burials are only identified when eroding out of sand deposits or creek banks, or when disturbed by development. The probability of detecting burials during archaeological fieldwork is extremely low. The potential for burial sites to occur within the investigation area is assessed as being very low, but cannot be discounted.

Carved Trees:

Carved trees were still relatively common in NSW in the early 20th century (Etheridge 1918, refer also to Mathews 1894 and Section 3.3). They were commonly used as markers for ceremonial or symbolic areas, including burials.

Both vegetation removal, natural attrition (for example, bush fire) and the long passage of time since the practice of tree carving was prevalent have rendered this site type rare. Given these factors and the extent of recent land use impacts, the potential for carved trees to occur within the investigation area is considered to be low, but cannot be discounted where mature native trees remain.

Cultural Significant Sites or Areas:

Sites of cultural significance to Aboriginal people (excluding the contemporary significance attached to the other site types listed here) can take three forms:

- ❑ Sites or places associated with ceremonies, spiritual/mythological beliefs and traditional knowledge, which date from the pre-contact period and have persisted until the present time;
- ❑ Sites or places associated with historical associations, which date from the post-contact period and are remembered by people today (for example, plant and animal resource use areas and known camp sites); and
- ❑ Sites or places of contemporary significance (apart from those areas for which Aboriginal objects remain, which are discussed elsewhere here), for which the significance has been acquired in recent times.

Although these sites do not qualify as Aboriginal objects under the *National Parks and Wildlife Act 1974* they can be declared as Aboriginal places under the Act.

Mythological sites, or other sites of traditional, historical or contemporary significance to Aboriginal people, can occur in any location. Often natural landscape features may be related to important mythological stories. Consultation with the local Aboriginal community is essential to identify the presence of such cultural significant sites. Physical evidence of historical contact can occur in the form of artefacts manufactured from introduced materials (eg. porcelain or glass).

Grinding Grooves:

Grinding grooves are typically elongated narrow depressions in soft rocks (particularly sedimentary) and are generally associated with watercourses. The depressions are created by the shaping and sharpening of ground-edge hatchets and grinding of seeds and processing of other plant matter and animal foods.

Grinding grooves are typically located in sedimentary bedrock along watercourses, but also occur in the Ulan locality on open surfaces of sandstone in other contexts (eg. simple slopes) and on smaller sandstone slabs or surfaces in rock shelters. The potential for grinding groove sites to occur, both in rock shelters and in open contexts, is assessed as moderate to low.

Quarry Sites:

A lithic quarry is the location of an exploited stone source (Hiscock and Mitchell 1993:32). Sites will only be located where exposures of a stone type suitable for use in artefact manufacture occurs.

Geological mapping of the investigation area indicates that materials suitable for stone knapping are likely to be exposed, including quartz and tuff. As such, the potential for lithic quarry evidence within the investigation area is assessed as moderate.

Ochre quarry sites are an uncommon site type, however, several have been recorded in the locality. Ochre quarries take the form of circular depressions or tunnels and are frequently associated with artefacts utilised in the process of extracting ochre (Hiscock and Mitchell 1993:62). The potential for evidence of ochre quarries within the investigation area is assessed as low.

Rock Engravings:

Rock engravings include outlines or filled-in figures, created on rock surfaces (typically sedimentary stone) by pecking, hammering or scraping.

Rock engravings are more common on exposed sandstone bedrock on ridge and spur crests than in the bases of valleys or margins of steep slopes. Although rock engravings have not been recorded within the locality, suitable sandstone bedrock may be present in the investigation area and engravings are known to occur elsewhere in the region (Haglund 1985, Navin 1990). The potential for rock engravings is assessed as very low, but cannot be discounted.

Rock Shelters With Art, Deposits and/or Grinding Grooves:

Rock shelters include rock overhangs, shelters or caves which were used by Aboriginal people. Rock shelter sites may contain artefacts, deposits and/or rock art or grinding grooves. These sites will only occur where suitable geological formations are present.

Numerous rock shelter sites have been identified in the locality, many with artefacts and some with art and/or grinding grooves. Numerous other rock shelters have been noted with PADs. Although artefacts may not have been visible at the time of recording, these shelters have some probability of containing artefact deposits, which can be confirmed or refuted by test excavation. These sites have been recorded in isolated rock formations and along more extensive rock formations.

Rock shelter sites in the locality vary widely in terms of contents (eg. containing artefacts, potential deposits, painted art and/or grinding grooves), location (eg. topographic context, distance to watercourse, size/order of watercourse and aspect), nature (eg. size of shelter, extent of habitable floor area, number and types of artefacts and stone materials) and research potential (eg. depth and extent of potential artefact deposits). Stone artefacts would be the primary form of expected evidence within the rock shelters, in anything from very low to very high densities. Charcoal from fireplaces/hearths may also occur, as may bones and/or shell from fauna used by Aboriginal people for subsistence (or incorporated into the deposit by other means, such as animal activity or natural processes). The presence of other evidence, such as the remains of wooden implements, cannot be discounted, even though their occurrence has rarely been documented in the region.

Apart from several major sites such as the nearby "Hands on Rock" complex or the "Castle Rock" site (WCP72) in the Wilpinjong Coal Mine ML1573 boundary, rock art occurs relatively infrequently in the recorded shelters and tends to comprise red ochre hand stencils. Hand stencils were part of a complex form of communication and utilised in the representation of signatures, special occasions, individuals, messages, stories, myths and spiritual events.

Sandstone rock formations occur in portions of the study area, including boulders and larger continuous rock formations, and as such the potential for rock shelter sites is assessed as high.

Scarred Trees:

Scarred trees contain scars caused by the removal of bark for use in manufacturing canoes, containers, shields or shelters. Mature trees, remnants of stands of the original vegetation, have the potential to contain scars.

Numerous scarred trees, many of uncertain (Aboriginal, non-indigenous or natural) origin, have been recorded in the Wilpinjong locality (Navin Officer 2005). Considering the long time period that has elapsed since this practice was prevalent and the extent of vegetation removal from within the investigation area, the potential for scarred tree sites to occur is assessed as relatively low, but cannot be discounted where mature native trees remain. The conclusion of Navin Officer (2005) that no 'definite' Aboriginal scarred trees occurred within the EIS project area is noted.

Stone Arrangements:

Stone arrangements include circles, mounds, lines or other patterns of stone arranged by Aboriginal people. Some were associated with bora grounds or ceremonial sites and others with mythological or sacred sites.

Pearson (1981:106) noted that stone arrangements in the region typically occur as lines or cairns on bare, exposed hill crests in the plateau/isolated hill areas, or on bare areas of flat land where flatter land predominates. The stone arrangements on hill crests are noted as being often a considerable distance from water, and therefore not within close proximity of any camp sites.

Hill tops and ridge crests which contain stone outcrops or surface stone, and have been subject to minimal impacts from recent land use practices, are potential locations for stone arrangements. Given the limited presence of these contexts within the investigation area, the potential for stone arrangements to occur is assessed as low.

Waterhole/wells:

Waterhole/wells are natural depressions in boulders or exposed bedrock, known as pan-holes or gnamma holes, which retain water, and as such may have represented a source utilised by Aboriginal people. There is no direct evidence of Aboriginal working or use of these waterholes.

Several waterhole/wells have been reported in the Wilpinjong locality and the potential for further features to occur is assessed as moderate.

4. METHODOLOGY

During the initial stages of the investigation, research was conducted into the environmental, cultural and archaeological background of the investigation area, building on the substantial work already completed by South East Archaeology in the region. Searches were undertaken of the OEH Aboriginal Heritage Information Management System and other relevant heritage registers and planning instruments (refer to Section 3.1). The WCPL Aboriginal Site Database was reviewed (refer to Section 3.1).

In order to address anticipated requirements (refer to Section 1.2), the investigation involved:

- ❑ Consultation with the Aboriginal community in accordance with the *Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010* policy (DECCW 2010c), following from the process commenced in October 2012 for both the Modification (Kuskie 2013a) and the current Extension Project; and
- ❑ A cultural heritage assessment conducted in accordance with the *Guidelines for Aboriginal Cultural Heritage Assessment and Community Consultation* (DEC 2005) and with reference to the *Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales* (DECCW 2010b) and *Guide to Investigating, Assessing and Reporting on Aboriginal Cultural Heritage in NSW* (OEH 2011a).

This report builds on the previous heritage assessments of Navin Officer (2005, 2006a, 2006b) and Kuskie (2013a) and does not seek to repeat background information contained within those reports.

The registered Aboriginal parties (refer to Table 7) were invited to attend a meeting on 11 November 2013 at which details of the Extension Project and proposed methodology were presented and a reconnaissance inspection was made of portions of the investigation area.

WCPL offered to engage representatives from each of the registered Aboriginal parties for paid participation in the field survey, subject to receipt of evidence of appropriate insurance and compliance with relevant WCPL Occupational Health and Safety (OH&S) procedures, including attendance at a safety induction. Five organisations accepted the invitation and addressed the OH&S requirements.

Field inspection of the investigation area was undertaken over 17 days (17 - 21 March, 29 April - 3 May, 12 - 16 May and 24 - 25 June 2014) by archaeologists from South East Archaeology (Peter Kuskie, Birgitta Stephenson, Corey O'Driscoll and Jason Barr), accompanied on every day by representatives of the registered Aboriginal parties (refer to Section 6). Full details of the Aboriginal community involvement in the survey are presented in the consultation database in Appendix 6. During the course of the survey assistance was provided by:

- ❑ NEWCO - Chaos Delauney, Shaen Morgan, Emma Syme, Eric Hill, Coral Williams and Kelsey Williams-Fawcett;
- ❑ WNTCAC - Kelsey Williams-Fawcett, Coral Williams and Robyn Williams;
- ❑ MGATSIC - Larry Foley, Shannon Foley, Steven Flick and Debbie Foley;
- ❑ Mudgee LALC - Christine Maynard, Larry Foley, Gemma Williams, Debbie Foley and James Williams; and
- ❑ WWWAC - Robert Stewart.

Additional detailed examination of possible cupules on a rock shelter site in Slate Gully was undertaken by use-wear/residue expert Birgitta Stephenson, with representatives of the registered Aboriginal parties, on 11 July 2014.

The investigation occurred in accordance with the methodology dated 26 November 2013 that was provided to the registered Aboriginal parties.

All registered parties were invited to attend an inspection of a selection of sites and a meeting on 2 April 2015 after the conclusion of the survey and draft report to discuss the survey results, cultural values and draft heritage assessment report (refer to Section 6 and Appendix 6). Representatives of five of the parties attended the meeting and site inspection.

For the purposes of the Aboriginal cultural heritage assessment, the investigation area (for detailed assessment) totals 1,275 hectares (12.75 square kilometres), as marked on Figures 4 and 5. It comprises all of development Zones 1 and 2 (refer to Section 1.1 and Figure 4), which consist of nine spatially separate areas fringing the existing approved development area and the Slate Gully extension area to the east in EL 7091. Approximately 39 hectares (3% of the investigation area for detailed assessment) has been totally modified by previous land use, such that negligible potential for Aboriginal heritage evidence exists. Reconnaissance inspection only was made of these areas.

The remainder of the investigation area for detailed assessment (approximately 1,232 hectares or 96.6% of the total) was subject to systematic archaeological survey sampling, apart from approximately 3 hectares (0.2%) that was not sampled due to revisions to the Zone 2 boundary after completion of the field survey. An additional 25.5 hectares which formed part of the initial study area, but was subsequently removed due to revisions to the investigation area boundary after the completion of the survey, was also sampled. This area now forms part of Zone 3, rather than Zone 2.

Subsequent to completion of the survey and draft report, a minor variation occurred to the northern alignment of the 330 kV electricity transmission line involving two tower locations and approximately three hectares of land outside of Area H and Zone 2, within Zone 3 (refer to Figure 19). Management strategies to address this minor variation are presented in Sections 10.2.5 and 11.

The investigation area was divided into particular combinations of environmental variables that are assumed to relate to Aboriginal usage of the area. These *archaeological terrain units* or *environmental contexts* were defined on the basis of landform element and class of slope (following McDonald *et al* 1984). They are discrete, recurring areas of land for which it is assumed that the Aboriginal land use and resultant heritage evidence in one location may be extrapolated to other similar locations. Therefore *survey areas* were defined as the individual environmental context that is bounded on all sides by different environmental contexts (*cf.* Kuskie 2000b).

Detailed recording of the archaeological *survey areas* was made on survey recording forms, including environmental variables and heritage resources identified or potentially present. Each *survey area* was assigned a unique sequential number after the initials of the spatially separate Extension Project investigation area (A - H) (refer to survey coverage database and mapping in Appendix 3).

Within each *survey area*, the areas inspected on foot correspond to the OEH (DECCW 2010b) definition of *survey units*. The *survey units* typically comprised general transects through vegetated terrain, or coverage of and separate recording of specific exposure types, such as vehicle tracks. Data for each *survey unit* was recorded separately on the survey area recording forms and representative photographs of survey units and survey areas were taken and are included in Appendix 5 where relevant and informative.

For the purposes of the analysis, *survey unit* data from each *survey area* are combined (refer to Appendix 3), and data from each survey area can be combined with comparable survey areas to analyse coverage and artefact density with respect to environmental variables such as landform element and slope (refer to Table 4).

For a thorough discussion of the rationale for use of the individual artefact as the basic unit of analysis, including the problems with open artefact site definitions due to exposure/obscurement issues, and the margins of error, variables and constraints associated with the data collection procedures and analysis, refer to the comprehensive discussion in Kuskie (2000b).

The general survey procedure involved participants inspecting each survey area either by working together as a single team, or through separation into two or three teams, each comprising an archaeologist and several Aboriginal community representatives.

The survey teams were equipped with high resolution 1:3,000 scale mapping of the investigation area, with one metre contours¹⁰, a 100 metre MGA grid and an aerial photograph underlay. Along with the use of hand-held Global Positioning System (GPS) units (generally accurate to within five metres), these features assisted with defining survey areas and survey units and accurately establishing the location of Aboriginal sites and marking the above onto the detailed base mapping (refer to Figures 12 and 13 and Appendices 3 and 4).

Hence, the survey sampled the entire geographic extent of the investigation area for detailed assessment (excluding the 3% of totally modified ground and 0.2% area not sampled), within individual survey areas based on specific combinations of landform element and class of slope. The extent of the sample and nature of survey coverage is discussed in Section 5.1. As the investigation area encompassed the proposed Zone 1 and 2 development impact areas, the coverage sampled much of the potential impact areas of the proposed Extension Project.

Within each survey area:

- ❑ Inspection was made widely for the obtrusive site types, such as rock shelters with deposit and/or art, grinding grooves and scarred trees; and
- ❑ Inspection was also made widely for stone artefacts and other cultural evidence, focusing on areas with ground surface visibility.

Aboriginal heritage site recording forms for each identified site were also completed. Spatially separate locations of heritage evidence were recorded as separate site loci named after the sequential Wilpinjong Coal Project (WCP) site numbering system (refer to Section 3.5 for further discussion of site definitions and delineation of site boundaries and Appendix 4 for detailed descriptions of all newly identified sites).

As required under Section 89A of the *National Parks and Wildlife Act 1974*, site records have been completed for all new or updated site recordings conducted during the assessment and lodged with the OEH.

¹⁰ High accuracy contours were not available in the initial weeks of the survey.

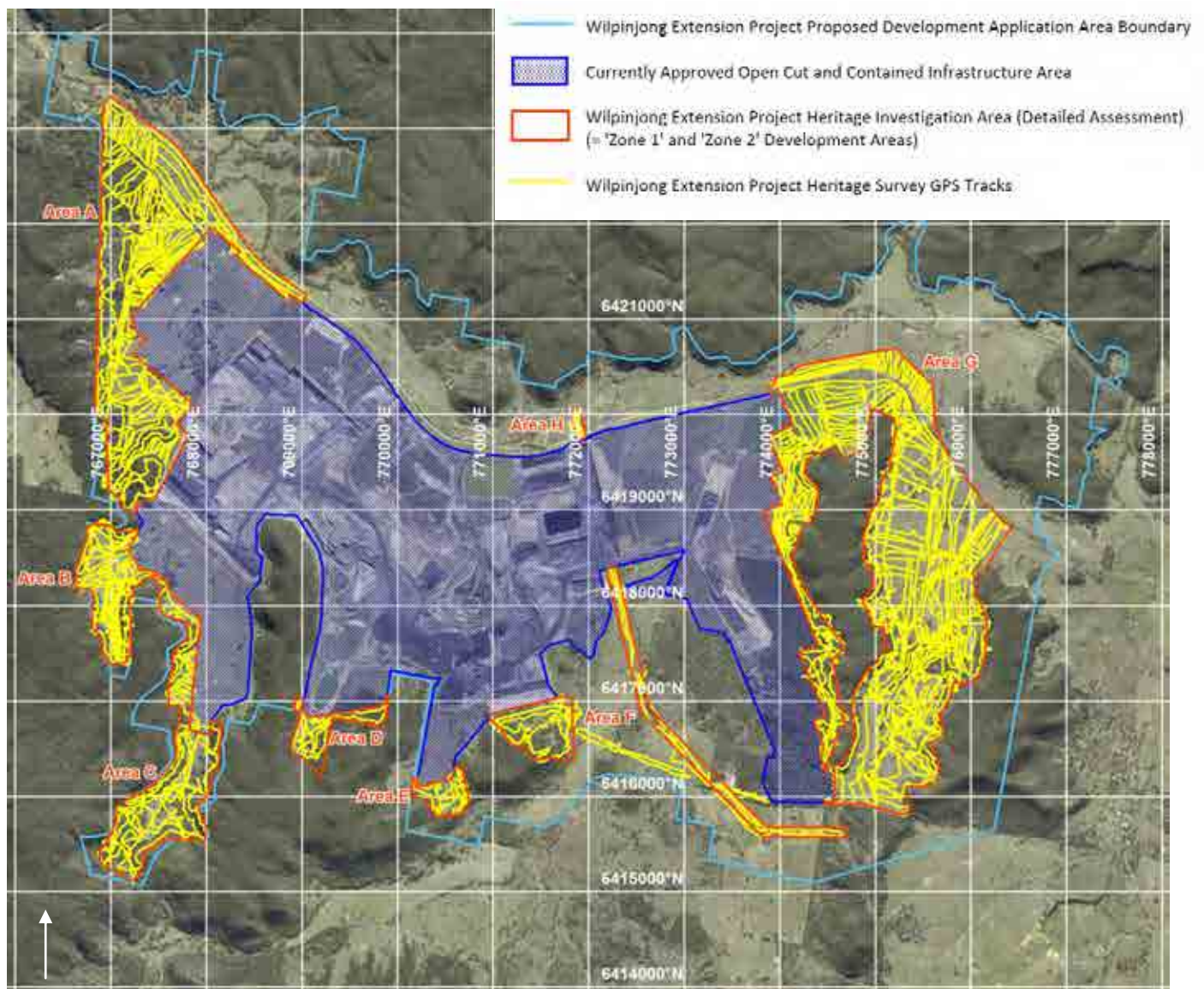


Figure 12: Approximate location of GPS recorded transects within the investigation area (noting that vegetation cover limited the effectiveness and accuracy of the hand-held GPS units at times, and that the field teams involved a number of participants only one of which in each team carried a GPS unit) (aerial photograph courtesy WCPL; one kilometre MGA grid).

Stone artefacts were recorded on a lithic item recording form, including details about provenance, stone material type, artefact type, size class, cortex and other relevant attributes (refer to Appendix 4).

During the survey and throughout the consultation process registered Aboriginal parties were also asked of their knowledge of any areas of cultural significance within the investigation area, for example:

- ❑ Sites or places associated with ceremonies, spiritual/mythological beliefs and traditional knowledge, which date from the pre-contact period and have persisted until the present time;

- ❑ Sites or places associated with historical associations, which date from the post-contact period and are remembered by people today (for example, plant and animal resource use areas and known camp sites); and
- ❑ Sites or places of contemporary significance (apart from those areas for which Aboriginal objects remain, which are discussed above), for which the significance has been acquired in recent times.

The results of the investigation are presented in Section 5. Photographs of the identified sites are presented in Appendix 4 and additional photographs of survey areas and the general investigation area are presented in Appendix 5.

5. RESULTS AND DISCUSSION

5.1 Survey Coverage

Comprehensive archaeological survey coverage was obtained across the geographic extent of the 1,275 hectare investigation area for detailed assessment (refer to Figures 12 and 13 and Appendix 3). Virtually all of Zones 1 and 2 (refer to Section 1.1 and Figure 4), comprising the nine spatially separate areas fringing the existing approved development area along with the Slate Gully extension area to the east in EL 7091, were comprehensively sampled.

Approximately 39 hectares (3% of the investigation area for detailed assessment) had been totally modified by previous land use, such that negligible potential for Aboriginal heritage evidence exists. Detailed survey was not conducted within these areas, only reconnaissance inspection (refer to Figure 13 and Appendix 3).

Virtually the remainder of the investigation area for detailed assessment (approximately 1,232 hectares or 96.6% of the total) was subject to systematic archaeological survey sampling (refer to Figures 7 - 11). Approximately 3 hectares (0.2%) was not sampled due to revisions to the Zone 2 boundary at Area D after completion of the field survey. An additional 25.5 hectares which formed part of the initial study area, but was subsequently removed due to revisions to the investigation area boundary after the completion of the survey, was also sampled. This area now forms part of Zone 3, rather than Zone 2.

This area subject to systematic archaeological survey sampling was subdivided into a total of 487 archaeological survey areas (A1 - A131, B1 - B24, C1 - C55, D1 - D16, E1 - E9, F1 - F47, G1 - G202, and H1 - H3), each representing a specific combination of landform unit and class of slope (definitions as per McDonald *et al* 1984). Each archaeological survey area was inspected for Aboriginal heritage evidence. The environmental contexts surveyed included the ten landform elements and four classes of slope present (refer to Table 4).

The locations of the individual survey areas are marked on detailed maps included within Appendix 3 and descriptions are also presented in Appendix 3. A summary of the survey coverage is presented in Table 4 for the combined environmental contexts and individual classes of slope and landform elements.

The total survey coverage (ground physically inspected for heritage evidence) equated to approximately 1,769,985 m² (177 hectares) or 14.1% of the sampled area. As this coverage only refers to an area of several metres width directly inspected by each member of the survey team, the actual coverage for obtrusive site types (for example, scarred trees and rock shelters) was significantly greater than this.

The total effective survey coverage (*visible* ground surface physically inspected with potential to host heritage evidence) equated to around 141,943 m² (14.2 hectares) or 1.13% of the overall area subject to sampling.

Table 4: Environmental contexts, class of slope and landform elements - summary of survey coverage and artefact density for Extension Project investigation area.

Environmental Context	Total Area of Context (m ²)	% Context Comprises of Investigation Area*	Total Area Surveyed (m ²)	% Surveyed of Context	Effective Survey Coverage Total (m ²)	% Effective Survey Coverage of Context	Total # Artefacts (open sites)	Artefact Density (# artefacts per m ² effective survey coverage)
level-very gentle flat	10,021	0.08%	1,500	14.97%	30	0.30%	0	-
level-very gentle valley flat	133,192	1.06%	10,400	7.81%	130	0.10%	0	-
level-very gentle terrace	7,549	0.06%	2,100	27.82%	42	0.56%	0	-
gentle terrace	6,127	0.05%	760	12.40%	8	0.13%	0	-
level-very gentle bench	16,484	0.13%	3,120	18.93%	276	1.67%	0	-
gentle bench	7,349	0.06%	720	9.80%	4	0.05%	0	-
level-very gentle drainage depression	237,633	1.89%	38,960	16.40%	2,264	0.95%	2	0.001
gentle drainage depression	1,930,634	15.35%	260,305	13.48%	11,910	0.62%	41	0.003
moderate drainage depression	95,859	0.76%	13,610	14.20%	1,466	1.53%	0	-
steep drainage depression	25,896	0.21%	4,950	19.11%	560	2.16%	0	-
level-very gentle simple slope	229,592	1.83%	57,070	24.86%	1,346	0.59%	19	0.014
gentle simple slope	5,794,688	46.09%	806,240	13.91%	64,004	1.10%	58	0.001
moderate simple slope	1,193,164	9.49%	166,610	13.96%	11,784	0.99%	14	0.001
steep simple slope	1,823,758	14.50%	223,590	12.26%	32,275	1.77%	17	0.001
level-very gentle spur crest	44,293	0.35%	7,620	17.20%	107	0.24%	0	-
gentle spur crest	604,187	4.81%	98,070	16.23%	5,803	0.96%	29	0.005
moderate spur crest	62,869	0.50%	6,500	10.34%	1,563	2.49%	0	-
level-very gentle ridge crest	4,028	0.03%	520	12.91%	7	0.17%	0	-
gentle ridge crest	239,725	1.91%	33,180	13.84%	5,801	2.42%	44	0.008
moderate ridge crest	22,685	0.18%	3,030	13.36%	228	1.01%	0	-
steep ridge crest	2,808	0.02%	400	14.25%	4	0.14%	0	-
level-very gentle hillock	15,071	0.12%	9,100	60.38%	182	1.21%	0	-
gentle hillock	36,889	0.29%	7,410	20.09%	595	1.61%	0	-
moderate hillock	9,730	0.08%	3,700	38.03%	495	5.09%	0	-
steep scarp	19,496	0.16%	10,520	53.96%	1,058	5.43%	1	0.001
Totals/Means	12,573,727	100%	1,769,985	14.08%	141,943	1.13%	225	0.002
Class of Slope								
level-very gentle	697,863	5.55%	130,390	18.68%	4,384	0.63%	21	0.005
gentle	8,619,599	68.55%	1,206,685	14.00%	88,126	1.02%	172	0.002
moderate	1,384,308	11.01%	193,450	13.97%	15,536	1.12%	14	0.001
steep	1,871,958	14.89%	239,460	12.79%	33,897	1.81%	18	0.001
Totals/Means	12,573,727	100%	1,769,985	14.08%	141,943	1.13%	225	0.002
Landform Element								
flat	10,021	0.08%	1,500	14.97%	30	0.30%	0	-
valley flat	133,192	1.06%	10,400	7.81%	130	0.10%	0	-
terrace	13,678	0.11%	2,860	20.91%	50	0.37%	0	-
bench	23,832	0.19%	3,840	16.11%	280	1.17%	0	-
drainage depression	2,290,022	18.21%	317,825	13.88%	16,200	0.71%	43	0.003
simple slope	9,041,202	71.91%	1,253,510	13.86%	109,409	1.21%	108	0.001
spur crest	711,350	5.66%	112,190	15.77%	7,474	1.05%	29	0.004
ridge crest	269,246	2.14%	37,130	13.79%	6,040	2.24%	44	0.007
hillock	61,690	0.49%	20,210	32.76%	1,272	2.06%	0	-
scarp	19,496	0.16%	10,520	53.96%	1,058	5.43%	1	0.001
Totals/Means	12,573,727	100%	1,769,985	14.08%	141,943	1.13%	225	0.002

* Totals and coverage include approximately 25.5 hectares of land surveyed outside of Zones 1 and 2 in Zone 3, and exclude 'modified' areas and the 0.2% of the investigation area not subject to sampling. Totals may not completely tally due to the effects of rounding.

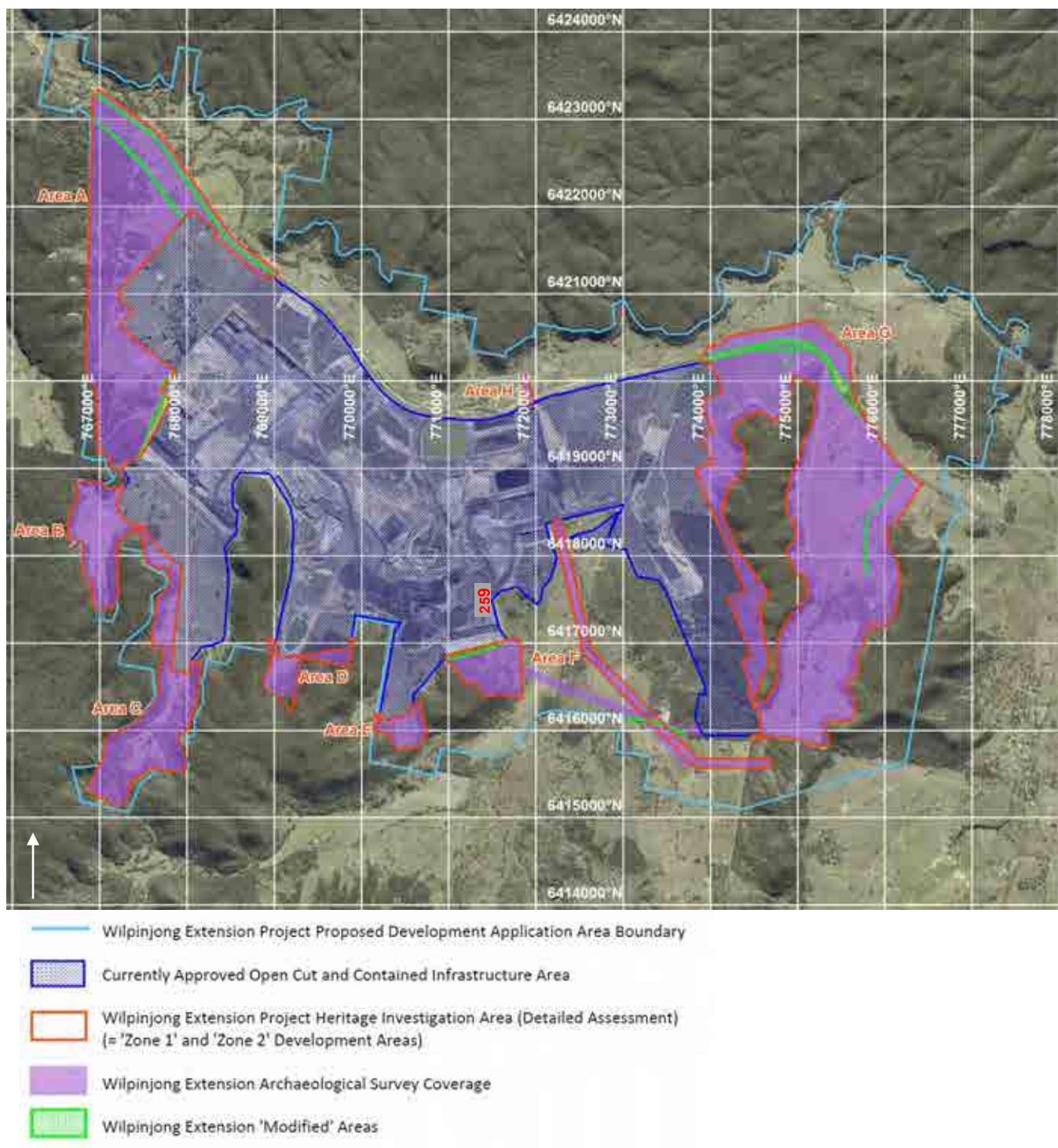


Figure 13: Heritage investigation area showing extent of archaeological survey coverage and modified areas (aerial photograph courtesy WCPL; one kilometre MGA grid; refer to Appendix 3 for detailed mapping of survey areas and Aboriginal sites).

Conditions of surface visibility were generally low across the investigation area, due to the dense cover of vegetation and in places leaf litter (Appendix 3). Sediment deposition and other ground disturbance also limited visibility in a small portion of the investigation area. Archaeological visibility, the actual visible ground surface with potential for heritage evidence (accounts for factors such as ground disturbance and sediment deposition), was generally similar to surface visibility. Mean archaeological visibility across the entire survey sample was approximately 8%. Exposures tended to be present along vehicle tracks, animal tracks, in erosion scours and in other areas of recent ground disturbance, such as animal diggings.

A number of mature native trees exist within the investigation area and where identified, these were inspected for evidence of Aboriginal scarring. Numerous rock formations are present within the investigation area, particularly on the margins of the valleys. For example, sandstone and/or conglomerate rock was noted in survey areas occupying approximately 60% of the investigation area. These formations included isolated boulders, low rock walls, larger scarps, open bedrock surfaces and other surface outcrops, and were targeted for inspection during the survey.

Notwithstanding the low surface visibility and resulting low proportion of effective survey coverage as a percentage of the entire investigation area, the level and nature of effective survey coverage is considered satisfactory enough to present an effective assessment of the Aboriginal heritage resources identified and potentially present within the investigation area. The coverage was relatively comprehensive for obtrusive site types (for example, scarred trees, grinding grooves and rock shelters) but limited for the less obtrusive stone artefacts.

Nevertheless, in view of the predictive modelling (refer to Sections 3.4 and 3.5) and results obtained from the sample of effective coverage, it is concluded that the survey provides a valid basis for formulating recommendations for the management of the identified and potential Aboriginal heritage resources.

5.2 Aboriginal Heritage Evidence

5.2.1 Overview

The conduct of the present survey has resulted in an increase in the known heritage resource within the investigation area. Prior to this survey, approximately 156 Aboriginal sites had been reported within or adjacent to this area (refer to Section 3.1, Table 2 and Appendix 2). The present survey has resulted in the identification of another 137 Aboriginal sites (refer below in relation to additional cultural values), comprising:

- ❑ 73 rock shelters with PADs;
- ❑ 60 open artefact sites¹¹;
- ❑ Two waterhole/wells;
- ❑ One rock shelter with artefacts and art; and
- ❑ One rock shelter with artefacts and ochre quarry.

¹¹ For the purposes of this assessment, "artefact scatters" and "isolated finds" are typically assessed together in recognition that the occurrence of a single artefact often represents the only visible portion of a larger artefact resource within a broader site/survey area.

A number of the previously recorded sites were relocated and re-recorded. The grid references of several of these sites were revised (updated mapping of all site locations within the investigation area is presented in Figure 14, with detailed maps of site locations in Appendices 3 and 4).

However, many of the Kayandel (2006) sites/PADs (in the range WCP 289 - 376) that were reported as occurring within the Extension Project area could not be identified in or within the immediate vicinity of the reported locations. For several sites, it was established by physical inspection that the Kayandel (2006) site had been reported with the incorrect grid reference datum (AMG instead of MGA), such as WCP307, which corresponds to WCP480 recorded during the present survey. One possibility is that the entire series of sites WE1 - WE88 (WCP 289 - 376) have been reported by Kayandel (2006) with the incorrect datum (AMG/AGD instead of MGA/GDA). However, due to the limited information (eg. measurements, descriptions and photographs) presented in the Kayandel (2006) site records, it is problematic to resolve this issue for each site without on-ground verification (through inspection of the alternative AMG and MGA locations and a sufficient radius around each to encompass margins of error that could be expected with a hand-held GPS unit in 2006). It was not feasible to do this during the survey (as many of the reported locations or potentially corrected locations are located outside of the Extension Project survey area for detailed investigation - refer to Appendix 3).

Where the actual reported site has not been able to be relocated (including by virtue of being outside of the investigation area), it has been problematical to correct the grid references and therefore many of the Kayandel (2006) sites/PADs remain with mapped locations that are probably incorrect. For a number of sites/PADs, this places them inside the Extension Project area, when in fact this is probably not the case (eg. direct field inspection in the reported locations yielded no evidence of the reported site). Until the actual site location can be physically confirmed in the field, it is problematic to assign an updated grid reference. It cannot be categorically assumed that every single Kayandel (2006) site has been reported with the incorrect datum (for example, this may have been an individual recorder error on single or multiple days, not a global error¹²). However, alternative mapping is presented in Appendix 3 showing the Extension Project Zones 1 - 3 and the Kayandel (2006) sites mapped with their reported datum and with a potentially corrected datum.

Hence, a total of 293 Aboriginal sites/PADs are known to occur directly within or immediately adjacent to the Extension Project investigation area (for detailed assessment - ie, development Zones 1 and 2), as listed in Appendix 7 and summarised in Table 5.

Full descriptions of the previously recorded sites are presented in Appendix 2. Where these sites were relocated and re-recorded, updated descriptions are also presented in Appendix 4. Full descriptions of all newly identified sites recorded during the current survey are presented in Appendix 4. The locations of the individual sites are marked on detailed maps included within Appendix 3 and also in Appendix 4.

For the purposes of the significance assessment and impact assessment (refer to Sections 7 and 9), all sites directly within or immediately adjacent to the Extension Project investigation area (for detailed assessment - development Zones 1 and 2) have been subject to consideration and are therefore included in Appendix 7.

¹² Several sites recorded by one Kayandel recorder on two days (21-22/6/2006) appear to have the correct datum, such as WCP 362, 364 and 365 (based on contours and description) and WCP373 (which appears on description to correlate to site WCP526 recorded during the present survey, albeit with a 50 metre margin of error, although photographs aren't presented by Kayandel to allow absolute confirmation).

Table 5: Summary of known Aboriginal sites inside or within approximately 100 metres of the heritage investigation area (for detailed assessment - development Zones 1 and 2) at the conclusion of the Extension Project heritage investigation (based on WCPL Aboriginal Site Database Revision 4, July 2014).

Aboriginal Site Type	Total
Open artefact site	133
Rock shelter with artefacts	9
Rock shelter with artefacts and art	1
Rock shelter with artefacts and ochre quarry	1
Rock shelter with artefacts and waterhole/well	1
Rock shelter with PAD	124
Scarred tree	2
Scarred tree (possible Aboriginal)	18
Waterhole/well	4
Total	293

No Aboriginal heritage sites within the investigation area are listed on any other heritage registers or planning instruments (refer to Section 3.1).

While the above discussion focuses on Aboriginal objects and physical evidence of Aboriginal occupation, contemporary cultural values associated with the investigation area have been identified by the registered Aboriginal parties. These include:

- ❑ In general terms, the use of subsistence or other resources, with comments made about the presence of various native flora and fauna where observed. These comments were not of a historical nature (ie. did not relate to plant and animal resource use areas known from the post-contact period) but rather were general observations of the occurrence of particular species and their known traditional uses (eg. for food, medicine, tools, etc.);
- ❑ In general terms, the traditional use of the area by north-eastern Wiradjuri people, and an ongoing cultural and spiritual connection to the land and resources of the study area by the north-eastern Wiradjuri; and
- ❑ In relation to 'Area G', the registered parties have identified the high cultural significance of the visually prominent hill with extensive rock formations situated in the valley floor of Slate Gully, which hosts a rock shelter with artefacts and art (WCP578), a rock shelter with artefacts and ochre quarry (WCP579), a rock shelter with PAD (WCP580) and a waterhole/well (WCP594), with an artefact scatter (WCP577) at the base (refer to Figure 15).

The possibility cannot be excluded that further Aboriginal values or associations may exist within the locality of the investigation area that were not divulged to South East Archaeology by the persons consulted.

In addition to these places, other archaeological sites (for example, artefact scatters and rock shelters) identified within the investigation area are of contemporary significance to the Aboriginal community, as they represent a tangible link with the traditional past and with the lifestyle and values of community ancestors (refer to Section 7).

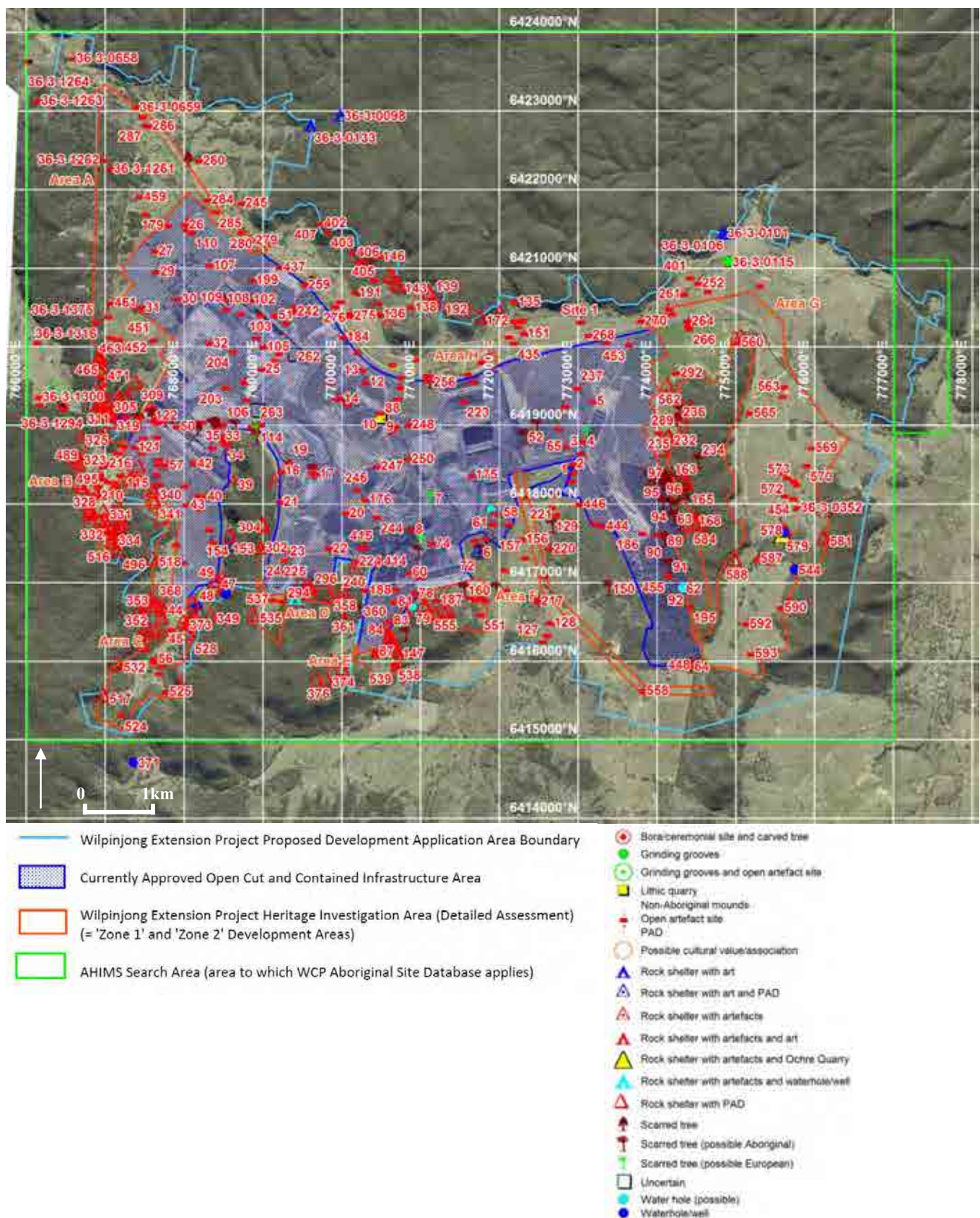


Figure 14: Location of recorded Aboriginal sites within the Wilpinjong Coal Mine area (WCPL Aboriginal Site Database Revision 4, July 2014; aerial photograph courtesy WCPL; one kilometre MGA grid; refer to Appendix 3 for detailed mapping of Aboriginal site locations; Note - possible errors with Kayandel 2006 sites WCP 289 - 376; some sites now extant).

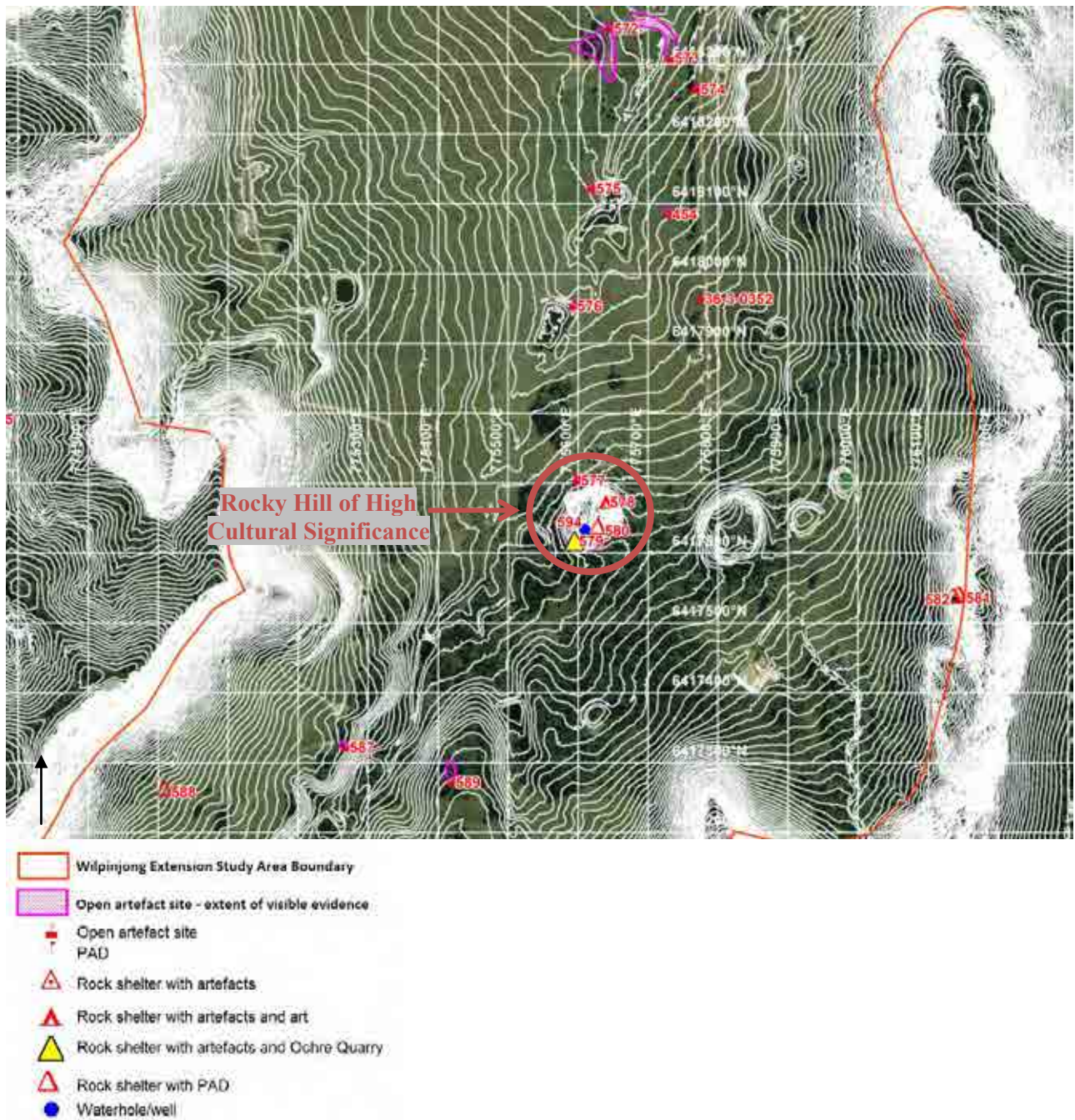


Figure 15: Location of Aboriginal sites and area of high cultural sensitivity within Area G, Slate Gully (WCPL Aboriginal Site Database Revision 4, July 2014; aerial photograph and one metre contours courtesy WCPL; 100 metre MGA grid).

5.2.2 Open Artefact Sites

A total of 133 open artefact sites are known to occur directly within or immediately adjacent to the investigation area for detailed assessment (development Zones 1 and 2). A summary of open artefact sites recorded during the current survey is presented in Appendix 4, along with comprehensive details, photographs and mapping of each site. The locations of all sites are marked on detailed maps included within Appendix 3. Descriptions of previously recorded open artefact sites are presented in Appendix 2.

Typically these are small, low density open isolated finds or open artefact scatters with ten or less artefacts. Sites with more than ten artefacts include:

- ❑ WCP572 (13 artefacts), WCP530 (17 artefacts) and WCP539 (43 artefacts) recorded during the present investigation;
- ❑ WCP326 (6 - 15 artefacts) recorded by Kayandel (2006);
- ❑ WCP280 (20 artefacts), WCP283 (27 artefacts) and WCP282 (53 artefacts) recorded by Kayandel (2006b);
- ❑ #36-3-0653 (15 artefacts) recorded by OzArk (2005); and
- ❑ WCP213 (11 artefacts), WCP87 (18 artefacts) recorded by Navin Officer (2005).

Typically "isolated finds" or "isolated artefacts" represent the only visible evidence of larger artefact scatters, in which low conditions of visibility have prevented the detection of further items. The terms "isolated artefact" and "artefact scatter" have been used interchangeably in previous studies. The term "open artefact site" encompasses those spatially discrete locations of visible artefact evidence in open contexts, that have been or can be referred to as "isolated artefacts" or "artefact scatters".

The identified artefacts probably only represent a small fraction of the entire artefact resource that is present within the investigation area, because the vast majority of evidence is likely to be currently obscured by vegetation and soil. Substantial portions of the investigation area were not directly sampled for artefacts, and where the sample was obtained, conditions of surface visibility were typically low (mean archaeological visibility across the entire survey sample was 8%, and the total effective survey coverage of the entire investigation area was 1.13%: refer to Section 5.1). The survey sample has, however, served to refine the predictive model with respect to artefact distribution (refer to Section 5.3).

5.2.3 Rock Shelters

A total of 124 rock shelters with PADs, nine rock shelters with artefacts, and single rock shelters with artefacts and art (WCP578), artefacts and ochre quarry (WCP579), and artefacts and waterhole/well (WCP298), are known to occur directly within or immediately adjacent to the investigation area for detailed assessment (development Zones 1 and 2). A summary of the rock shelters recorded during the current survey is presented in Appendix 4, along with comprehensive details, photographs and mapping of each site. The locations of all sites are marked on detailed maps included within Appendix 3. Descriptions of previously recorded rock shelters are presented in Appendix 2.

As discussed in Section 5.2.1, a number of the previously recorded rock shelters (eg. Kayandel 2006) could not be relocated in the reported positions. For a number of these recordings, the contours and topography indicate that the recorded rock shelter could not possibly exist in the immediate vicinity of the reported grid reference. It is inferred that for a number of these previously reported rock shelters, that the grid references are inaccurate. Given the comprehensive nature of the present survey, and the obtrusive nature of this site type, the potential for additional shelters to exist directly within the investigation area, that were not identified during the survey, is reassessed as very low. As such, it is inferred that a number of these previously recorded shelters (that were not relocated) are in fact situated outside of the present investigation area (refer to Appendix 7), but the scope of the present assessment did not extend to searching outside of the investigation area for these shelters to confirm their definite locations.

The rock shelter with artefacts and art (WCP578) and the rock shelter with artefacts and ochre quarry (WCP579) are located on the rocky hill¹³ in Slate Gully (Appendix 4). Site WCP578 is a relatively large shelter with a high potential for a deposit of research value. Five red hand stencils are present.

Site WCP579 has several deposits in adjacent chambers of high research potential, a range of artefacts including an uncommon porcellanite item (this material is typically found in the upper Hunter Valley around Muswellbrook and sources are not known in the Ulan locality; *cf.* Kuskie and Clarke 2004), and seams of white ochre (kaolin/pipeclay) that appear to have been extracted from above the shelter entrance and 20 metres from the north face on the rocky hill. Apparent 'cupules' on a panel on the left side of shelter near the entrance were subject to further investigation by a use-wear/residue expert (Birgitta Stephenson) but high-powered microscopic analysis revealed them to be non-human in origin.

Site WCP298 (recorded by Kayandel 2006; Appendix 2) is a small shelter of low research potential, with a nearby natural waterhole.

The nine rock shelters with artefacts (in addition to WCP 298, 578 and 579) were all previously recorded (refer to Appendix 2 and to Appendix 4 for sites re-recorded during the present investigation). They include:

- ❑ WCP 115, 116, 118, 119 and 120 in Area B, recorded by Navin Officer (2005) as a cluster of shelters within large boulders on the margin of the valley floor. Most of these shelters had two or three artefacts, apart from WCP119 with 11 (54 recorded during the present investigation - refer to Appendix 4);
- ❑ WCP325 in Area B, recorded by Kayandel (2006) approximately 30 metres west of the investigation area, but with few other details;
- ❑ WCP45 in Area C, recorded by Navin Officer (2005) as having a single artefact and small potential deposit within a boulder;
- ❑ WCP367 in Area C, recorded by Kayandel (2006) as having a single artefact and being located 60 metres (and on the basis of contour mapping, inferred to be possibly 100 metres) west of the investigation area; and
- ❑ WCP356 in Area G, recorded by Kayandel (2006) as a shelter in a boulder with ten artefacts, but not relocated at the reported grid reference during the present investigation (on the basis of the survey inspection and contour mapping, the actual location is inferred to be potentially 80 metres to the east outside of the investigation area).

The rock shelters with PADs are not technically "Aboriginal objects" as defined under the NP&W Act, however excavation of any of these shelters may reveal stone artefacts and other cultural deposits (for example, charcoal from camp fires).

The research potential of these deposits (and the deposits with surface artefacts) can be assessed in relation to various criteria (refer to Section 7.2).

¹³ This rocky hill is circular in shape and approximately 90 metres in diameter and 23 metres high above the adjacent valley floor. It is comprised of residual sandstone bedrock (erosion has removed the surrounding rock and formed the valley) and conforms to the general description of an inselberg or monadnock.

Most of the PADs recorded during the present survey are small, but the general threshold for inclusion was that there had to be sufficient room and shelter for at least one adult to sit and some deposit (ie. shelters with only bare rock floors and no deposit were not recorded, although it is probable that such shelters may have been utilised by Aboriginal people on occasions).

The reasons for the absence of visible evidence in these shelters probably varies, but in many cases may relate to limited archaeological visibility. A number of shelters had a covering on the surface of recent sediment deposition, or for other reasons such as leaf litter, visibility was low. However, a genuine absence of occupation (specifically, the resulting evidence thereof) may also be the explanation for a number of these shelters.

In terms of the gross shelter floor area (not the *habitable floor area* where the roof is higher than one metre above the floor), most of the shelters are relatively small (typically less than 30 m²). Approximately 73% of the 79 shelters recorded during the present survey had gross floor areas of 15 square metres or less. Several of the larger shelters included WCP 473, 505, 119, 552, 500, 502, 579, 504 and 480, all with floor areas of more than approximately 35 m².

Some of the PADs appeared to have a relatively shallow depth of deposit, but many appeared to be relatively deep. This was estimated using a stake flag, a method that can be unreliable in compact soil or deposits with abundant gravel/rock (Kuskie 2012). Deeper deposits significantly enhance the potential for stratigraphy and identifying chronological changes in occupational evidence.

In general, a number of the shelters tended to be small in size, have low roof heights, limited habitable floor areas, sloping floors and/or shallow potential deposits, which tended to limit their potential research value. However, other shelters were larger, with greater roof heights and more potential for occupation deposits.

5.2.4 Scarred Trees

Eighteen 'possible Aboriginal' scarred trees previously recorded by Navin Officer (2005), one scarred tree recorded by Kayandel (2006) and one recorded by Warren Bluff occur within or immediately adjacent to the investigation area for detailed assessment (development Zones 1 and 2) (refer to Appendix 2 for details). Given that sufficient evidence was generally available in the existing site descriptions to reassess these trees (refer to Appendix 2), and uncertainties with the accuracy of many of the grid references, the present survey did not engage in the time-consuming process of seeking to relocate each individual tree. Based on the reported grid references, 14 of these trees are situated outside of the immediate investigation area (but within approximately 100 metres).

Of greatest significance is the conclusion by Navin Officer (2005) that no 'definite' Aboriginal scarred trees occur within the Wilpinjong Coal Mine Project area. These 18 'possible' Aboriginal scarred trees were noted as having scars that conformed to all or most criteria for an Aboriginal origin, but were thought to have derived from non-indigenous human (eg. surveyors) or natural origin.

Aboriginal scarred trees exhibit the evidence of Aboriginal utilisation of bark and/or wood for the manufacture of canoes, containers, shelters, shields or boomerangs. Scarred trees may also have been associated with cultural activities and places, such as initiation ceremonies and burials, although these are more often associated with carved trees. Beesley (1989), Bell (1982) and Crew (1990, 1991) outline the criteria for identifying Aboriginal scarred trees:

- ❑ The scar is wholly enclosed;
- ❑ The scar exhibits the removal of bark and/or wood;
- ❑ The scar is regular in shape and usually oval, elongated, rectangular, or curved to fit the shape of the trunk;
- ❑ Multiple scars on one tree may be present;
- ❑ Stone or steel axe marks may be present around the edge of the scar;
- ❑ Multiple, small, regularly spaced scars may be present;
- ❑ The tree is of indigenous species and of mature age;
- ❑ The tree may be associated with particular resource zones such as rivers; and
- ❑ The tree may be associated with other Aboriginal sites.

A number of non-Aboriginal causes for scarred trees exist, including loss of branches, lightning and fire damage, insect damage, growth stress, bird activity and modern (or historical) activity such as survey marks and mechanical damage from machinery and vehicles (Crew 1990, 1991).

Natural causes for scarring often result in basal scars and scars irregular or ragged in shape, while scars on immature and exotic trees are not considered to be characteristic of Aboriginal activity and may be the result of either natural or modern causes (Crew 1990, 1991).

Scars arising from recent (non-Aboriginal) human activity are generally fully enclosed, but usually exhibit the removal of bark only and are often rectangular, arched or half oval in shape (Crew 1990, 1991). Such scars may also exhibit steel axe marks and occur on exotic species, often associated with sites of non-Aboriginal human activity, such as construction areas, roads or farm buildings (Crew 1990, 1991).

Review of the original site descriptions (refer to Appendix 2) confirms Navin Officer's (2005) conclusion that none of the 'possible' Aboriginal scarred trees exhibit sufficient attributes to be confidently classified as deriving from Aboriginal use. Many of the trees exhibits attributes consistent with non-Aboriginal causes for the scarring. Following reassessment against the attributes listed above, an Aboriginal origin for the scar cannot be entirely discounted for only two of the trees (WCP64 and #36-3-0103), both of which are situated outside of the immediate investigation area.

5.2.5 Other Site Types

The only other site type reported within or immediately adjacent to the investigation area for detailed assessment (development Zones 1 and 2) is the waterhole/well (refer to Appendices 2 and 4 for details).

Four waterhole/wells are reported as stand-alone sites (WCP 314 and 362 - Kayandel 2006, and WCP 544 and 594 located during the present survey) and one in association with a rock shelter with artefacts (WCP298, Kayandel 2006).

These items are natural depressions in boulders or exposed bedrock, known as pan-holes or gnamma holes, which retain water, and as such may have represented a source utilised by Aboriginal people. There is no direct evidence of Aboriginal working or use of these waterholes.

5.2.6 Cultural Values

Contemporary cultural values associated with the investigation area have been identified by the registered Aboriginal parties. Some of these relate to physical objects, including items that qualify as *Aboriginal objects* as defined under the *National Parks and Wildlife Act 1974*. However, some relate to intangible values, associations or landscape features that do not qualify as *Aboriginal objects*. These include:

- ❑ In general terms, the use of subsistence or other resources, with comments made about the presence of various native flora and fauna where observed. These comments were not of a historical nature (ie. did not relate to plant and animal resource use areas known from the post-contact period) but rather were general observations of the occurrence of particular species and their known traditional uses (eg. for food, medicine, tools, etc.);
- ❑ In general terms, the traditional use of the area by north-eastern Wiradjuri people, and an ongoing cultural and spiritual connection to the land and resources of the study area by the north-eastern Wiradjuri; and
- ❑ In relation to 'Area G', the registered parties have identified the high cultural significance of the visually prominent hill with extensive rock formations situated in the valley floor of Slate Gully, which hosts a rock shelter with artefacts and art (WCP578), a rock shelter with artefacts and ochre quarry (WCP579), a rock shelter with PAD (WCP580) and a waterhole/well (WCP594), with an artefact scatter (WCP577) at the base (refer to Figure 15).

In addition to these places, other archaeological sites (eg. artefact scatters) identified within the investigation area are of contemporary significance to the Aboriginal community, as they represent a tangible link with the traditional past and with the lifestyle and values of community ancestors (refer to Section 7).

In general terms, the attachment of the north-eastern Wiradjuri people to the landscape and continuing strong cultural connections with the locality of the study area was evident. As noted by Goulding (2002:63) land is a fundamental part of Aboriginal culture, and such cultural connections are integral to the health and wellbeing of Aboriginal people, although can be complex and are not always obvious to others.

5.3 Discussion

The results of the investigation are discussed below, including the potential integrity of the evidence, nature of the evidence and interpretations of the evidence.

5.3.1 Integrity of Evidence

The integrity of the identified sites and the remainder of the investigation area can primarily be assessed for surface evidence only through examination of land use impacts. Controlled excavation enables integrity to be assessed through the horizontal and vertical distribution of artefacts and by conjoining items.

As discussed in Section 2, recent non-Aboriginal land-use practices have had generally low impacts on the investigation area. Some impacts have been caused by:

- ❑ Vegetation removal and timber harvesting;
- ❑ Pastoral activities;
- ❑ Rural settlement (including residences and other infrastructure such as buildings and farm dams); and
- ❑ Mining and infrastructure (such as the Wilpinjong Coal Mine, Gulgong - Sandy Hollow Railway, Ulan - Wollar Road, Wilpinjong Road, Wollar Road, Slate Gully Road, Wollar-Wellington 330kV electricity transmission line, several quarries and other powerlines, telecommunication cables, essential services and roads).

Approximately 39 hectares (3%) of the heritage investigation area for detailed assessment has been totally modified by previous land use, such that negligible potential for Aboriginal heritage evidence remains. These areas were associated with the Ulan - Wollar Road, Gulgong - Sandy Hollow Railway, Wollar Road, Slate Gully Road and existing approved Wilpinjong Coal Mine works.

In the remainder of the investigation area, levels of ground disturbance were recorded during the survey, after McDonald *et al* (1984) (Appendix 2). The survey areas typically exhibited low levels of ground disturbance and should sub-surface deposits of artefacts occur, mostly they may exhibit reasonable integrity. Approximately 78% of the area subject to detailed heritage survey sampling was assessed as exhibiting low levels of ground disturbance, with 3% assessed as low to moderate, 18% as moderate and less than 1% as high.

The open artefact sites tend to be located in exposures created by ground disturbance (for example, erosion, vehicle tracks or animal diggings) and as a result exhibit varying levels of integrity. Of the 66 open artefact sites recorded in detail during the present survey, 22 exhibit low levels of disturbance, three exhibit a low to moderate level, 23 a moderate level, three a moderate to high level and 15 a high level.

However, in general, disturbance levels are low across much of the investigation area and should sub-surface deposits of artefacts occur in open contexts, they may generally exhibit reasonable integrity.

Of the 79 rock shelter sites/PADs recorded in detail during the present survey, 31 exhibit low levels of disturbance, five exhibit a low to moderate level, 32 a moderate level, seven a moderate to high level and four a high level. The causes of disturbance to rock shelter deposits included erosion and bioturbation (particularly animal burrows).

5.3.2 Lithic Assemblage

A total of 294 lithic items were recorded during the present survey, primarily in open artefact sites, but also in several rock shelters. These items are listed for each site in Appendix 4 and summarised in Table 6. Most of the items were recorded in the rock shelter sites WCP119 (54 artefacts) and WCP579 (14 artefacts) and the open artefact sites WCP539 (43 artefacts), WCP530 (17 artefacts) and WCP572 (13 artefacts). The remaining 64 sites recorded during the present survey contained ten or less artefacts.

The previously recorded open artefact sites within or immediately adjacent to the investigation area for detailed assessment (development Zones 1 and 2) also generally contain low numbers of reported artefacts. At least 31 sites recorded by Navin Officer (2005), Kayandel (2006, 2006b), Kuskie (2013a), OzArk (2005), Hamm (2008a) and Apex Archaeology (2013 a-d) are reported as isolated artefacts, and at least another 21 open artefact sites as containing ten or fewer artefacts. For many of the earlier recordings, detailed descriptions of each artefact were not presented (refer to Appendix 2), as such the discussion below focuses on those items recorded during the present survey.

Table 6: Summary of stone artefacts recorded during the present heritage survey.

Lithic Item Type	Stone Material										Total
	acidic volcanic	basalt	chert	crystal quartz	jasper	porcellanite	quartz	quartzite	tuff	volcanic	
backed artefact - portion			1				1				2
blade							1				1
core	1		2	1			18	1	7		30
flake	12		15	5			48	1	16		97
flake - distal				1		1	13		1		16
flake - longitudinal	1		1	1			12		2		17
flake - medial	1			1			9		3		14
flake - proximal	1			2			12		3		18
flake - utilised									1		1
ground edge axe	1									1	2
ground edge axe - rejuvenation flake		1									1
lithic fragment			4	3	1		57		9		74
retouched flake							1		1		2
retouched flake - proximal							1				1
retouched flake - utilised			1								1
retouched piece				1							1
retouched piece - utilised									1		1
core fragment				2			12				14
axe blank	1										1
Total	18	1	24	17	1	1	185	2	44	1	294

In terms of stone materials, consistent with assemblages from the locality (for example, the overall Ulan assemblage of Kuskie 2009 of over 9,000 artefacts), the combined assemblage is overwhelmingly dominated by quartz (including crystal quartz; 68.7% of the combined assemblage), with lower frequencies of tuff (15%), chert (8%) and acidic volcanics (6%) and very low frequencies of other materials such as basalt, jasper, porcellanite, quartzite and other volcanics.

There are three main forms of massive quartz: veins, geodes and macro-crystals. For the purposes of flaking, these varieties are essentially similar, although vein or reef quartz is more likely to contain major pre-existing flaws. Quartz is composed of extremely small hexagonal crystals of silicon dioxide, which give it a glossy texture. When pure it is translucent, but minute traces of minerals may add colours such as smoky grey, pink or yellow. Most quartz has microscopic gas or liquid filled vacuoles that give it a milky appearance. While this does not affect the rock's strength, clay minerals in ground water, particularly iron compounds, may seep into the minute flaws and weaken the stone, leading to natural fracturing. It can also break with a conchoidal fracture.

Because quartz exhibits a small degree of cleavage and tends to have internal flaws, it ranges in flaking quality from very poor to acceptable. Internal cracking of quartz often occurs during flaking and its fracture path is usually much less predictable than stone which breaks with a strong conchoidal fracture. For these reasons quartz is generally a low-quality flaking material. However, because of its abundance and availability, in some areas such as the Ulan - Wilpinjong locality it is the main stone type used for flaking. Its other advantage is that it provides small flakes with very sharp edges, which are suitable for light-duty work such as skinning, light butchering and cutting plant matter.

Ten (5%) of the quartz artefacts display waterworn cortex and five items terrestrial cortex. Quartz pebbles have been noted in numerous locations across the locality and are derived from decomposed conglomerate rock. The pebbles occur in various sizes and quality, but are often sufficient for knapping (*cf.* Kuskie 2009).

Tuff comprises 15% of the combined assemblage. Tuff is a fine grained, isotropic stone formed after a cloud of ash was ejected in an explosive volcanic eruption. The ash settled to the ground or through ponded water. After burial, some tuff beds became indurated, through a low-grade metamorphic process (probably involving pressure) in which the stone recrystallised to a more stable structure. Tuff seams are commonly associated with Permian era Coal Measures. Tuff samples examined from the nearby Hunter Valley are rhyolitic in chemical composition (quartz and potassium-feldspar, occasionally with layer silicate or goethite) (Kuskie and Kamminga 2000).

Tuff is typically grey in colour in the lower Hunter Valley (a function of grain size, not a reference to individual grains, which can be of a variety of colours). However, tuff is porous enough for the diffusion of iron bearing solution, with iron precipitating out to give a yellow, brown, red or orange colour. Variations to the surface colouration can also result from weathering processes. In the Ulan and Wilpinjong locality, the tuff is predominantly yellow or brown in colour, indicating the presence of the mineral goethite.

As with quartz, tuff was probably procured from local sources in the Wilpinjong area. Tuff occurs widely in the locality, as seams exposed in the scarps and slopes of the dissected sandstone terrain (including occasionally within rock shelters) and as tabular colluvial gravels on the slopes and also in the drainage depressions where it has migrated further downwards. Tuff and/or tuffaceous stone was noted during the survey in a number of areas, including A15, A72, A97, B5, B8, B15, C4, C8, C10, D1, E2, E4, E7, G19 and G195. Approximately 25% of the tuff artefacts exhibit tabular cortex and 7% terrestrial cortex, indicative of these local sources.

Chert comprises 8% of the combined assemblage. Cherts are highly siliceous sedimentary rocks, with a chemical composition of silicon dioxide and major constituent minerals of chalcedony, quartz and opal. Chert is formed in marine sediments and occurs as nodules in limestone. The various accumulations of other substances, for example iron oxides, during the process of formation often colours the parent matrix of chert, leaving the final material often quite visually arresting colours or patterns of colours, particularly banded layers. Chert was a favoured material for manufacturing artefacts, as it breaks by the process of conchoidal fracture and provides flakes that have sharp, durable edges.

Chert is present in the local Illawarra Coal Measures and occurs in a relatively low frequency as pebbles in the conglomeritic derived gravels. Colluvial gravels probably represented relatively local sources for this stone.

Ochre nodules were also observed within the investigation area during the survey, including within survey areas A84, B5 and E2. The nodules occur within ironstone cobbles and may have been exploited for use in paint.

In terms of artefact types, consistent with assemblages from the locality (for example, the overall Ulan assemblage of Kuskie 2009), the combined open site assemblage is overwhelmingly dominated by flakes (33%), flake portions (22%), lithic fragments (25%), cores (10%) and core fragments (5%). These items may represent the fragmented debris of on-site knapping of primary flakes and/or microblades or other on-site fracture, such as accidental breakage, or accidental discard.

Backed artefacts comprise a relatively small (0.7%) component of the assemblage, with only two backed artefact portions present (in sites WCP119 and WCP497). No complete microliths (such as bondi points or geometric microliths) were identified.

Bondi points are a form of microlith often found in artefact scatter sites dating to the mid-late Holocene. While the function of these finely fashioned implements is not known with certainty, most archaeologists consider that they were used in armatures of hunting and fighting spears (Mulvaney and Kamminga 1999:235-36). Microliths may have served as barbs, or else as lacerators intended to disable an enemy or prey by causing haemorrhage. It is possible that different microlith types were designed to serve these different functions. Alternative uses have been proposed for bondi points, including their use as cutting implements (*cf.* Sokoloff 1977). Most recently, Fullagar (*et al* 1994) has inferred from residues on a small sample of bondi points from the Hunter Valley that they served as multi-functional tools. Therin (2000) inferred that some backed artefacts from the ID# 132 salvage assemblage at Ulan were used as knives rather than spear barbs. However, the evidence for use in spear armatures is persuasive and it could easily account for the range of residues observed.

Approximately 2.4% of the assemblage comprises other retouched and/or utilised flakes or flake portions or pieces (seven items). Two can be described as 'scrapers' (in sites WCP495 and WCP592). Although the functions of the utilised items are uncertain, they indicate that tasks other than artefact production occurred. Retouched flakes and pieces are artefacts that can have limited analytical value, because the purpose of the retouch they exhibit is not necessarily known. Some may be associated with backed artefact production or be portions of backed artefacts. Nevertheless, in general terms, the frequency of utilised and/or retouched items is relatively low.

Two ground-edge axes, an axe blank and a rejuvenation flake from a ground-edge axe were also located (in sites WCP 119, 572, 573 and 590). Stone hatchets were an essential part of a person's tool-kit. They were used to cut saplings for building gunyahs, for stripping bark from trees, cutting notches in trees for climbing, and cutting toe-holds in trees to procure animals or honey from bee nests (Mathews 1894). These items were all made of tough volcanic stone. Axes were shaped and sharpened on sandstone rock, forming grinding grooves in the process. Although grinding grooves have not been identified within the investigation area (for detailed assessment), three sites are known within the immediate locality:

- ❑ Site 'Yawanna No. 3' (OEH #36-3-0115) recorded by Warren Bluff along Wilpinjong Creek (within development 'Zone 3');
- ❑ Site S2MC151 (OEH #36-3-1297) recorded by Hamm (2008b) west of the Extension Project area within the Moolarben Stage 2 area; and
- ❑ Site 'Borehole 16' (OEH # pending) recorded by Kayandel (no further details provided, listed in Wilpinjong Site Database with uncertain/inaccurate grid references).

5.3.3 Spatial Distribution, Site Interpretation and Reassessment of Occupation Model

The spatial distribution of evidence can be examined for the sample derived from the present survey, particularly in relation to environmental variables such as slope and landform element. However, the inferences that can be made from this comparison are limited by the small nature of the total effective survey coverage and low number of artefacts identified.

Overall, artefacts in open contexts in the surveyed area occur at a very low mean density of 0.002 per square metre of effective survey coverage (refer to Table 4).

Relatively higher densities were evident in the level-very gentle simple slope contexts (0.014 artefacts/m² of effective survey coverage) and to a lesser extent the gentle ridge crest context (0.008/m²) compared to other environmental contexts. In terms of gradient, a relatively higher density occurs on level-very gentle ground (0.005/m²), compared with gentle ground (0.002/m²) and moderate or steep ground (0.001/m²). These results are consistent with extensive evidence obtained elsewhere in south-eastern Australia (*cf.* Kuskie 2000b). In terms of landform unit, the ridge crest (0.007/m²) and to a lesser extent the spur crest (0.004/m²) units exhibited higher densities.

However, the extent to which these results reflect intensity of occupation or sampling issues is uncertain, given the small nature of the total effective survey coverage and low numbers of artefacts identified. The landform density results could relate to a shallow nature of soil deposits and erosional contexts on the elevated landforms (eg. ridge and spur crests) compared with possibly deeper soil deposits and more depositional contexts (from colluvial slopewash) in lower-elevation landforms (eg. slopes and flats in valley floors).

Generally the spatial distribution and nature of evidence is largely consistent with background discard, manuport and artefactual material which is insufficient either in number or in association with other material to suggest focused activity in a particular location (*cf.* Kuskie and Kamminga 2000). In general terms, the artefact density indicates a generally low-intensity utilisation of the Extension Project investigation area.

Although the identified open artefact evidence probably only represents a fraction of the artefact resource that is present within the investigation area, because the majority of evidence is likely to be currently obscured by vegetation and soil (*cf.* Kuskie 2009), much of the Extension Project investigation area (for detailed assessment) is located in contexts that do not conform to primary or secondary resource zones under the model of occupation presented in Section 3.4.

These areas are generally distant from higher order watercourses, where more reliable potable water and subsistence resources would have been available, and/or are of moderate to steep gradient. As such, rather than having represented focused occupation, Aboriginal use of these portions of the investigation area is therefore more likely to have related to hunting and gathering activities, along with transitory movement between locations and procurement of stone materials, and would have been of a generally low intensity. The survey results support these conclusions.

However, portions of the investigation area are located closer to a third or higher-order watercourse or other areas of possible water retention (for example, former ponds, swamps or marshes), which are likely to have been significant factors in relation to Aboriginal occupation of the locality (refer to Section 3). Examples of these areas¹⁴ include:

- ❑ Portions of Areas A, G and H close to Wilpinjong Creek and its associated creek flats (survey areas A1, A2, A5, A6, A9, A11, A12, A14, A18, A19 and A41, G1-7 and H1-3 of gentle or level-very gentle gradient);
- ❑ Portions of Area A close to the lower section of Planters Creek (survey areas A41-44 of gentle or level-very gentle gradient);
- ❑ Portions of Area B close to the third order Spring Creek (survey areas B9, B13, B15 and B16 of gentle or level-very gentle gradient);
- ❑ Portions of Area C close to the third order Spring Creek tributary (survey areas C17, C28, C31, C38 and C47 of gentle or level-very gentle gradient);
- ❑ Portions of Area F close to the higher order Cumbo Creek (survey areas F1-3, F22, F24, F26 and F37 of gentle or level-very gentle gradient); and
- ❑ Portions of Area G close to the mid-lower section of the un-named watercourse in Slate Gully (survey areas G65, G97, G98 and G118 of gentle or level-very gentle gradient).

These areas can potentially be classified as secondary resource zones. However, without systematic excavation of a representative sample of these contexts, including at varying distances from the water sources, verification of this modelling and identification of the true nature and distribution of sub-surface evidence within these areas is not possible. According to the modelling in Section 3.4, occupation of these portions of the investigation area may have included camping by small parties of hunters/gatherers and nuclear/extended family groups, in addition to hunting and gathering and transitory movement between locations. Occupation of these areas may have occurred at a higher intensity than in the surrounding areas.

¹⁴ Survey areas of moderate or steep gradient are excluded from this list as substantial evidence obtained elsewhere (eg. Kuskie 2000b) demonstrates that such areas are generally unlikely to have hosted evidence of focused occupation (such as encampments).

Significantly, notwithstanding limitations posed by the vegetation cover and sediment deposition, the survey results tentatively support these predictions of the occupation model, with the location of seven of the ten sites with the highest artefact counts (ten or more artefacts) in these zones (WCP 280, 282, 283, 326, 530 and 572 and #36-3-0653).

In the absence of systematic test excavation results from a range of contexts and at varying distances from the water sources, empirical evidence is not available to confirm the potential nature and distribution of heritage evidence within these areas or the general distance from the water source at which occupation becomes less focused (ie. artefact densities decline substantially). Based on evidence elsewhere (eg. Kuskie 2000b), this is estimated on a very conservative basis here to be a maximum of 200 metres, but can vary with different contexts (for example, in some locations, steep adjacent slopes may limit this distance to say 50 metres), different order or nature of water source (for example, the higher the order of the watercourse, the broader the zone in which more focused occupation may have occurred), and could be in the order of less than 100 metres for many areas within the Extension Project. Certain contexts (for example, low spurs at drainage confluences) may have been occupied at a greater intensity than other contexts at the same distance from the water source. Strategies to resolve this issue are presented in Sections 10 and 11.

The evidence identified during the survey is consistent with the occupation model for the locality (refer to Section 3.4). No evidence was identified that would lead to revisions to the model.

The inferences that can be made about the nature of occupation at the identified sites or elsewhere in the investigation area are limited by the nature of the sample. It is inferred from the evidence obtained during the survey of the Extension Project investigation area that:

- ❑ Aboriginal people widely used the Extension Project investigation area, but generally at a low intensity, apart from around the potential secondary resource zones noted above, where occupation *may* have occurred at a higher intensity;
- ❑ The artefact and rock shelter evidence is largely consistent with transitory movement through the landscape and occasional and short-duration visits by small parties of hunters and/or gatherers;
- ❑ Some of the artefact and rock shelter evidence *may* relate to more focused occupation, such as camping by small parties of hunters and/or gatherers or nuclear/extended families (such as at site WCP282);
- ❑ Activities appear to have occurred more frequently on areas of level-very gently inclined ground, compared with gently or moderate to steeply inclined ground;
- ❑ At least some of the evidence within the area relates to occupation during the past 5,000 years (as can be inferred from certain artefact types);
- ❑ The stone material quartz was predominantly used for stone-working activities, largely because of its local availability, and it was probably procured from relatively local colluvial gravels in a casual, opportunistic manner. Tuff was also used, in lower frequencies, and was also probably procured from local sources;
- ❑ Ochre was procured from sources within the Extension Project area and used for rock art and/or body art, evidence of non-secular activity; and
- ❑ Core reduction strategies are inferred to have been largely expedient, to produce flakes for immediate use (ie. largely casual and opportunistic, meeting requirements on an 'as needed' basis).

The distribution of rock shelter sites/PADs relates to the distribution of rock formations. Numerous rock formations occur, particularly on the more elevated margins of the valleys (typically as boulders and low rock walls, but also including larger scarps). More substantial cliff formations tended to be located outside of the immediate investigation area (for detailed assessment) higher up the side-slopes of the valleys. Rock formations also occur in the low elevation portions of several of the broad open valleys. Typically these comprise isolated boulders that have detached and moved downwards from the ridge-slopes above.

Approximately 81% of the shelters recorded during the present survey occur on simple slopes, with 11% on scarps, and only 2.5% each on spur crest, hillock and drainage depression units. Scarps only comprise 0.2% of the investigation area, highlighting the relationship between distribution of rock shelter sites/PADs and the distribution of rock formations.

Virtually all of the shelters are some distance from higher-order water sources or potential secondary resource zones, with the possible exceptions of:

- ❑ WCP 327, 328, 329, 330, 331, 332, 333, 334, 508, 509, 510, 513, 515 and 516 within 100 metres of the third order Spring Creek (survey area B9 and B16) along with WCP 116-120, 496, 498, 499, 501-504, 506, 512 and 514 within 150 metres of that source;
- ❑ WCP 517 within 100 metres of the third order Spring Creek tributary (survey area C31); and
- ❑ WCP 578, 579 and 580 on the large rocky hill in Slate Gully, all within 150 metres of the mid-lower section of the un-named watercourse in Slate Gully (survey area G118).

However, many of these shelters have relatively small habitable floor areas, small/low entrances, sloping floors and/or low roof heights, which tend to limit their prospective use for overnight encampments, particularly by family groups (refer to detailed site descriptions in Appendix 3). A number of the shelters with PADs may not have been utilised at all by Aboriginal people. However, the shelters with artefacts provide evidence that at least several of the shelters were utilised.

Of the shelters within proximity of the potential secondary resource zones, only the following represent larger shelters that may have been suitable for use by family groups for overnight or longer stays:

- ❑ WCP 118/119, 502 and 504 within 150 metres of the third order Spring Creek (survey areas B9 and B16); and
- ❑ WCP 578 and 579 on the large rocky hill in Slate Gully, within 150 metres of the mid-lower section of the un-named watercourse in Slate Gully (survey area G118).

Other large shelters occur though (further distant from the potential secondary resource zones), such as WCP 473, 480, 500, 505 and 552, all with floor areas of more than approximately 35 m². These shelters may also have been occupied by small parties during the course of hunting/gathering, including for overnight encampments, although the further distance from potable water may have made them less attractive locations.

As noted above, many of the small rock shelters have characteristics that would have limited their prospective use for much more than temporary shelter from adverse weather. Many of the 124 rock shelters with PADs within the investigation area (for detailed assessment) may not even have been utilised, although it is also likely that in many cases the absence of visible evidence relates to limited archaeological visibility. A number of shelters had a covering on the surface of recent sediment deposition, or for other reasons such as leaf litter, visibility was low. Of the nine rock shelters with artefacts, similar to the PADs, most appear to have few artefacts, and tend to be small in size, have low roof heights, limited habitable floor areas, sloping floors and/or shallow potential deposits, which tend to limit their potential for more than very temporary occupation.

Kuskie (2013f), during development of a rock shelter sampling strategy at UCML, identified three potential *key variables* with respect to occupation of the shelters:

- ❑ *Size of habitable floor area / Extent of PAD:* A larger habitable floor area (the floor area of a rock shelter where the ceiling height is about one metre or more) equates to higher potential, as family groups may have been accommodated, a broader range of activities performed, and overnight camps and stays of longer duration been more feasible. Conversely, a small floor area limits the potential to short-duration/low-intensity activities such as people having sought temporary shelter from adverse weather. Closely related is the extent of potential deposit (although affected by open rock surfaces and boulders on the shelter floor). A larger PAD, including often in areas marginally forward of the dripline, equates to higher research potential, whereas a smaller PAD equates to lower potential, although this is not directly a factor that would have influenced Aboriginal decision-making about site location/occupation;
- ❑ *Distance to higher order water:* Proximity to potable water is an important element in the location of focused occupation, and consequently the location of deposits of higher research potential. Higher order watercourses (fourth order and above) represent more reliable/frequently available/longer duration sources of potable water, than lower order watercourses (ephemeral, unreliable, infrequently available, shorter duration of water retention). Distance to higher order water is considered to be a key variable, with shelters grouped at UCML into the somewhat arbitrary (as quantitative data is not available) categories of close (<200 metres to higher order water) and further (>200 metres from higher order water); and
- ❑ *Clustering with other shelters:* A cluster of shelters may enable occupation by an extended family group/larger group of people and perhaps for longer duration, whereas a small isolated shelter may only be suitable for a small party and perhaps a stay of shorter duration. Clustering with other shelters is considered to be a key variable, with shelters grouped into categories of strong (multiple shelters in close proximity) and weak/nil (few or no other shelters in close proximity) (Kuskie 2013f).

The rock shelter with artefacts and art (WCP578) provides evidence of non-secular activity (five hand stencils), although the purpose of the hand stencils is not known. Hand stencils were part of a complex form of communication and utilised in the representation of signatures, special occasions, individuals, messages, stories, myths and spiritual events.

Some members of the Native Title Claimant party (such as Mrs Robyn Williams, pers. comm., 2014) expressed the view that this shelter with art (WCP578) was a women's site (ie. a place for women and children, with access to initiated men restricted) and that the site is related to Castle Rock (WCP72). MGATSIC representatives (including Mrs Debbie Foley, pers. comm., 2014) also viewed the shelter as a women's site and noted the small size of most of the hand stencils.

There is no evidence to dispute conclusions that site WCP578 is a restricted access 'women's site', but likewise there is no conclusive evidence in support of such a proposition. Mr Larry Foley (MGATSIC, pers. comm., 2014) had a contrasting view that the red ochre indicated initiated men and that one horizontally aligned hand stencil signalled 'next in line' for initiation, indicating that the site was a men's site.

The relationship of site WCP578 with the nearby rock shelter with artefacts and ochre quarry (WCP579) and waterhole/well (WCP594), located on the same rocky hill in Slate Gully, and possibly the artefact scatter at the base of the rocky hill (WCP577) (refer to Figure 15) is of interest.

Site WCP579 has several deposits in adjacent chambers of high research potential, a range of artefacts, and seams of kaolin/pipeclay that appear to have been extracted from above the shelter entrance and 20 metres from the north face on the rocky hill. Substantial roof collapse has occurred, quite possibly in very recent times. Prior to this the habitable floor area would have been considerably larger. From the range of artefacts at WCP579, its position lower down on the rocky hill than WCP578, its closer proximity to the drainage with potentially potable water (survey area G118), and the evidence for extraction of kaolin/pipeclay (for probable use as white ochre for body paint and decorating shields, etc), it could be inferred that this site was occupied by parties of men, or perhaps by family groups during the course of the normal seasonal round (ie. non-restricted access).

The presence of an uncommon porcellanite item indicates either the movement of Wonnarua people from the upper Hunter Valley to this location, or visits to that area by north-eastern Wiradjuri people who returned with this material, or trade with nearby upper Hunter Wonnarua people. This material is typically found in the upper Hunter Valley around Muswellbrook (Kuskie and Clarke 2004) and sources are not known in the Ulan locality, however the potential occurrence of local sources cannot be discounted¹⁵.

The presence of the nearby Ulan - Wollar Road (within two kilometres north of the rocky hill), which connects with the Bylong Valley Way to provide modern access to Sandy Hollow in the Hunter Valley 60 kilometres directly to the east, is noted, as the early non-indigenous settlers often utilised travel routes following Aboriginal pathways (*cf.* Kuskie 2009). Wilpinjong Creek is located three kilometres north of the rocky hill, and it flows north-east, connecting with Wollar Creek before continuing north to the Goulburn River, from where it flows in a large 'u-shape' to the north and east before heading east along the Bylong Valley to Sandy Hollow. Riverine corridors such as these were also noted Aboriginal pathways or corridors for movement between locations, and with its potable water, subsistence resources and associated flats and terraces suitable for encampments, the Goulburn River is likely to have been utilised as such. Notably, near the very headwaters of the Goulburn River 15 kilometres north-west of the Extension Project is the major "Hands on Rock" complex of rock shelters with extensive art (particularly hand stencils), along with other significant sites such as "The Drip".

¹⁵ Geologist James Stringer (pers. comm. to WCPL, 18 March 2015) advises that porcellanite "is likely" to occur within the Triassic Wollar Sandstone formation and Permian Illawarra coal measures in the Wilpinjong locality. However, despite the conduct of extensive heritage surveys in the region, no known sources or occurrences have been identified and the material has not been identified or reported within any archaeological assemblages in the locality.

While on present evidence the nature of occupation at the sites on the rocky hill in Slate Gully and their relationship with each other and with other sites and occupation in the region can only be speculated, the potential movement of people and/or goods (eg. porcellanite and white ochre), differential use of the nearby shelters (restricted and non-restricted access), and evidence associated with non-secular activities (art and ceremony) are issues warranting further investigation.

Several other site types have been identified within the investigation area, which indicate different Aboriginal activities.

The waterhole/wells, of which four are recorded, along with a fifth in association with a rock shelter with artefacts, are natural depressions in boulders or exposed bedrock, known as pan-holes or gnamma holes, which retain water, and as such may have represented a source utilised by Aboriginal people.

The scarred trees possibly represent the utilisation of bark and/or wood for the manufacture of canoes, containers, shelters, shields or boomerangs. However, as noted in Section 5.2.4, many if not all of the scars on these 20 trees may have originated from non-Aboriginal causes (natural or non-indigenous human).

5.3.4 Regional Context

The nature of the evidence from the investigation area can be compared with other studies and sites in the region (refer to Section 3.2). The primary purpose is to identify similarities and differences with other reported evidence, in order to provide a framework for interpreting representativeness and assessing potential cumulative impacts.

Several primary similarities have been identified with other survey results in the locality including the:

- ❑ Occurrence of similar open artefact sites and rock shelter sites/PADs in similar topographical contexts;
- ❑ Occurrence of ochre procurement sites, waterhole/wells, rock art and possible scarred trees;
- ❑ Similar stone material and artefact types;
- ❑ Generally low artefact numbers and mean densities; and
- ❑ Presence of evidence in similar environmental contexts, including landform elements and classes of slope.

The nature of much of the evidence from the investigation area is consistent with the results from the previous heritage assessment for the EIS (Navin Officer 2005).

Few specific aspects of the heritage evidence located within the Extension Project investigation area (for detailed assessment) are rare or unique within a local or regional context, however the following represent less commonly reported or unusual examples of evidence:

- ❑ The porcellanite artefact in site WCP579, the rock shelter with artefacts and ochre quarry on the large rocky hill in Slate Gully, is not known from the locality (*cf.* Kuskie 2009). It is inferred to have potentially originated from the upper Hunter Valley and may indicate either the movement of Wonnarua people from the upper Hunter Valley to Slate Gully, or visits to the upper Hunter Valley by north-eastern Wiradjuri people who returned with the material, or trade between the two groups, although ultimately a local source for the material cannot be discounted;
- ❑ The seams of kaolin/pipeclay ('white ochre') that appear to have been quarried from above the entrance to site WCP579 and nearby on the rocky hill in Slate Gully, is infrequently known in the locality (only one example is reported at Ulan, site ID# 807; Kuskie 2009); and
- ❑ The visually prominent hill with extensive rock formations situated in the valley floor of Slate Gully, which hosts a rock shelter with artefacts and art (WCP578), a rock shelter with artefacts and ochre quarry (WCP579), a rock shelter with PAD (WCP580) and a waterhole/well (WCP594), with an artefact scatter (WCP577) at the base (refer to Figure 15), and which has been identified by the registered Aboriginal parties as being of high cultural significance, represents a distinctive complex of sites in an unusual context. The nature of occupation at these sites, the relationship of these sites with each other and with other sites in the region, the potential movement of people and/or goods (eg. porcellanite and white ochre), differential use of nearby shelters (restricted and non-restricted access), and evidence associated with non-secular activities (art and ceremony) are locally relevant research issues for which the evidence that may be able to contribute knowledge may not be available from other sources.

5.3.5 Reassessment of Predictive Model

In view of the survey results, the predictive model of site location (refer to Section 3.5) for the investigation area for detailed assessment (development Zones 1 and 2) can be reassessed in relation to the areas within the sampled zone that were not directly inspected. For the minor portion of development Zone 2 that was not sampled (2.4 hectares) and the broader development Zone 3, the predictive modelling remains as outlined in Section 3.5.

Visual inspection confirmed that negligible potential for heritage evidence exists within the modified areas, which have been extensively impacted by earthmoving works associated with existing roads and mining operations.

The potential for bora/ceremonial, carved tree, rock engraving and stone arrangement sites to occur within the portions of the investigation area in development Zones 1 and 2 that have not been directly sampled can be reassessed as very low or negligible.

No direct evidence of lithic procurement sites was identified, however the potential for casual, opportunistic procurement of stone, such as quartz or tuff, from colluvial gravels or terrestrial outcrops within the portions of the investigation area in development Zones 1 and 2 that have not been directly sampled cannot be discounted.

One ochre quarry was identified during the survey (representing extraction of pipeclay), but the potential for further evidence to occur within the portions of the investigation area in development Zones 1 and 2 that have not been directly sampled can be reassessed as low.

No evidence was encountered of burial sites, and although the potential for skeletal remains to occur within the portions of the investigation area in development Zones 1 and 2 that have not been directly sampled is considered to be very low, it cannot be discounted.

Minor areas of exposed sandstone bedrock were identified within the investigation area and widely sampled for the presence of grinding grooves. The potential for open grinding groove sites to occur within the portions of the investigation area in development Zones 1 and 2 that have not been directly sampled can be revised downward to very low, but cannot be discounted in areas that were not directly sampled or are currently obscured by sediment or vegetation/leaf litter.

Numerous rock shelter sites and PADs were identified during the survey. However, given the comprehensive nature of the survey coverage, the sampling strategy and the obtrusive nature of this site type, the potential for additional rock shelters to occur within the portions of the investigation area in development Zones 1 and 2 that have not been directly sampled can be reassessed as very low or negligible.

Several waterhole/wells were identified during the survey and several have previously been reported within the investigation area. These are natural features lacking any direct evidence of Aboriginal modification or use. The potential for additional waterhole/wells to occur within the portions of the investigation area in development Zones 1 and 2 that have not been directly sampled cannot be discounted.

No additional scarred tree sites were identified during the present survey, although items have previously been recorded by Navin Officer (2005) and others. The potential for additional scarred tree sites to occur within the portions of the investigation area in development Zones 1 and 2 that have not been directly sampled can be revised downward to very low, but cannot be discounted in areas that were not directly sampled and in which mature native trees remain. The conclusion of Navin Officer (2005) that no 'definite' Aboriginal scarred trees occurred within the EIS project area is noted.

In relation to intangible values, sites of traditional cultural significance (such as mythological sites) were not identified by the Aboriginal representatives involved in the investigation. The registered Aboriginal parties also did not disclose any specific knowledge of other cultural values/places (for example, historically known places or resource use areas). Although the possibility cannot be excluded that traditional or historical Aboriginal values or associations may exist that were not divulged by the persons consulted, this potential is reassessed as low. The registered Aboriginal parties did identify contemporary values/associations with the investigation area and previously recorded values nearby have been reported by Navin Officer (2005).

A number of open artefact sites were identified within the investigation area during the present survey. There remains a high potential for additional open artefact evidence to occur in the areas that were not directly sampled or are currently obscured by vegetation. The artefact evidence may involve a broad range of artefact and stone types, but will predominantly comprise evidence associated with non-specific stone flaking of quartz.

On the basis of the occupation model and survey results, the potential for further artefact evidence to occur within the Extension Project investigation area for detailed assessment (development Zones 1 and 2) can be summarised as follows:

- ❑ In the 'modified' areas and in other minor, localised portions of development Zones 1 and 2 in which the upper soil unit has been totally removed, previous land use has caused such substantial impacts that there is generally negligible potential for any Aboriginal heritage evidence to survive;

- ❑ In the portions of development Zones 1 and 2 that are located closer to a third or higher-order watercourse or other areas of possible water retention (for example, former ponds, swamps or marshes) and that may be characterised as being within a secondary resource zone¹⁶ there is a moderate or high potential for sub-surface deposits of artefacts to occur, including deposits that may be of research value. More focused occupation (eg. encampments, or events of longer duration or involving larger numbers of people) and/or repeated Aboriginal occupation may have occurred in these areas. These areas potentially include:
 - Portions of Areas A, G and H close to Wilpinjong Creek and its associated creek flats (survey areas A1, A2, A5, A6, A9, A11, A12, A14, A18, A19 and A41, G1-7 and H1-3 of gentle or level-very gentle gradient);
 - Portions of Area A close to the lower section of Planters Creek (survey areas A41-44 of gentle or level-very gentle gradient);
 - Portions of Area B close to the third order Spring Creek (survey areas B9, B13, B15 and B16 of gentle or level-very gentle gradient);
 - Portions of Area C close to the third order Spring Creek tributary (survey areas C17, C28, C31, C38 and C47 of gentle or level-very gentle gradient);
 - Portions of Area F close to the higher order Cumbo Creek (survey areas F1-3, F22, F24, F26 and F37 of gentle or level-very gentle gradient); and
 - Portions of Area G close to the mid-lower section of the un-named watercourse in Slate Gully (survey areas G65, G97, G98 and G118 of gentle or level-very gentle gradient);
- ❑ In the remainder of development Zones 1 and 2, a low to very low density sub-surface deposit of artefacts may occur, consistent with the survey results and occupation model. In general, this evidence will be consistent with background discard, and although a low frequency of activity areas (with consequent higher artefact density) may be present, will not represent focused occupation. The potential for sub-surface deposits of artefacts that may be of high research value to occur within these portions of the investigation area is generally low.

¹⁶ These areas can potentially be classified as secondary resource zones. However, without systematic excavation of a representative sample of these contexts, including at varying distances from the water sources, verification of this modelling and identification of the true nature and distribution of sub-surface evidence within these areas is not possible. According to the modelling in Section 3.4, occupation of these portions of the investigation area may have included camping by small parties of hunters/gatherers and nuclear/extended family groups, in addition to hunting and gathering and transitory movement between locations. Occupation of these areas may have occurred at a higher intensity than in the surrounding areas.

6. ABORIGINAL CONSULTATION

The investigation area lies within the boundaries of the Mudgee Local Aboriginal Land Council (Mudgee LALC) and within an area of interest to other Aboriginal persons and organisations.

The Aboriginal heritage assessment has involved a comprehensive program of consultation with the Aboriginal community that complies with the policy requirements of the OEH (refer to consultation database and relevant correspondence in Appendix 6). These requirements are specified in the OEH policy entitled *Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010* (DECCW 2010c).

Notwithstanding that the *Guidelines for Aboriginal Cultural Heritage Impact Assessment and Community Consultation* (DEC 2005) reference the now outdated *Interim Community Consultation Requirements for Applicants* policy (DEC 2004), the assessment has proceeded in accordance with the 2010 guidelines. These were introduced on 12 April 2010 and supercede the 2004 policy, but effectively incorporate the same procedures.

The consultation requirements specified in the OEH *Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010* (DECCW 2010c) involve the following procedures (numbering follows the OEH guidelines):

- 4.1.2) In order to identify Aboriginal people who may have an interest in the investigation area and hold knowledge relevant to determining the cultural significance of Aboriginal objects or places, providing written notification of the project to the relevant DECCW Environment, Protection and Regulation Group (EPRG) regional office, LALC, Local Council and Catchment Management Authority (CMA), along with the Registrar of Aboriginal Owners under the *Aboriginal Land Rights Act 1983* (Department of Aboriginal Affairs), National Native Title Tribunal and Native Title Services Corporation Ltd (NTSCORP)¹⁷ including the name and contact details of the proponent, the location and a brief overview of the proposed project, and a request for advice on the contact details of such Aboriginal people;
- 4.1.3) Providing written notification of the project directly to those Aboriginal persons/organisations that were identified in Procedure 4.1.2, along with the LALC, and placing an advertisement in a local newspaper circulated in the general location of the investigation area, explaining the project and its location. The notification includes the name and contact details of the proponent, the location and a brief overview of the proposal, a statement about the purpose of the consultation, an invitation for Aboriginal people with cultural knowledge relevant to the investigation area to register an interest and advice on privacy matters¹⁸, with a minimum 14 day response period¹⁹;
- 4.1.6) Providing a record of the names of each Aboriginal person who registered an interest along with a copy of that registration and the notification letter in Procedure 4.1.3 to the relevant DECCW EPRG regional office and LALC within 28 days of the closing date for registrations of interest;

¹⁷ Procedures 4.1.2 - 4.1.7 are not required where an approved native title determination exists over the entire investigation area. In this event, consultation is only required with the native title holders.

¹⁸ Procedure 4.1.5.

¹⁹ Procedure 4.1.4.

- 4.2 & 4.3) Providing detailed information about the project, heritage impact assessment process and proposed heritage assessment methodology to all registered Aboriginal parties identified in Procedure 4.1, with a minimum 28 day response period for comments;
- 4.2 & 4.3) Considering any input received from the registered parties in finalising the heritage assessment methodology and process, and implementing the methodology in consultation with the registered Aboriginal parties. This included seeking input on knowledge of Aboriginal objects and places of cultural value to Aboriginal people within the investigation area and views on potential management strategies, and incorporated a field inspection of the investigation area;
- 4.3 & 4.4) Preparation of a draft Aboriginal heritage impact assessment report and seeking the views of registered Aboriginal parties on cultural values and potential management strategies through provision of a copy of the draft report to the registered parties, with a minimum 28 day response period for comments; and
- 4.3 & 4.4) Preparation of a final Aboriginal heritage impact assessment report that incorporates the input of the registered Aboriginal parties and the proponent's response to each submission made on the draft report, and making the final report available to the registered Aboriginal parties and the relevant LALC.

All consultation with the Aboriginal community is documented in Appendix 6 of this report.

Compliance with Procedure 4.1.2 of the OEH policy was achieved through correspondence forwarded to the relevant organisations by Jamie Lees of WCPL on 18 October 2012, in relation to both the Modification (Kuskie 2013a) and the Extension Project. The following responses were received:

- ❑ The Registrar of Aboriginal Owners responded on 22 October 2012 advising that there are no Registered Aboriginal Owners for this area but that the Mudgee and Wanaruah Local Aboriginal Land Councils may be able to assist further;
- ❑ The OEH responded on 26 October 2012 advising that 21 Aboriginal organisations or individuals should be contacted;
- ❑ Mid-Western Regional Council responded on 26 October 2012 advising that seven Local Aboriginal Land Councils are within the Council boundaries and another 15 organisations should be contacted;
- ❑ Native Title Services Corporation responded on 29 October 2012 advising that privacy restrictions prevent provision of any details but the letter had been forwarded to relevant individuals/organisations with a request to register an interest as soon as possible; and
- ❑ The National Native Title Tribunal responded on 30 October 2012 advising that there was one Registered Native Title Claim within the search area, NC2009/004 of the Wellington Valley Wiradjuri People (although further investigation identified that the geographic area of the claim did not encompass the investigation area and the claim has subsequently been dismissed).

Through the operation of the *Native Title Act 1993* (NTA), an Ancillary Deed is maintained between WCPL and William Allen, Martin de Launey and Lynette Syme (Native Title Party) for Mining Lease Application (MLA) 259. The “Deed” (Government Party Deed) represents an agreement for the purposes of section 31(1)(b) of the NTA and was executed on 12 December 2005.

As a result of the above correspondence, Procedure 4.1.3 of the OEH consultation policy was then implemented by WCPL writing in November 2012 to the organisations named by the parties above, with an invitation to register an interest.

An advertisement was also placed in the Public Notices sections of the Mudgee Guardian on 9 November 2012 (refer to Appendix 6).

At the conclusion of these registration of interest procedures, eight Aboriginal parties had registered an interest in the assessment, as listed in Table 7. Following discussion and clarification that the investigation area is located wholly within the Mudgee LALC boundary, the Wanaruah LALC requested only to be provided with a copy of the draft heritage report and did not seek further involvement in the Extension Project.

Table 7: Summary of registered Aboriginal parties involvement.

Registered Party	Date Registered	Sent Extension Project Information and Methodology	Attended Meeting to Discuss Project and Methodology	Responded to Methodology	Participation in Field Survey
Wellington Valley Wiradjuri Aboriginal Corporation (WVWAC)	6/11/12	18/10/13	-	-	17-21/3/14, 29/4, 1-3/5/14, 12-16/5/14, 24-25/6/14
Murong Gialinga Aboriginal and Torres Strait Islander Corporation ('Murong Gialinga' or MGATSIC)	7/11/12	18/10/13	11/11/13	19/11/13	17-21/3/14, 29/4-3/5/14, 12-16/5/14, 24-25/6/14
Paul Brydon	13/11/12	18/10/13	-	19/11/13	-
Wanaruah LALC*	19/11/12	18/10/13	-	-	-
Binjang Wellington Wiradjuri Heritage Survey (Binjang WWHS)	21/11/12	18/10/13	-	-	-
North East Wiradjuri Company Ltd (NEWCO)	23/11/12	18/10/13	11/11/13	26/10/13	17-21/3/14, 29/4-3/5/14, 12-16/5/14, 24-25/6/14
Mudgee LALC	23/11/12	18/10/13	11/11/13	-	17-21/3/14, 29/4-3/5/14, 12-16/5/14, 25/6/14
Warrabinga Native Title Claimants Aboriginal Corporation ('Warrabinga' or WNTCAC)	23/11/12	18/10/13	11/11/13	19/11/13	17-21/3/14, 29/4-3/5/14, 12-16/5/14, 24-25/6/14

* Following discussion, the Wanaruah LALC requested only to be provided with a copy of the draft report (the Extension Project area is located wholly within the Mudgee LALC boundary) and is not seeking further involvement in the Extension Project.

One organisation, Yinarr Cultural Services, sought to register an interest in the Extension Project on 26 September 2013, long after the closing date for registrations of interest (23 November 2012). WCPL advised Yinarr Cultural Services that the registration could not be accepted under the *Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010* policy (DECCW 2010c), but invited the organisation to join the consultation process as an "additional interested stakeholder" (not a "registered Aboriginal party") and be provided with the proposed methodology and draft heritage report for review if interested. Yinarr Cultural Services accepted that invitation on 13 December 2013 (after the closing period for comments on the draft methodology and initial Extension Project meeting of 11 November 2013).

Compliance with Procedure 4.1.6 of the OEH consultation policy was achieved on 4 December 2012 by providing copies of the required information to the OEH and Mudgee LALC.

As per Procedures 4.2 and 4.3 of the OEH consultation policy, detailed information about the Extension Project and the proposed (draft) methodology were forwarded to all registered Aboriginal parties on 18 October 2013 with a request for comment by 19 November 2013. An invitation was also sent to each party on 18 October 2013 to attend a meeting on 11 November 2013 to discuss the Extension Project and methodology and undertake a reconnaissance inspection of the investigation area. Verbal confirmation of receipt of this information was obtained from every party.

The meeting to discuss the Extension Project and proposed methodology, followed by a reconnaissance inspection of the investigation area, was held on 11 November 2013. Representatives of Mudgee LALC, NEWCO, MGATSIC and WNTCAC were in attendance.

Several verbal and written responses to the methodology were received, both during the meeting and at other times. These responses are documented in Appendix 6 and where issues were raised, a response to each issue is provided in Table 8.

Lyn Syme (NEWCO) requested a project description, more detailed mapping and that the methodology be separated into different documents for the existing mining lease and the Slate Gully area. As noted in Table 8 (refer to Issues #2 and 3), the Extension Project activities were discussed further at the meeting of 11 November 2013 and the methodology was identical for both areas and therefore it was problematic to justify separate methodologies or documents. Robyn Williams (Warrabinga) sought to clarify the depth of any excavations and specify that wet-sieving be used (refer to Issues #4 and 5, Table 8).

At the meeting on 11 November 2013, at which the proposed methodology and information about the Extension Project was presented, no comments were made on the methodology. Christine Maynard (Mudgee LALC) expressed concern about the survey occurring in multiple teams, but was satisfied with the proposed inspection of selected sites and the area that would be offered to all parties after completion of the survey.

Debbie Foley (MGATSIC), Dorothy Stewart (Binjang WWHS), Brad Bliss (WVWAC) and Paul Brydon indicated satisfaction with the methodology, which was subsequently finalised on 26 November 2013.

WCPL offered to engage representatives from each of the registered Aboriginal parties for paid participation in the field survey, subject to receipt of evidence of appropriate insurance and compliance with relevant WCPL OH&S procedures, including attendance at a safety induction. Five organisations (MGATSIC, Mudgee LALC, NEWCO, Warrabinga and WVWAC) accepted the invitation and addressed the OH&S requirements.

The field survey was conducted over 17 days (17 - 21 March, 29 April - 3 May, 12 - 16 May and 24 - 25 June 2014) by archaeologists from South East Archaeology (Peter Kuskie, Birgitta Stephenson, Corey O'Driscoll and Jason Barr), accompanied on every day by representatives of the registered Aboriginal parties. Full details of the registered parties involvement in the survey are presented in the consultation database in Appendix 6. Through the course of the survey, assistance was provided by the following individuals:

- ❑ NEWCO - Chaos Delauney, Shaen Morgan, Emma Syme, Eric Hill, Coral Williams and Kelsey Williams-Fawcett;
- ❑ Warrabinga - Kelsey Williams-Fawcett, Coral Williams and Robyn Williams;
- ❑ MGATSIC - Larry Foley, Shannon Foley, Steven Flick and Debbie Foley;
- ❑ Mudgee LALC - Christine Maynard, Larry Foley, Gemma Williams, Debbie Foley and James Williams; and
- ❑ WYWAC - Robert Stewart.

Additional detailed examination of possible cupules on a rock shelter site in Slate Gully was undertaken by use-wear/residue expert Birgitta Stephenson, with representatives of the registered Aboriginal parties, on 11 July 2014.

The representatives expressed satisfaction with the level of survey coverage and the consultation process, as well as a strong interest in the findings.

The representatives did not disclose any specific knowledge of sites or places associated with ceremonies, spiritual/mythological beliefs or traditional knowledge, which date from the pre-contact period and have persisted until the present time, within the investigation area. The representatives also did not disclose any specific knowledge of sites or places associated with historical associations, which date from the post-contact period and are remembered by people today (for example, plant and animal resource use areas and known camp sites), within the investigation area.

The possibility cannot be excluded however, that traditional or historical Aboriginal values or intangible associations may exist that were not divulged to South East Archaeology by the persons consulted. It was not feasible to contact every single knowledge holder in the north-eastern Wiradjuri community.

The representatives did however disclose a number of associations with the investigation area of contemporary significance, including:

- ❑ In general terms, the use of subsistence or other resources, with comments made about the presence of various native flora and fauna where observed. These comments were not of a historical nature (ie. did not relate to plant and animal resource use areas known from the post-contact period) but rather were general observations of the occurrence of particular species and their known traditional uses (eg. for food, medicine, tools, etc.);
- ❑ In general terms, the traditional use of the area by north-eastern Wiradjuri people, and an ongoing cultural and spiritual connection to the land and resources of the study area by the north-eastern Wiradjuri; and

- ❑ In relation to 'Area G', the registered parties have identified the high cultural significance of the visually prominent hill with extensive rock formations situated in the valley floor of Slate Gully, which hosts a rock shelter with artefacts and art (WCP578), a rock shelter with artefacts and ochre quarry (WCP579), a rock shelter with PAD (WCP580) and a waterhole/well (WCP594), with an artefact scatter (WCP577) at the base (refer to Figure 15).

In addition to these places, other archaeological sites (such as artefact scatters and rock shelters) identified within the investigation area are of contemporary significance to the Aboriginal community, as they represent a tangible link with the traditional past and with the lifestyle and values of community ancestors (refer to Section 7).

In general terms, the attachment of the north-eastern Wiradjuri people to the landscape and continuing strong cultural connections with the locality of the study area was evident. As noted by Goulding (2002:63) land is a fundamental part of Aboriginal culture, and such cultural connections are integral to the health and wellbeing of Aboriginal people, although can be complex and are not always obvious to others.

Compliance with Procedures 4.3 and 4.4 of the OEH consultation policy was achieved by providing copies of the draft heritage assessment report to each of the registered Aboriginal parties on 2 April 2015, with a request for their comment by 8 May 2015, followed by preparation of this final report incorporating and addressing input received.

Subsequent to the completion of the field survey and draft report, all registered Aboriginal parties and the additional interested stakeholder were invited to attend an inspection of a selection of sites and a meeting to discuss the survey results, cultural values and draft heritage assessment report. The meeting and site inspection occurred on 2 April 2015 and was attended by representatives of NEWCO, WVVAC, MGATSIC, Warrabinga, Mudgee LALC and Paul Brydon. At the meeting, the draft report was presented and discussed, and an update of the Extension Project status and timing was provided. An inspection of sites occurred along Wilpinjong Creek and in Slate Gully, including at the hill with extensive rock formations.

Representatives of NEWCO and Warrabinga requested that a figure from Mathews (1894) depicting the Wilpinjong bora site be removed from the final report. This figure has been removed from the final report. A representative of Mudgee LALC requested if additional persons from the community could be allowed the opportunity to inspect the Slate Gully sites. WCPL agreed to facilitate such an inspection where requested.

Correspondence received from the registered Aboriginal parties in relation to the draft report is included in Appendix 6. Responses were received from NEWCO, ND-01, MGATSIC and Warrabinga.

Issues raised by the registered Aboriginal parties during the course of the assessment and subsequent consultation and how they have been addressed are outlined in Table 8. Each issue number has been noted on the correspondence provided by the registered Aboriginal parties in Appendix 6.

Copies of the final heritage assessment report will be made available to the registered Aboriginal parties.

Table 8: Summary of registered Aboriginal parties key comments and how they have been addressed by the Extension Project.

Issue #	Issue	Raised by	Extension Project Team Response
1	Attempted registration of interest 10 months after closing date.	Kathie Steward-Kinchela, Yinarr Cultural Services (26/9/13)	WCPL extended an invitation to Kathie Steward-Kinchela to be included in the consultation process as an additional interested stakeholder, should she wish. Kathie accepted the invitation on 13/12/13.
2	Response to proposed methodology, requesting project description and methodology be separated into different documents for the existing mining lease and the Slate Gully area.	Lyn Syme, NEWCO (26/10/13)	Activities are specified in the description and will be further clarified in subsequent reporting and were discussed further at the meeting regarding the methodology. The proposed methodology is identical for both areas within the existing mining lease and the Slate Gully area and therefore it is problematic to justify separate methodologies or documents.
3	Response to proposed methodology, requesting more detailed mapping of proposal.	Lyn Syme, NEWCO (26/10/13)	Information provided at meeting regarding the methodology and more detailed mapping included here as Figure 3.
4	Response to proposed methodology, requested that any excavations are dug to clay and/or bedrock or coal.	Robyn Williams, Warrabinga (19/11/13)	The proposed methodology states that specific techniques, sampling strategy and scope of any excavation would be discussed with the registered Aboriginal parties and their input sought prior to the conduct of any such work. Any excavation would be conducted to an adequate depth to ensure that all cultural-bearing deposit has been excavated.
5	Response to proposed methodology, requested that any excavations involve wet sieving.	Robyn Williams, Warrabinga (19/11/13)	The proposed methodology states that specific techniques, sampling strategy and scope of any excavation would be discussed with the registered Aboriginal parties and their input sought prior to the conduct of any such work. Wet-sieving would be conducted (rather than dry-sieving) in soils where the clay content is higher and the deposit will not adequately pass through the sieve mesh (without the assistance of running water).
6	Indicated satisfaction with proposed methodology.	Paul Brydon (19/11/13)	Noted. Methodology finalised with support of registered Aboriginal parties.
7	Indicated satisfaction with proposed methodology.	Dorothy Stewart, Binjang WWHS (19/11/13)	Noted. Methodology finalised with support of registered Aboriginal parties.
8	Indicated satisfaction with proposed methodology.	Debbie Foley, MGATSIC (19/11/13)	Noted. Methodology finalised with support of registered Aboriginal parties.
9	Indicated satisfaction with proposed methodology.	Brad Bliss, WVVAC (24/11/13)	Noted. Methodology finalised with support of registered Aboriginal parties.
10	Response to invitation from WCPL to participate in technical analysis of possible cupules at rock shelter in Slate Gully, stating that eight days notice is insufficient and requesting further information on the proposed methods.	Robyn Williams, Warrabinga (7/7/14)	Jamie Lees (WCPL) provided further information to Robyn about the proposed investigation techniques (use of portable microscope).

Issue #	Issue	Raised by	Extension Project Team Response
11	Response to draft report, opposed to impacts to the hill with extensive rock formations situated in the valley floor of Slate Gully (referred to this locality as 'Bird Rock').	Debbie Foley, MGATSIC (30/4/15)	Noted. While conservation would be the optimal heritage outcome, avoidance of impacts to the site complex would be highly problematic without a major revision to the mine plan and resulting non-extraction of substantial quantities of coal, at a significant economic cost to the proponent and the State (refer to Section 10.2.2). The proposed mitigation measures (refer to Sections 10.2.2 and Recommendation #1.a.iv) would offset to the extent feasible the proposed impacts to the scientific and cultural values of the site complex.
12	Response to draft report, stated that all RAPs should be treated equally and have equal access and without requiring approval from any Native Title party.	Debbie Foley, MGATSIC (30/4/15)	Noted.
13	Response to draft report, recommended that all artefacts are collected/recorded as each are equally important, and that scarred trees and art require further consideration.	Debbie Foley, MGATSIC (30/4/15)	Noted. As per Recommendations #1.a.iv, 1.a.vii and 1.a.ix, further consideration will be given to art sites and scarred tree sites in relation to the Extension Project. In relation to the collection of every single artefact within the impact area, WCPL is of the view that as per Recommendation #1.a.ii, systematic surface collection of the identified artefact evidence will occur from the open artefact sites as specified in Appendix 7, involving procedures outlined in Section 10.2.1, but it is not practical or cost-effective to attempt collection of every single artefact within the impact area (for reasons including that it may not be physically possible to relocate some items).
14	Response to draft report, requested the archaeologist address the MGATSIC issues.	Debbie Foley, MGATSIC (30/4/15)	Acknowledged. Refer to responses to #11-13.
15	Response to draft report, expressed disappointment that impacts would occur to the hill with extensive rock formations situated in the valley floor of Slate Gully (referred to this locality as 'Bird Rock'), but understood that they may be unavoidable. However, requested that all possible endeavours are undertaken to gather as much information as possible (eg. laser scanning etc) and allow for possible modelling of the site in the future.	Paul Brydon (4/5/15) (verbal comment to WCPL)	Acknowledged. Refer to response to #11 in relation to potential impacts to the site complex and Section 10.2.2 and Recommendation #1.a.iv in relation to mitigation measures, including laser scanning.
16	Response to draft report, objects to other non-traditional Aboriginal organisations or people participating in surveys, consultation and assessments within Traditional Lands.	ND-01	Noted. Consultation with the Aboriginal community has proceeded in accordance with relevant OEH guidelines and policy, as outlined in Section 6 and as required by the DP&E (refer to Appendix 1).
17	Response to draft report, expresses objections and seeks the proponent to negotiate an agreed outcome with this organisation in relation to culture, heritage and environmental concerns.	ND-01	Noted. Consultation undertaken with the Aboriginal community in relation to the Extension Project is documented in Appendix 6. As described in Section 11, it is recommended that the protocol for the involvement of Aboriginal stakeholders specified in the ACHMP is updated in consultation with all RAPs.

Issue #	Issue	Raised by	Extension Project Team Response
18	Response to draft report, seeks the proponent and DP&E senior management to meet with the organisation and negotiate an agreed outcome with this organisation in relation to issues #19-21.	ND-01	Noted. Refer to response to #17 above.
19	Response to draft report, requested all artefacts identified and recorded in field surveys by RAPs to be photographed and recorded in the field, including isolated artefacts, with a decision as to whether to collect each artefact to be made on site with the RAPs. Acknowledged not necessarily cost-effective or warranted to collect every single artefact, but where four or more artefacts exist in a site these should be collected and stored in an agreed Keeping Place.	ND-01	Noted. Where additional surveys occur and artefacts are identified, typically they are recorded and a sample are photographed. Refer to response to Issue #13 in relation to potential collection of all artefacts (particularly from existing/known sites). However, procedures could be incorporated in the WCPL ACHMP such that where new open artefact sites are identified, and surface collection is an appropriate management strategy (as opposed to excavation or other strategies), a decision about whether to collect the items could be made on-site with the RAPs. Salvaged items would be stored in a Keeping Place as per the existing WCPL ACHMP.
20	Response to draft report, expressed strong objection to impacts to the hill with extensive rock formations situated in the valley floor of Slate Gully (referred to this locality as 'Bird Rock'), noting that the location is of high cultural significance to the organisations Traditional Families and other RAPs, is in Song Lines and other Clan Stories, and impacts should be avoided with a 100 metre exclusion zone.	ND-01	Noted and acknowledged. Refer to response to #11 in relation to potential impacts to the site complex and responses to #17 and 18.
21	Response to draft report, noted preference for no disturbance to cultural heritage sites but acknowledged that some impacts are unavoidable and requested use of new technology and salvage methods to protect significant sites such as the ochre quarry, rock art and shelters (taken to be a reference to the hill with extensive rock formations situated in the valley floor of Slate Gully but also potentially other shelters).	ND-01	Noted and acknowledged. Refer to response to #11 in relation to potential impacts to the Slate Gully site complex and Section 10.2.2 and Recommendation #1 in relation to all mitigation measures associated with the potential impacts and Aboriginal heritage.
22	Response to draft report, advised that colour scheme and symbols of maps such as Figure 18 (in fact, referring to Figure 17) are unclear.	Lance Syme, Warrabinga (8/5/15)	Noted. Due to the inclusion of several layers of relevant information, this is problematic to avoid. Electronic copies, which can be enlarged and for which this consequently does not represent an issue, have been provided to all RAPs.
23	Response to draft report, advised that colour scheme and symbols of maps such as Figure 5 are unclear.	Lance Syme, Warrabinga (8/5/15)	Noted.
24	Response to draft report, sought clarification as to whether references to significance of sites within the report relates to archaeological significance, cultural significance or overall significance.	Lance Syme, Warrabinga (8/5/15)	References are generally to overall significance unless otherwise specified.

Issue #	Issue	Raised by	Extension Project Team Response
25	Response to draft report, sought clarification as to whether 'Zone 3' was surveyed and if not, why not.	Lance Syme, Warrabinga (8/5/15)	The nature and extent of survey coverage is discussed in Sections 4 and 5.1. The focus of the survey was to systematically and comprehensively sample the geographic extent of Zones 1 and 2 in which impacts from the Extension Project are proposed. Minor survey coverage (25.5 hectares) was achieved in Zone 3, but this represents land that formed part of the initial Zone 2 study area and was subsequently excluded from Zone 2 after the survey had been completed. As outlined in Sections 1.1, 9 and 11, while minor ancillary works would occur within Zone 3 when identified during detailed design (including post-approval), in the absence of any defined development plans, detailed heritage survey was not warranted as a component of the present investigation and survey will occur post-approval as required (refer to Recommendation #1.a.vi).
26	Response to draft report, requested inclusion of grid coordinate zone.	Lance Syme, Warrabinga (8/5/15)	Report has been revised to include Zone 55 in relation to references to the MGA grid coordinates where relevant.
27	Response to draft report, requested clarification if updated site records have been provided to the OEH AHIMS for several sites with incorrect grid references (Navin Officer 2005 sites).	Lance Syme, Warrabinga (8/5/15)	As part of a review of the WCPL Aboriginal Site Database, WCPL will notify the OEH of the errors inherent within the OEH AHIMS database.
28	Response to draft report, noted that in relation to Figure 6 'traditionally' AHIMS numbers have been provided rather than 'private database references'.	Lance Syme, Warrabinga (8/5/15)	Due to the size of the area represented on Figure 6 (108 square kilometres) and the number of recorded sites, and the absence of OEH AHIMS numbers for several previous recordings, use of the sequential and briefer WCPL Aboriginal Site Database nomenclature was considered satisfactory. Note that AHIMS numbers for relevant sites are included in the ACHA as necessary (eg. refer to Appendix 4).
29	Response to draft report, sought clarification as to why WCPL Aboriginal Site Database data included in Tables 1 and 2 rather than the OEH AHIMS data.	Lance Syme, Warrabinga (8/5/15)	As noted in Section 3.1, there are numerous problems with the raw AHIMS data, including omitted sites and sites with incorrect datums and erroneous grid references. These issues have been rectified within the WCPL Aboriginal Site Database, which therefore serves as the most accurate current representation of known Aboriginal sites within the WCPL area.
30	Response to draft report, sought clarification of the survey coverage for each of the archaeological survey areas.	Lance Syme, Warrabinga (8/5/15)	Survey coverage data for each archaeological survey area is presented in the comprehensive database in Appendix 3.

Issue #	Issue	Raised by	Extension Project Team Response
31	Response to draft report, sought explanation as to what is meant by 'comprehensively sampled' in relation to survey coverage.	Lance Syme, Warrabinga (8/5/15)	As noted in Section 5.1, 'comprehensive' refers to the fact that archaeological survey coverage was obtained across the geographic extent of the 1,275 hectare investigation area for detailed assessment (refer to Figures 12 and 13 and Appendix 3). Virtually all of Zones 1 and 2 were sampled. This area subject to systematic archaeological survey sampling was subdivided into a total of 487 archaeological survey areas, each representing a specific combination of landform unit and class of slope. Each archaeological survey area was inspected for Aboriginal heritage evidence. The total survey coverage (ground physically inspected for heritage evidence) equated to approximately 14.1% of the sampled area. As this coverage only refers to an area of several metres width directly inspected by each member of the survey team, the actual coverage for obtrusive site types (for example, scarred trees and rock shelters) was significantly greater than this. This 'comprehensive' nature of the survey coverage contrasts with alternative sampling strategies that could have been employed which would only focus on selected areas (eg. creeks or ridges or arbitrary 'transects') and not extend across the geographic extent of the impact area.
32	Response to draft report, queried a statement in Section 10.1.1 that 'test excavations can take the form of ... mechanically excavated trenches or surface scrapes', with respect to OEH advice that these are not appropriate strategies.	Lance Syme, Warrabinga (8/5/15)	Acknowledged. Section 10.1.1 outlines a number of different potential methods for sub-surface testing. Mechanically excavated trenches and surface scrapes represent such potential methods, but there is no suggestion that these methods are suitable or endorsed by the consultant with respect to the Extension Project. The subsequent paragraphs outline the elemental steps of formulating a research design, through which selection of an appropriate methodology and sampling strategy occurs. In Section 10.2.1, discussion of the imperative for sub-surface test excavation as a component of the heritage assessment for the Extension Project is presented, with the conclusion that such testing is not considered to be warranted.
33	Response to draft report, in relation to the variation to the northern alignment of the 330 kV electricity transmission line easement (Section 10.2.5) moving the line closer to site WCP174, queried when the additional 'systematic heritage survey of this area' would be undertaken.	Lance Syme, Warrabinga (8/5/15)	As noted in Section 10.2.5, systematic heritage survey of this area is warranted prior to any impacts occurring. There is no obstacle to this occurring post-approval as a component of the Extension Project management measures as described in Section 11.
34	Response to draft report, stated preference for photographs from the site inspection being integrated into the main body of the report, rather than as an appendix.	Lance Syme, Warrabinga (8/5/15)	Noted, but the current format is preferred as it provides an easy reference for every site (inclusive of photograph) as per Appendix 4.

Issue #	Issue	Raised by	Extension Project Team Response
35	Response to draft report, stated preference for inclusion of photographs and dimensions of all previously unidentified artefacts that were recorded during the Extension Project survey and photographs of rock shelters.	Lance Syme, Warrabinga (8/5/15)	Dimensions of every artefact recorded during the Extension Project survey are presented with detailed descriptions of each artefact for each site in Appendix 4. Photographs of less common artefacts are presented in Appendix 4. Photographs and plans of all rock shelters recorded during the Extension Project survey are presented in Appendix 4.
36	Response to draft report, stated preference for inclusion of photographs showing the landscape and terrain.	Lance Syme, Warrabinga (8/5/15)	Representative photographs of survey areas and the general investigation area are presented in Appendix 5 where relevant and informative.
37	Response to draft report, sought confirmation that site records for the new Aboriginal sites recorded during the Extension Project survey were lodged with AHIMS.	Lance Syme, Warrabinga (8/5/15)	Aboriginal Site Recording Forms for all new sites (and a number of re-recordings of previous sites) were lodged with the OEH in August 2014 after completion of the survey and site documentation.
38	Response to draft report, sought confirmation that updated site records have been lodged with AHIMS for sites where the grid references were revised.	Lance Syme, Warrabinga (8/5/15)	Aboriginal Site Recording Forms for a number of re-recordings of previous sites (including where grid references were updated) were lodged with the OEH in August 2014 after completion of the survey and site documentation. It is not feasible to lodge updated site records for sites such as those discussed in Section 5.2.1 where the grid references appear to be erroneous but the site has not been re-located. This cannot occur until the actual site location has been physically confirmed on the ground.
39	Response to draft report, sought inclusion of a statement that Aboriginal Site Impact Recording Forms (Section 10.2.2) will be provided to the OEH within 4 months of the completion of works.	Lance Syme, Warrabinga (8/5/15)	Noted. Recommendation #1.g states that "Aboriginal Site Recording Forms will be lodged in a timely manner with the OEH for any previously unrecorded Aboriginal heritage evidence that is identified within the Extension Project area during the course of operations and/or further heritage assessments, and Aboriginal Site Impact Recording Forms will be lodged for any site that is subject to salvage or development impacts". It is not considered appropriate to specify an exact timeframe, as the extent of analysis and reporting on each salvaged site will vary and must be completed before appropriate information can be included in the Site Impact Recording Form. If the 'completion of works' is taken to mean the completion of analysis and reporting, then lodgement of Site Impact Recording Forms should occur within a much shorter timeframe than four months (after completion of analysis and reporting).
40	Response to draft report, expressed view that a lengthier period of time should be allowed for comment on reports of this size and complexity.	Lance Syme, Warrabinga (8/5/15)	Acknowledged. A total of 36 days was provided by WCPL for comment, over and above the minimum 28 days specified in the OEH guidelines. Further opportunities for comment are also provided during the EIS public exhibition period.
41	Response to draft report, requested meeting with DP&E about the Extension Project.	Lance Syme, Warrabinga (8/5/15)	Noted.

Issue #	Issue	Raised by	Extension Project Team Response
42	During on-site meeting requested that a figure from Mathews (1894) depicting the Wilpinjong bora site be removed from the final report.	Robyn Williams, Warrabinga, and Lyn Syme, NEWCO (2/4/15)	Figure 11 has been removed at the request of the Aboriginal community representatives.
43	During on-site meeting requested if additional persons from the community could be allowed the opportunity during the period for review of the draft heritage report to inspect the Slate Gully sites.	Christine Maynard, Mudgee LALC (2/4/15)	WCPL agreed to facilitate such an inspection where requested during the period for review of the draft heritage report.
44	Response to draft report, expressed support for the draft ACHA. Acknowledged the competency of the archaeologist.	Lyn Syme, NEWCO (29/4/15) (verbal comment to WCPL)	Acknowledged.

7. SIGNIFICANCE ASSESSMENT

7.1 Criteria

The information contained within this report, along with an assessment of the significance of the Aboriginal heritage evidence, provides the basis for informed decisions to be made regarding the management and degree of protection which should be afforded to specific Aboriginal heritage sites.

The significance of Aboriginal heritage evidence can be assessed along the following criteria, widely used in Aboriginal heritage management, derived from the relevant aspects of the International Council on Monuments and Sites (ICOMOS) *Burra Charter*:

- I. Scientific (Archaeological) value;
- II. Importance to Aboriginal people (Cultural value);
- III. Educational value;
- IV. Historic value; and
- V. Aesthetic value.

Greater emphasis is generally placed on scientific and cultural criteria when assessing the significance of Aboriginal heritage evidence in Australia.

Scientific (Archaeological) Value:

Scientific value refers to the potential usefulness of heritage evidence to address further research questions, the representativeness of the evidence, the nature of the evidence and its state of preservation.

Research Potential:

Research potential refers to the potential for information derived from further investigation of the evidence to be used for answering current or future research questions. Research questions may relate to any number of issues concerning past human culture, human behaviour generally or the environment. Numerous locations of heritage evidence have research potential. The critical issue is the threshold level, at which the identification of research potential translates to significance/importance at a local, regional or national level.

Several key questions can be posed for each location of heritage evidence:

- ☐ Can the evidence contribute knowledge not available from any other resource?
- ☐ Can the evidence contribute knowledge, which no other such location of evidence can?
- ☐ Is this knowledge relevant to general questions about human history, past environment or other subjects?

Assessing research potential therefore relies on comparison with other evidence in local and regional contexts. The criteria used for assessing research potential include the:

- a) Potential to address locally specific research questions;
- b) Potential to address regional research questions;

- c) Potential to address general methodological or theoretical questions;
- d) Potential deposits; and
- e) Potential to address future research questions.

In terms of meeting a threshold level to have significant research potential, the particular questions asked of the evidence should be able to contribute knowledge that is not available from other resources or evidence (either on a local or regional scale) and are relevant to general questions about human history, past environment or other subjects.

Representativeness:

Representativeness is generally assessed at local, regional and national levels. It is an important criterion, because the primary goal of cultural resource management is to afford greatest protection to a representative sample of Aboriginal heritage evidence throughout a region. The more unique or rare evidence is, the greater its value as being representative within a regional context.

The main criteria used for assessing representativeness include:

- a) The extent to which the evidence occurs elsewhere in the region;
- b) The extent to which this type of evidence is subject to existing or potential future impacts in the region;
- c) The integrity of the evidence compared to that at other localities in the region;
- d) Whether the evidence represents a prime example of its type within the region; and
- e) Whether the evidence has greater potential for educational or demonstrative purposes than at other similar localities in the region.

Nature of Evidence:

The nature of the heritage evidence is related to representativeness and research potential. The less common the type of evidence is, the more likely it will have representative value. The nature of the evidence is directly related to its potential to be used in addressing present or future research questions. Criteria used in assessing the nature of the evidence include the:

- a) Presence, range and frequency of stone materials;
- b) Presence, range and frequency of artefact types; and
- c) Presence and types of other features.

A broader range of stone and artefact types generally equates to the potential for information to address a broader range of research questions. The presence of non-microlith and microlith tool types also equates to higher potential to address relevant research questions. The presence and frequency of particular stone or artefact types or other features also has relevance to the issue of representativeness (for example, a rare type may be present).

Integrity:

The state of preservation of the evidence (integrity) is also related to representativeness and research potential. The higher the integrity of evidence, the greater the level of scientific information likely to be obtained from its further study. This translates to greater importance for the evidence within a local or regional context, as it may be a suitable example for preservation within a sample representative of the entire cultural resources of a region.

The criteria used in assessing integrity include:

- a) Horizontal and vertical spatial distribution of artefacts;
- b) Preservation of intact features such as midden deposits, hearths or knapping floors;
- c) Preservation of site contents such as charcoal and shell which may enable accurate direct dating or other analysis; and
- d) Preservation of artefacts which may enable use-wear/residue analysis.

Generally, many of these criteria can only be applied to evidence obtained by controlled excavation. High levels of ground disturbance limit the possibility that the evidence would surpass the threshold of significance on the basis of integrity (ie. the area would be unlikely to possess intact spatial distributions, intact features, *in situ* charcoal or shell, etc).

Aboriginal (Cultural) Significance:

Aboriginal (cultural) significance refers to the value placed upon Aboriginal heritage evidence by the local Aboriginal community.

All heritage evidence tends to have some contemporary significance to Aboriginal people, because it represents an important tangible link to their past and to the landscape. Heritage evidence may be part of contemporary Aboriginal culture or be significant because of its connection to spiritual beliefs or as a part of recent Aboriginal history.

Consultation with the local Aboriginal community is essential to identify the level of Aboriginal significance.

Educational Value:

Educational value refers to the potential of heritage evidence to be used as an educational resource for groups within the community.

Historic Value:

Historic value refers to the importance of heritage evidence in relation to the location of an historic event, phase, figure or activity.

Aesthetic Value:

Aesthetic value includes all aspects of sensory perception. This criterion is mainly applied to art sites or mythological sites.

7.2 Significance of Heritage Evidence Within the Investigation Area

The significance of the Aboriginal heritage sites, cultural areas/values and potential deposits within or immediately adjacent to the Extension Project investigation area (for detailed assessment - development Zones 1 and 2) has been assessed in relation to the criteria presented in Section 7.1. The significance assessment is presented for each site in Appendix 7 and summarised in Table 9. The locations of sites and places of moderate or high heritage significance are mapped on Figure 16.

The significance assessment involves ratings of 'nil', 'low', 'low-moderate', 'moderate', 'moderate-high' and 'high'. Key criteria are included in Appendix 7 where relevant. The assessment has been conducted within both local (abbreviated as 'L') and regional ('R') contexts.

It is noted that all Aboriginal heritage is of interest and contemporary value to the Aboriginal community. Aboriginal heritage evidence represents a tangible link with the traditional past and with the lifestyle and values of community ancestors. The Aboriginal community themselves are in the best position to identify the levels of cultural significance and the stakeholders have been invited throughout the course of the assessment, the field investigation and stakeholder meetings to provide input into the cultural significance of the specific sites and areas.

The response of several registered Aboriginal parties is that all identified sites and cultural values, along with the Extension Project area itself, are of cultural significance (refer to Table 9 and Appendix 7). Some Aboriginal community members are reluctant to engage in any comparative or ranking process (as is inherent within any system of significance assessment) and prefer to identify all sites and the investigation area as being of cultural significance. Nevertheless, a specifically high value has been noted for the visually prominent hill with extensive rock formations situated in the valley floor of Slate Gully, which hosts a rock shelter with artefacts and art (WCP578), a rock shelter with artefacts and ochre quarry (WCP579), a rock shelter with PAD (WCP580) and a waterhole/well (WCP594), with an artefact scatter (WCP577) at the base (refer to Figure 15).

The key conclusions of the significance assessment are presented below for each site type. In overall terms for the cultural values, along with the sites that comprise physical objects under the NP&W Act or potential deposits (eg. the artefact scatters and rock shelters with PADs):

- ❑ Three (1%) are assessed as being of high significance within a local context (the Slate Gully rocky hill site complex/cultural values, and the rock shelter with artefacts and art {WCP578} and rock shelter with artefacts and ochre quarry {WCP579} on the rocky hill);
- ❑ Three (1%) are assessed as being of moderate significance within a local context (effectively two sites, as the rock shelter with artefacts WCP118/WCP119 has been treated as one site here, along with an open artefact site WCP282);
- ❑ One (0.3%) is assessed as being of low to moderate significance within a local context (an open artefact site WCP539);
- ❑ 28 (9.5%) are assessed as being of low to possibly moderate significance within a local context;
- ❑ 220 (74%) are assessed as being of low significance within a local context; and

- 41 (14%) are of uncertain significance (three open artefact sites recorded by Navin Officer {2005} for which no details are presented to evaluate, and 38 rock shelters recorded by Kayandel {2006} that could not be relocated during the present survey²⁰).

Only two of the sites are assessed as being of any potential significance within a regional context, the rock shelter with artefacts and ochre quarry (WCP579) and the rock shelter with artefacts and art (WCP578) on the Slate Gully rocky hill. The evidence of non-secular activities (art and ceremony), differential use (restricted and non-restricted access), movement of people and/or goods (eg. porcellanite and white ochre), and inter-relationship of these sites situated on an uncommon topographic feature (hill in valley floor, with extensive rock formations) with aesthetic values, contributed to this assessment. It is noted however, that substantial portions of the region have not been subject to any systematic archaeological survey. The conduct of future surveys throughout the region and resultant increase in knowledge of Aboriginal heritage could result in a revision to this assessment. It is also noted that if occupation deposits were to be identified through controlled excavation in rock shelters or open contexts that relate to occupation earlier than the mid-late Holocene period (older than say 5,000 years BP), such sites could rate as being of regional significance.

Table 9: Summary of significance assessment for each site type within the Extension Project investigation area (for detailed assessment).

Site Type	Significance							Total
	high local, low-possibly moderate regional	high local, low regional	moderate local, low regional	low-moderate local, low regional	low-possibly moderate local, low regional	low local, low regional	uncertain	
Cultural area/value		1				2		3
Open artefact site			1	1	22	106	3	133
Rock shelter with artefacts			2			4	3	9
Rock shelter with artefacts and art	1							1
Rock shelter with artefacts and ochre quarry	1							1
Rock shelter with artefacts and waterhole/well							1	1
Rock shelter with PAD					6	84	34	124
Scarred tree						2		2
Scarred tree (possible Aboriginal)						18		18
Waterhole/well						4		4
Total	2	1	3	1	28	220	41	296

²⁰ Refer to discussion in Section 5.2.1. Many of these sites (in the range WE1 - WE88/WCP 289 - 376) are inferred to be situated outside of the Extension Project investigation area (for detailed assessment - development Zones 1-2), and a number may be situated outside of the Development Application area (development Zones 1-3).

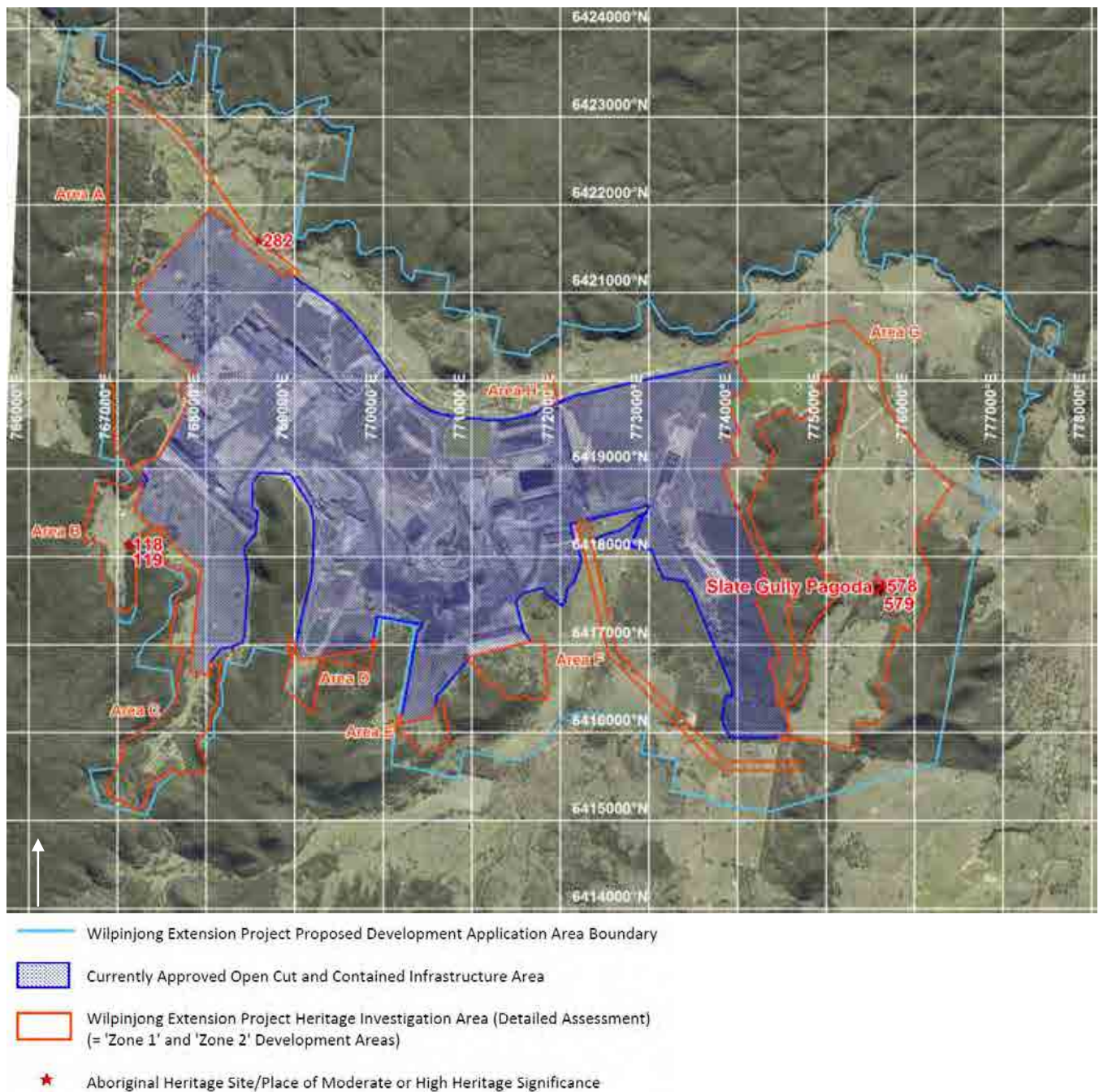


Figure 16: Location of Aboriginal sites and areas of moderate or high heritage significance within the Extension Project investigation area (for detailed assessment) (aerial photograph courtesy WCPL; 1 kilometre MGA grid).

Open Artefact Sites

One of the open artefact sites is assessed as being of moderate significance within a local context (WCP282), one as being of low to moderate significance (WCP539), 22 as being of low to possibly moderate significance, 106 of low significance and three of uncertain significance (refer to Appendix 7 and Table 9).

Artefact scatters and isolated artefacts are common occurrences throughout the region and are therefore generally of low representative value. The sites tended to be of lower significance if levels of ground disturbance were high (and therefore the integrity of any evidence low), there was a limited range and nature of artefact evidence, and/or the potential for deposits of research value was low. Many of the open artefact sites contained low numbers of artefacts, with a consequent limited range of contents, and were located outside of secondary resource zones in areas of low potential for deposits of research value.

Research potential relates to the probability that the sites contain sub-surface deposits that may yield evidence useful in addressing locally relevant research questions, such as those relating to occupation patterns or stone technology. This was assessed in relation to the model of occupation (refer to Section 3.4) and thus assumes that deposits of higher research potential will generally be located where more focused occupation has occurred, such as in the primary and secondary resource zones. As discussed in Section 2, the occurrence of these contexts within Zones 1 and 2 is limited.

The artefact sites tended to be of 'low to possibly moderate' or 'low to moderate' significance where there was a moderate range and nature of evidence present, and/or some potential for deposits of research value.

Site WCP282 is assessed as being of moderate significance within a local context on the basis that:

- ❑ The site is of relatively low representative value within a regional context, however in a local context it is one of few reported large open artefact sites;
- ❑ The site exhibits a modest range of artefact and stone material types, and relatively high numbers of artefacts, with several less common types; and
- ❑ There is a high potential for sub-surface deposits of artefacts to occur, including deposits that may be *in situ* and of high research value. Further investigation of these deposits could address locally important questions regarding logistical and settlement patterns and stone artefact manufacturing technology.

The artefact sites of uncertain significance comprised WCP 267, 270 and 272, all marked on Figure 5.1 of Navin Officer's (2006a) salvage report but with no other details provided and no site record available from the OEH AHIMS. Site WCP267 is noted as containing more than 50 artefacts, and WCP 270 and 272 as containing less than 50 artefacts, but all are situated in the zone of moderate to high potential along Wilpinjong Creek.

Rock Shelters

Two of the rock shelter sites (WCP 578 and 579) are assessed as being of high significance within a local context, two as being of moderate significance (WCP 118 and 119), six as being of low to possibly moderate significance (WCP 307, 465, 466, 480, 504 and 505), 88 of low significance and 38 of uncertain significance (refer to Appendix 7 and Table 9).

The research potential and significance of the rock shelter sites/PADs was assessed with reference to various criteria (refer to Appendix 7), including:

- 1) Size of the habitable floor area: A larger habitable floor area (the floor area of a rock shelter where the ceiling height is about one metre or more) equates to higher potential, as family groups may have been accommodated, a broader range of activities performed, and overnight camps and stays of longer duration been more feasible. Conversely, a small floor area limits the potential to short-duration/low-intensity activities such as people having sought temporary shelter from adverse weather;
- 2) Internal roof height: A low internal roof height (eg. less than standing height) is inferred to have reduced the attractiveness of a shelter for occupation of any more intensity than temporary shelter from adverse weather;
- 3) Nature of artefacts (count, density, range, specific types): As with artefact sites, a broader range and nature of evidence, including less common or rare items, is an indicator of higher potential and significance. However, due to site formation processes and factors influencing the visibility of items on the current shelter floors, the absence of evidence or a limited range of visible evidence is not taken to be a factor that lowers the level of significance;
- 4) Depth of deposit: The deeper the deposit within a rock shelter, the higher the potential for stratification and spatially (vertically) separate evidence of discrete episodes of occupation from different time periods. Hence, a deeper deposit equates to higher potential and a shallower deposit equates to lower potential²¹;
- 5) Extent of potential deposit: A larger PAD, including often in areas marginally forward of the dripline, equates to higher potential, whereas a smaller PAD equates to lower potential;
- 6) Complexity (presence of grooves and/or art): The presence of grooves and/or art adds to the range of activities performed in a shelter and equates to higher significance and possibly research potential;
- 7) Proximity to potable water: The topographic context of each shelter was considered, particularly proximity to potable water, especially higher order watercourses (refer to the model of occupation in Section 3.4, which assumes that deposits of higher research potential will generally be located where more focused occupation has occurred, such as in the primary and secondary resource zones); and
- 8) Potential integrity: Although problematic to assess in the absence of controlled hand excavation, where low integrity was inferred (typically due to shallow deposits and clear evidence of extensive animal activity, such as wombat burrows, and/or erosion) this typically negates most other criteria and equates to low research potential and low significance.

The research potential of rock shelters was one of the primary criteria used in assessing their significance, as there can be stratified deposits with datable cultural evidence (potentially extending back many thousands or even tens of thousands of years) and typically, due to sedimentation processes or other visibility constraints, any evidence visible on the surface of the shelter floor does not necessarily provide an accurate indication of the nature of the buried deposits.

²¹ Noting however, that methods of estimating depth, such as probing with a stake flag, can be unreliable in compact soil or deposits with abundant gravel/rock (Kuskie 2012), and therefore depth was often too problematic to reliably estimate during the survey.

Rock shelter sites/PADs of low significance typically have small habitable floor areas and/or potential deposits, occasionally with shallow deposits, sloping floors and/or low internal roof heights. Consequently they have low research potential. These shelters also tend to be situated outside of the primary or secondary resource zones. Such shelters may not even have been used by Aboriginal people (in the case of PADs where evidence is not visible), or if occupied, may only have been for short-duration/low-intensity activities, such as the seeking of temporary shelter from adverse weather. However, without excavation of a sample from a shelter, where artefacts are not visible it cannot be stated that the shelter was not occupied by Aboriginal people, nor can the nature and resulting evidence of any occupation be known with certainty.

The rock shelters with PADs WCP 307, 465, 466, 480, 504 and 505 tend to be of 'low to possibly moderate' significance where there is a moderate sized habitable floor area and PAD and low to possibly moderate potential for deposits of research value. These shelters are also located outside of the primary or secondary resource zones.

The combined rock shelter with artefacts site WCP118/119 is assessed as being of moderate significance within a local context on the basis that:

- ❑ The site is of relatively low representative value within a local or regional context;
- ❑ The site exhibits a modest range of artefact and stone material types, and relatively high number of artefacts, with several less common types;
- ❑ The site has been affected by post-depositional impacts, to a moderate to high extent in portions; and
- ❑ There is a high potential for sub-surface deposits of artefacts to occur, including deposits that may be *in situ* (in portions) and of moderate to high research value. Further investigation of these deposits could address locally important questions regarding logistical and settlement patterns and stone artefact manufacturing technology.

The rock shelter with artefacts and art (WCP578) is assessed as being of high significance within a local context and low to possibly moderate significance within a regional context on the basis that:

- ❑ The site is of high representative value within a local context and possibly some representative value within a regional context, as part of the Slate Gully rocky hill complex of sites (uncommon context and complex) and potentially representing less commonly known non-secular, gender specific use;
- ❑ The site exhibits some complexity, with artefacts and art;
- ❑ The site has been affected by post-depositional impacts to a low extent; and
- ❑ The site has a large habitable floor area and relatively large PAD and there is a high potential for sub-surface deposits of artefacts to occur, including deposits that may be *in situ* and of high research value. Further investigation of these deposits could address locally important questions regarding the nature of occupation at the sites on the rocky hill in Slate Gully and their relationship with each other and with other sites and occupation in the region, the differential use of the nearby shelters (restricted and non-restricted access), and evidence associated with non-secular activities (art and ceremony).

The rock shelter with artefacts and ochre quarry (WCP579) is assessed as being of high significance within a local context and low to possibly moderate significance within a regional context on the basis that:

- ❑ The site is of high representative value within a local context and moderate representative value within a regional context, as part of the Slate Gully rocky hill complex of sites (uncommon context and complex) and with less commonly known evidence of extraction of kaolin ('white ochre') and presence of an unusual item (porcellanite artefact);
- ❑ The site exhibits some complexity, with artefacts and kaolin extraction (few reported examples in region) and an unusual item (porcellanite artefact);
- ❑ The site has been affected by post-depositional impacts to a low extent; and
- ❑ The site has a large habitable floor area and PAD and there is a high potential for sub-surface deposits of artefacts to occur, including deposits that may be *in situ* and of high research value. Further investigation of these deposits could address locally important questions regarding the nature of occupation at the sites on the rocky hill in Slate Gully and their relationship with each other and with other sites and occupation in the region, the potential movement of people and/or goods (eg. porcellanite and white ochre), the differential use of the nearby shelters (restricted and non-restricted access), and evidence associated with non-secular activities (art and ceremony).

The rock shelters of uncertain significance were all recorded by Kayandel (2006) and could not be relocated during the present survey (refer to discussion in Section 5.2.1). Many of these sites (in the range WE1 - WE88/WCP 289 - 376) are inferred to be situated outside of the Extension Project investigation area (for detailed assessment - development Zones 1-2), and a number may be situated outside of the Development Application area (ie. outside of development Zones 1-3). Strategies are proposed to verify these site locations and reassess their significance (refer to Sections 10 and 11).

For any shelter, irrespective of the assessed level of research potential, this factor can only be adequately assessed through controlled excavation. Without excavation, the nature of any evidence present in sub-surface deposits cannot be adequately identified. Controlled excavation of any shelter may lead to a revision of the assessment of significance, either upward (in the case of a shelter where deposits of higher research value than anticipated are revealed) or downward (in the case of a shelter where anticipated deposits of research value do not exist or are in a state of low integrity).

Waterhole/Well

The four waterhole/wells (WCP 314, 362, 544 and 594) are assessed as being of low heritage significance. These are all natural features with no evidence of Aboriginal modification or use. WCP594 however, is part of the complex of sites on the rocky hill in Slate Gully.

Scarred Trees

The 20 possible Aboriginal scarred trees are all assessed on a preliminary basis as being of low heritage significance. Review of the previously recorded data for these trees and reinspection of several indicates that nearly all exhibit characteristics consistent with non-Aboriginal origins for the scars. A number of the trees are deceased and many of the scars represent low quality examples (negligible representative value). The scarred tree WCP64 reported by Navin Officer (2005) was previously reassessed by Kuskie (2013a) as being of low heritage significance, due to the low quality nature of the scar, inconclusive nature of its origin and the condition of the host tree (deceased).

However, consistent with the current ACHMP, management strategies are presented in Section 11 to verify the nature of these scars and reassess their significance.

Cultural Places/Values

No sites or places associated with ceremonies, spiritual/mythological beliefs or traditional knowledge, which date from the pre-contact period and have persisted until the present time, or places associated with historical associations which date from the post-contact period and are remembered by people today, were identified within the investigation area (for detailed assessment).

However, as documented above, the physical manifestations of evidence of past occupation (Aboriginal objects or archaeological/heritage sites) are generally of contemporary significance to the Aboriginal community, as they represent a tangible link with the traditional past and with the lifestyle and values of community ancestors.

The representatives also disclosed a number of associations with the investigation area of contemporary cultural significance, including:

- ❑ In general terms, the use of subsistence or other resources, with comments made about the presence of various native flora and fauna where observed. These comments were not of a historical nature (ie. did not relate to plant and animal resource use areas known from the post-contact period) but rather were general observations of the occurrence of particular species and their known traditional uses (eg. for food, medicine, tools, etc.);
- ❑ In general terms, the traditional use of the area by north-eastern Wiradjuri people, and an ongoing cultural and spiritual connection to the land and resources of the investigation area by the north-eastern Wiradjuri; and
- ❑ In relation to 'Area G', the registered parties have identified the high cultural significance of the visually prominent hill with extensive rock formations situated in the valley floor of Slate Gully, which hosts a rock shelter with artefacts and art (WCP578), a rock shelter with artefacts and ochre quarry (WCP579), a rock shelter with PAD (WCP580) and a waterhole/well (WCP594), with an artefact scatter (WCP577) at the base (refer to Figure 15). Several stakeholders regard the WCP578 shelter as a women's site (ie. a place for women and children, with access to initiated men restricted).

In general terms, the attachment of the north-eastern Wiradjuri people to the landscape and continuing strong cultural connections with the locality of the study area was evident. As noted by Goulding (2002:63), land is a fundamental part of Aboriginal culture and such cultural connections are integral to the health and wellbeing of Aboriginal people, which can be complex and is not always obvious to others.

8. STATUTORY OBLIGATIONS

Commonwealth, State and local legislation relevant to the protection and management of Aboriginal heritage is outlined in the sections below. The investigation area does not contain any heritage items listed for indigenous values under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) or *Aboriginal and Torres Strait Islander Heritage Protection Act 1984* or *NSW Heritage Act 1977*, but it does contain Aboriginal objects protected under the *NSW National Parks and Wildlife Act 1974*.

8.1 Commonwealth

While the primary legislation offering protection to Aboriginal heritage in NSW is enacted by the State (refer to Section 8.2), several Acts administered by the Commonwealth may also be relevant.

Environment Protection and Biodiversity Conservation Act 1999:

The EPBC Act is the primary Commonwealth legislation for the protection and management of matters of national environmental significance, which includes heritage places. The primary features of the EPBC Act relating to heritage include:

- ❑ A National Heritage List of natural, indigenous and historic places of national heritage significance;
- ❑ A Commonwealth Heritage List of heritage places owned or managed by the Commonwealth; and
- ❑ Consideration of heritage in the planning and development approvals process.

Commonwealth Heritage places are protected in that:

- ❑ Actions taken on Commonwealth land which are likely to have a significant impact on the environment will require the approval of the Minister;
- ❑ Actions taken outside Commonwealth land which are likely to have a significant impact on the environment on Commonwealth land, will require the approval of the Minister; and
- ❑ Actions taken by the Commonwealth Government or its agencies that are likely to have a significant impact on the environment anywhere will require approval by the Minister.

Australian Government agencies that own or lease heritage places are required to assist the Minister and the Australian Heritage Council to identify and assess the heritage values of these places. They are required to:

- ❑ Develop heritage strategies;
- ❑ Produce a register of the heritage places under their control;
- ❑ Develop a management plan to manage these places consistent with the Commonwealth Heritage Management Principles prescribed in regulations to the Act;
- ❑ Ensure the ongoing protection of the Commonwealth heritage values of the place when selling or leasing a Commonwealth heritage place; and

- ❑ Ask the Minister for advice about taking an action, if the action has, will have, or is likely to have, a significant impact on a Commonwealth heritage place.

The environmental assessment process of the EPBC Act protects matters of national environmental significance (including national heritage places), along with the environment where actions proposed are on, or will affect, Commonwealth land and/or where Commonwealth agencies are proposing to take an action. When a proposal is identified as having the potential to have a significant impact on a matter of national environmental significance, the proponent must refer the project to the Commonwealth Department of the Environment. The matter is made public and referred to the relevant state, territory and Commonwealth ministers for comment. The Minister then decides whether the likely environmental impacts of the project are such that it should be assessed under the EPBC Act. State governments may, under agreement with the Commonwealth, assess actions that may have an impact on matters of national environmental significance. Following assessment, the Minister or their delegate may approve the action (with or without conditions) or not approve the action.

Australian Heritage Council Act 2003:

The *Australian Heritage Council Act 2003* established the Australian Heritage Council, an independent expert body to advise the Minister on the listing and protection of heritage places and other matters relating to heritage. This Act also enabled until 19 February 2012 the continued management of the Register of the National Estate, a list of more than 13,000 heritage places around Australia that had been compiled by the former Australian Heritage Commission since 1976. The Register of the National Estate has now ceased to be a statutory list and is retained only as an archive of information. References to the Register of the National Estate have now been removed from the EPBC Act and *Australian Heritage Council Act 2003*.

Aboriginal and Torres Strait Islander Heritage Protection Act 1984:

The *Aboriginal and Torres Strait Islander Heritage Protection Act 1984* provides for the protection of areas and objects which are of significance to Aboriginal people in accordance with Aboriginal tradition. The Act allows Aboriginal people to apply to the Minister to seek protection for significant Aboriginal areas and objects. The Minister has broad powers to make such a declaration should the Minister be satisfied that the area or object is a significant Aboriginal area or object and is under immediate threat of injury or desecration. An 'emergency declaration' can remain in force for up to 30 days.

8.2 State

National Parks and Wildlife Act 1974:

The *National Parks and Wildlife Act 1974* (NP&W Act) provides the primary basis for the legal protection and management of Aboriginal heritage in NSW. With respect to development proposals and planning approvals, the *Environmental Planning and Assessment Act 1979* (EP&A Act) is the primary legislation.

Implementation of the Aboriginal heritage provisions of the NP&W Act is the responsibility of the Office of Environment and Heritage (OEH). The rationale behind the NP&W Act is to prevent the unnecessary or unwarranted destruction of Aboriginal objects and to protect and conserve objects where such action is considered warranted (DECCW 2009a, 2009b).

Section 2A of the Act, defines its objects to include 'the conservation of nature, including ...

- (b) the conservation of objects, places or features (including biological diversity) of cultural value within the landscape, including, but not limited to:
 - (i) places, objects and features of significance to Aboriginal people, and
 - (ii) places of social value to the people of New South Wales.

Section 2A also identifies that the objects of the Act are to be achieved by applying the principles of ecologically sustainable development, defined in Section 6 of the *Protection of the Environment Administration Act 1991* as requiring the integration of *economic* and *environmental* considerations (including cultural heritage) in the decision-making process.

In regard to Aboriginal cultural heritage, ecologically sustainable development can be achieved by applying the principle of intergenerational equity and the precautionary principle (DECCW 2009b).

Intergenerational equity is the principle whereby the present generation should ensure the health, diversity and productivity of the environment for the benefit of future generations. In terms of Aboriginal heritage, intergenerational equity can be considered in terms of the cumulative impacts to Aboriginal objects and places in a region. If few Aboriginal objects and places remain in a region, fewer opportunities remain for future generations of Aboriginal people to enjoy the cultural benefits of those Aboriginal objects and places. Information about the integrity, rarity or representativeness of the Aboriginal objects and places proposed to be impacted, and how they illustrate the occupation and use of land by Aboriginal people across the region, are therefore relevant to the consideration of intergenerational equity and the understanding of the cumulative impacts of a proposal (DECCW 2009b:26).

The precautionary principle states that if there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing cost-effective measures to prevent environmental degradation. In applying the precautionary principle, decisions should be guided by (DECCW 2009b:26):

- ❑ A careful evaluation to avoid, wherever practicable, serious or irreversible damage to the environment; and
- ❑ An assessment of the risk-weighted consequences of various options.

The precautionary principle is relevant to the OEH's consideration of potential impacts to Aboriginal cultural heritage where:

- ❑ The proposal involves a risk of serious or irreversible damage to Aboriginal objects or places or to the value of those objects or places; and
- ❑ There is uncertainty about the Aboriginal cultural heritage values or scientific or archaeological values, including in relation to the integrity, rarity or representativeness of the Aboriginal objects or places proposed to be impacted (DECCW 2009b:26).

Where this is the case, the OEH instructs that a precautionary approach should be taken and all cost-effective measures implemented to prevent or reduce damage to the objects/place (DECCW 2009b).

With the exception of some artefacts in collections, the NP&W Act generally defines all Aboriginal objects to be the property of the Crown. The Act then provides various controls for the protection, management of and impacts to these objects. An 'Aboriginal object' is defined under Section 5(1) as:

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

In practice, archaeologists generally subdivide the legal category of 'object' into different site types, which relate to the way Aboriginal heritage evidence is found within the landscape. The archaeological definition of a 'site' may vary according to survey objectives, however it should be noted that even single and isolated artefacts are protected as Aboriginal objects under the NP&W Act.

Under Section 89A of the NP&W Act, a person who is aware of the location of an Aboriginal object that is the property of the Crown or, not being the property of the Crown, is real property, and does not, in the prescribed manner, notify the Director-General thereof within a reasonable time after the person first becomes aware of that location is guilty of an offence against the Act unless the person believes on reasonable grounds that the Director-General is aware of the location of that Aboriginal object. The 'prescribed manner' is currently taken to be written notice in a form approved by the Director-General, being the Aboriginal Site Recording Forms available on the OEH website. Failure to comply with the requirements may result in a maximum penalty of 100 penalty units and, in the case of a continuing offence, a further 10 penalty units for each day the offence continues, for an individual, with double the fines for a corporation.

Aboriginal places are defined as any place declared to be an Aboriginal place under Section 84 of the Act. Typically these are locations of 'special significance with respect to Aboriginal culture' (for example, traditional or historical cultural value to Aboriginal people), for which identified Aboriginal objects may not be present.

Section 86 of the NP&W Act specifies the offences and penalties relating to harming or desecrating Aboriginal objects and Aboriginal places:

- 1) A person must not harm or desecrate an object that the person knows is an Aboriginal object.

Maximum Penalty:

- (a) in the case of an individual - 2,500 penalty units or imprisonment for one year, or both, or (in circumstances of aggravation) 5,000 penalty units or imprisonment for two years, or both, or
- (b) in the case of a corporation - 10,000 penalty units (currently \$1,100,000).

- 2) A person must not harm an Aboriginal object ('strict liability offence').

Maximum Penalty:

- (a) in the case of an individual - 500 penalty units or (in circumstances of aggravation) 1,000 penalty units, or
- (b) in the case of a corporation - 2,000 penalty units (currently \$220,000).

Under Section 86(4) it is an offence for a person to harm or desecrate an Aboriginal place, with maximum penalties of 5,000 penalty units or imprisonment for two years, or both, for individuals and 10,000 penalty units for corporations.

Harm to an Aboriginal object or place is defined under Section 5(1) as any act or omission that:

- (a) destroys, defaces or damages the object or place, or
- (b) in relation to an object—moves the object from the land on which it had been situated, or
- (c) is specified by the regulations, or
- (d) causes or permits the object or place to be harmed in a manner referred to in paragraph (a), (b) or (c), but does not include any act or omission that:
- (e) desecrates the object or place, or
- (f) is trivial or negligible, or
- (g) is excluded from this definition by the regulations.

There are various exemptions and defences to offences under Section 86 of the Act, including:

- ❑ Of most relevance to development proposals generally, the offences under Section 86(1), (2) and (4) have a defence to prosecution under Section 87(1) if the harm or desecration was authorised by an Aboriginal Heritage Impact Permit (AHIP) and the conditions to which that AHIP were subject have not been contravened;
- ❑ The strict liability offence under Section 86(2) has a defence to prosecution under Section 87(2) if the person exercised *due diligence* to determine whether the act or omission constituting the alleged offence would harm an Aboriginal object and reasonably determined that no Aboriginal object would be harmed. Section 87(3) and the regulations associated with the Act (National Parks and Wildlife Regulation 2009) enable due diligence to be achieved through compliance with industry-specific Codes of Practice approved by the Minister. These include the DECCW (2010a) *Due Diligence Code of Practice for the Protection of Aboriginal Objects in NSW* and other approved codes such as the *NSW Minerals Industry Due Diligence Code of Practice for the Protection of Aboriginal Objects* (NSW Minerals Council 2010).

The 'due diligence' process is essentially intended to provide a defence to the strict liability offence under Section 86(2) of the NP&W Act, if an activity were subsequently to unknowingly harm an Aboriginal object in the absence of an AHIP. If Aboriginal objects are present or are likely to be present and an activity will harm those objects, then an AHIP application is required (excluding Part 3A projects). While the DECCW (2010a) *Due Diligence Code of Practice for the Protection of Aboriginal Objects in NSW* sets out procedures to determine whether or not Aboriginal objects are, or are likely to be present, identify whether the activity may harm objects and whether an AHIP is necessary, it does not constitute a level of Aboriginal heritage impact assessment that is typically required to satisfy the assessment requirements for projects under Part 4 and Part 5 of the EP&A Act. However, the conduct of an environmental impact assessment for a Part 4 or Part 5 project that satisfies the requirements of the Code of Practice will satisfy the 'due diligence' defence to Section 86(2) of the NP&W Act;

- ❑ The strict liability offence under Section 86(2) has a defence to prosecution under Section 87(4) if the person shows that the act or omission constituting the alleged offence is prescribed by the regulations as a low impact act or omission.

Clause 80B of the National Parks and Wildlife Regulation 2009 describes low impact acts or omissions as including:

- Maintenance work on land already disturbed (such as maintenance of existing roads, tracks or utilities);

- Farming and land management works on land already disturbed (such as cropping or leaving paddocks fallow, or construction of farm dams, fences, irrigation infrastructure, ground water bores, flood mitigation works, erosion control or soil conservation works, or maintenance of various existing infrastructure);
- Grazing of animals;
- Activity on already disturbed land that comprises exempt development or was the subject of a complying development certificate issued under the EP&A Act;
- Mining exploration work (such as costeaning, bulk sampling or drilling) on land already disturbed;
- Geological mapping, surface geophysical surveys and sub-surface surveys involving downhole logging, sampling or coring using hand-held equipment except where conducted as part of an archaeological investigation (exempted where the DECCW 2010 *Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales* is followed);
- Removal of isolated dead or dying vegetation if there is minimal ground disturbance;
- On already disturbed land seismic surveying or groundwater monitoring bores;
- Environmental rehabilitation work (such as silt fencing, tree planting, bush regeneration and weed removal, but not erosion control or soil conservation works).

For the purposes of Clause 80B, land is considered to be 'already disturbed' if it 'has been the subject of a human activity that has changed the land's surface, being changes that remain clear and observable' (for example, soil ploughing, construction of rural infrastructure such as dams and fences, construction of roads, tracks and trails, clearing of vegetation, construction of buildings, installation of utilities, substantial grazing involving the construction of rural infrastructure, or construction of earthworks related to the above);

- ❑ The defence of honest and reasonable mistake of fact applies under Section 86(5) to the strict liability offence of Section 86(2) and to offences against Aboriginal places under Section 86(4);
- ❑ The offences under Section 86(1) and (2) do not apply under Section 86(6), with respect to an Aboriginal object that is dealt with in accordance with section 85A (refer below);
- ❑ Exemptions are available under Section 87A to Section 86(1)-(4) for various emergency situations, conservation works and conservation agreements; and
- ❑ Exemptions are available under Section 87B to Section 86(1), (2) and (4) for Aboriginal people in relation to the carrying out of traditional cultural activities.

Consents regarding impacts to Aboriginal objects or areas with potential for Aboriginal objects are managed through the OEH Aboriginal Heritage Impact Permit system, as outlined in Section 90 of the NP&W Act and clauses 80D and 80E of the Regulations. The issuing of an AHIP is dependent upon adequate archaeological assessment and review (cultural heritage assessment report), together with an appropriate level of Aboriginal community liaison and involvement.

Typically, to support an AHIP, an Aboriginal cultural heritage assessment must be undertaken in accordance with the OEH (2011a) *Guide to Investigating, Assessing and Reporting on Aboriginal Cultural Heritage in NSW*, which effectively involves an assessment following the DECCW (2010b) *Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales* and Aboriginal community consultation in accordance with the DECCW (2010c) *Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010* policy (refer to Section 6).

The DECCW (2010b) *Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales* contains detailed requirements for heritage assessments. Key features include:

- ❑ Investigations must be undertaken by people with appropriate skills and experience, specified in Section 1.6 as:
 - 1) A minimum of a Bachelor's degree with honours in archaeology or relevant experience in the field of Aboriginal cultural heritage management, and
 - 2) The equivalent of two years full-time experience in Aboriginal archaeological investigation, including involvement in a project of similar scope, and
 - 3) A demonstrated ability to conduct a project of the scope required through inclusion as an attributed author on a report of similar scope.
- ❑ Archaeological test excavation will be necessary when (regardless of whether or not there are objects present on the ground surface) it can be demonstrated through Requirements 1, 2, 3, 4, and 5 of the Code that sub-surface Aboriginal objects with potential conservation value have a high probability of being present in an area, and the area cannot be substantially avoided by the proposed activity; and
- ❑ A Section 90 AHIP is not required for test excavations undertaken in compliance with the Code (implementation of the *Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010* policy is required however).

Under clause 80D of the National Parks and Wildlife Regulation 2009, the cultural heritage assessment report that accompanies the AHIP application must address:

- ❑ The significance of the Aboriginal objects or Aboriginal places that are the subject of the application;
- ❑ The actual or likely harm to those Aboriginal objects or Aboriginal places from the proposed activity that is the subject of the application;
- ❑ Any practical measures that may be taken to protect and conserve those Aboriginal objects or Aboriginal places;
- ❑ Any practical measures that may be taken to avoid or mitigate any actual or likely harm to those Aboriginal objects or Aboriginal places; and
- ❑ Include any submission received from a registered Aboriginal party under clause 80C and the applicant's response to that submission.

The OEH determination of AHIP applications is guided by the OEH (2011a) *Guide to Investigating, Assessing and Reporting on Aboriginal Cultural Heritage in NSW*, OEH (2011b) *Applying for an Aboriginal Heritage Impact Permit: Guide for Applicants*, and OEH (2011c) *Guide to Aboriginal Heritage Impact Permit Processes and Decision-Making* policy.

AHIPs may be issued in relation to a specified Aboriginal object, Aboriginal place, land, activity or person or specified types or classes of Aboriginal objects, Aboriginal places, land, activities or persons. AHIPs may be transferred or varied (subject to conditions and approval of the Director-General). AHIPs may be refused. An application is taken to be refused (unless otherwise granted or refused earlier), 60 days after the date on which the application was received by the Director-General (not including any period during which an applicant is required to supply to the Director-General further information under Section 90F).

The Director-General may attach any conditions seen fit to any AHIP granted. Failure to comply with a condition is deemed under Section 90J to be a contravention of the Act. Such offences may result in a maximum penalty of 1,000 penalty units and/or imprisonment for six months, and, in the case of a continuing offence, a further 100 penalty units for each day the offence continues, for an individual, with double the fines for a corporation.

Under Section 90K of the NP&W Act, in making a decision in relation to an AHIP, the Director-General must consider the following matters (but only these matters):

- a) The objects of the Act;
- b) Actual or likely harm to the Aboriginal objects or Aboriginal place that are the subject of the permit;
- c) Practical measures that may be taken to protect and conserve the Aboriginal objects or Aboriginal place that are the subject of the permit;
- d) Practical measures that may be taken to avoid or mitigate any actual or likely harm to the Aboriginal objects or Aboriginal place that are the subject of the permit;
- e) The significance of the Aboriginal objects or Aboriginal place that are the subject of the permit;
- f) The results of any consultation by the applicant with Aboriginal people regarding the Aboriginal objects or Aboriginal place that are the subject of the permit (including any submissions made by Aboriginal people as part of a consultation required by the regulations);
- g) Whether any such consultation substantially complied with any requirements for consultation set out in the regulations (specified in Section 90N of the NP&W Act and clause 80C of the National Parks and Wildlife Regulation 2009 and in the DECCW *Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010*);
- h) The social and economic consequences of making the decision;
- i) Any documents accompanying the application and any public submission that has been made under the EP&A Act in connection with the activity to which the permit application relates and that has been received by the Director-General; and
- j) Any other matter prescribed by the regulations.

An appeals process is available under Section 90L of the NP&W Act whereby an applicant, dissatisfied with the refusal of the Director-General to grant a Section 90 AHIP, or with any conditions attached to the AHIP, may appeal to the Land and Environment Court. The appeal must be made within 21 days after notice of the decision that is being appealed. The decision of the Land and Environment Court on the appeal is final and is binding on the Director-General and the appellant.

Under Section 85A of the NP&W Act, the Director-General may 'dispose' of Aboriginal objects that are the property of the crown:

- a) By returning the Aboriginal objects to an Aboriginal owner or Aboriginal owners entitled to, and willing to accept possession, custody or control of the Aboriginal objects in accordance with Aboriginal tradition, or

- b) By otherwise dealing with the Aboriginal objects in accordance with any reasonable directions of an Aboriginal owner or Aboriginal owners referred to in paragraph (a), or
- c) If there is or are no such Aboriginal owner or Aboriginal owners - by transferring the Aboriginal objects to a person, or a person of a class, prescribed by the regulations for safekeeping (typically implemented by way of a Care Agreement between the OEH and the Aboriginal person or organisation).

Under Section 85A(3) of the NP&W Act, the regulations may make provision as to the manner in which any dispute concerning the entitlement of an Aboriginal owner or Aboriginal owners to possession, custody or control of Aboriginal objects for the purposes of this section is to be resolved.

Under Section 91AA of the NP&W Act, if the Director-General is of the opinion that any action is being, or is about to be carried out that is likely to significantly affect an Aboriginal object or Aboriginal place or any other item of cultural heritage situated on land reserved under the Act, the Director-General may make a stop-work order for a period of 40 days. Various exemptions exist, such as for emergency situations and for approved developments under the EP&A Act. A person that contravenes a stop-work order may be penalised up to 1,000 penalty units and an additional 100 units for every day the offence continues (10,000 units and 1,000 units respectively in the case of a corporation). Under Section 91A, the Director-General may also make recommendations to the Minister for an Interim Protection Order in respect of land which has cultural significance, including Aboriginal objects, for a duration of up to two years. The existence of an AHIP does not prevent the making of a stop-work order or an interim protection order (Section 90O).

Under Section 91L of the NP&W Act the Director-General may direct a person to carry out remediation work to Aboriginal objects or places, if they have been harmed as a result of an offence under the Act. The remediation work may involve protection, conservation, maintenance, remediation or restoration of the harmed Aboriginal object or place. The maximum penalties under Section 91Q for contravening a remediation direction are 2,000 penalty units and 200 penalty units for each day the offence continues for a corporation.

Environmental Planning and Assessment Act 1979:

The EP&A Act requires that environmental impacts (including those to cultural heritage) be considered in land use planning and decision-making. The Minister administering the EP&A Act may make various planning instruments such as Local Environmental Plans (LEPs) or Development Control Plans (DCPs). These planning instruments may identify places and features of cultural heritage significance and define statutory requirements regarding the potential development, modification and conservation of these items. In general, places of identified significance, or places requiring further assessment, are listed in heritage schedules that form part of an LEP. Listed heritage items are then protected from certain defined activities, unless consent has been gained from an identified consent authority (typically the local government authority).

In determining a Development Application (DA) under Part 4 of the EP&A Act, a consent authority, such as a local government authority, must take into consideration matters such as the provisions of environmental planning instruments (for example, LEPs), DCPs, the likely impacts of that development, including environmental impacts on the natural and built environments, and social and economic impacts on the locality (Section 79C{1}).

If Aboriginal objects are known to exist on the land to which the development application applies prior to the application being made, under Part 4 of the EP&A Act an 'Integrated Development Application' (IDA) must be submitted to the consent authority. Any Development Approval issued for development of this kind must be consistent with the General Terms of Approval (GTA's) or requirements provided by the relevant State Government agency (for example, the OEH).

Under Part 5 of the EP&A Act, public authorities and government agencies that carry out activities have a duty to take into account to the fullest extent possible all matters affecting or likely to affect the environment (including cultural heritage) by reason of that activity. This typically takes the form of a Review of Environmental Factors (REF) or Environmental Impact Statement (EIS), with the agency (proponent) acting as the determining authority.

Part 3A of the EP&A Act has been repealed, but under Division 4.1 of Part 4, 'State Significant Development' is treated in a similar manner to the former Part 3A. The Minister is the Consent authority for State Significant Development applications, although for staged developments, the Minister may determine the local Council as the Consent authority for subsequent stages. As for other development applications under Part 4, the environmental impacts of the proposal need to be considered, including those on heritage.

Similar to the previous Part 3A legislation, under Section 89J of Part 4 of the EP&A Act, a Section 90 AHIP to impact Aboriginal objects is not required for an approved State Significant Development or for any investigative or other activities required to be carried out for the purpose of complying with environmental assessment requirements issued in connection with a development application for any such development. *In lieu* of a Section 90 AHIP, Aboriginal heritage needs to be managed post-approval under an Aboriginal Cultural Heritage Management Plan subject to the approval of the DP&E.

The Wilpinjong Coal Mine was approved under Part 3A of the EP&A Act. The Extension Project is being assessed under Division 4.1 of Part 4 the EP&A Act.

The interplay of the NP&W Act and Regulation and the planning system is complex. For proposed developments, the specific level of Aboriginal heritage impact assessment and Aboriginal community consultation required, and any requirement for an AHIP, is highly dependent upon not just the NP&W Act and Regulation, but the nature of the proposal, the Part and Division of the EP&A Act under which planning approval is required, any specific project approval requirements issued by DP&E and/or the OEH, the presence or otherwise of Aboriginal objects, and the potential for Aboriginal objects to occur.

8.3 Local

Under the *Environmental Planning and Assessment Act 1979* the Minister may make various planning instruments such as Local Environment Plans (LEPs), that are administered at a local government level. These plans set out objectives and controls for the development of land in the local government areas.

The *Mid-Western Regional Local Environmental Plan 2012* applies to the investigation area, however it is noted that the NSW Minister for Planning is the consent authority for the Extension Project, as the Wilpinjong Coal Mine is a Major Project approved under Part 3A of the EP&A Act.

9. POTENTIAL IMPACTS

The proposed works associated with the Extension Project have been outlined in Section 1 and are summarised in Table 10 (refer also to Figure 4).

Impacts will vary substantially between the three 'development Zones', as summarised in Table 10 and shown on Figure 17:

- ❑ In Zone 1, impacts will be total and substantial across a development impact area of approximately eight square kilometres (800 hectares), including to any Aboriginal sites or cultural values within this zone;
- ❑ In Zone 2, impacts will be total within an estimated 50% of this approximately 480 hectare (4.8 square kilometre) development zone, but prior to detailed design, the specific impacts on individual Aboriginal sites or cultural values are not currently known with certainty. There is potential within Zone 2 for avoidance of impacts to significant heritage sites and other sites of lower significance, depending on the nature of the infrastructure and/or level of significance. Aboriginal sites within this zone may be subject to total impacts, partial impacts or no impacts; and
- ❑ In Zone 3, the extent of impacts within the area of 4,416 hectares (excluding Zones 1 and 2)²² is not known and is subject to future detailed design of ancillary works. Until detailed design occurs, the specific impacts on individual Aboriginal sites will not be known. There is a high potential within Zone 3 for avoidance of impacts to significant heritage sites and other sites of lower significance, depending on the nature of the infrastructure and/or level of significance. Aboriginal sites within this zone may be subject to total impacts, partial impacts or no impacts, but for many sites the probability of impacts is assessed as unlikely.

The potential impacts of the proposed Extension Project on each of the Aboriginal sites and cultural areas/values within or immediately adjacent to the investigation area for detailed assessment (Zones 1 and 2) are presented in Appendix 7 and summarised in Tables 11 and 12. The level of impacts will be reduced to some extent by the implementation of various mitigation measures and management strategies, as outlined in Sections 10 and 11 and in Appendix 7. The 'type of harm', 'degree of harm' and 'consequence of harm' are as specified in the OEH (DECCW 2010b) guidelines.

In the absence of appropriate management and mitigation measures, it is concluded that the impacts of the proposed Extension Project on Aboriginal heritage would be moderate to low within a local context and low within a regional context. With the implementation of mitigation measures, the impacts will be low within a local context and very low within a regional context.

²² Zone 3 measures approximately 2,425 hectares if the approved Open Cut and Contained Infrastructure Area (which has largely been developed) is also excluded.

Table 10: Potential impacts of the Extension Project (refer to Appendix 7 for potential impacts for each Aboriginal site/cultural value).

Development Zone	Approximate Total Area of Zone	Nature of Impacts/Development	Estimated Approximate Disturbance Area Within Zone	Potential Impacts to Heritage
Zone 1: Open Cut Extensions	800 hectares	Open cut pits.	800 hectares (approximate incremental disturbance 755 hectares as some of the open cut extensions will overlay currently approved ancillary development areas that are not encompassed within the Open Cut and Contained Infrastructure Area footprint)	Type of harm: ☐ Probably direct. Degree of harm: ☐ Probably total. Consequence of harm: ☐ Probably total loss of value.
Zone 2: General Ancillary Development and Infrastructure Extensions	480 hectares (extent of survey/assessment area for detailed investigation outside of open cut limit)	- Land disturbance for relocation of public infrastructure and ancillary mining infrastructure located outside of the open cut limit, such as: - relocation of public roads; - relocation of electricity transmission lines and services; - water management structures and dams; - highwall drilling clearance area; - pipelines; - access roads/haul roads; and - mining support services and ancillary facilities.	240 hectares (pending detailed design)	Type of harm: ☐ Possibly direct or none. Degree of harm: ☐ Possibly total, partial or none. Consequence of harm: ☐ Probably total, partial or no loss of value.
Zone 3: Other Ancillary Development	Development Application Area	☐ Additional ancillary land disturbance requirement identified during Project additional engineering design (eg. post-approval), such as: - water management infrastructure including water pipelines, bores and associated electricity supply; - access tracks; - environmental monitoring equipment; - telecommunications; and - minor ancillary infrastructure.	Determined by Additional Design Work	Type of harm: ☐ Possibly direct or none. Degree of harm: ☐ Possibly total, partial or none. Consequence of harm: ☐ Possibly total, partial or no loss of value.

Table 11: Summary of type of potential impacts of Extension Project (type of harm and degree of harm) for each Aboriginal site type (refer to Appendix 7 for potential impacts for every individual Aboriginal site/cultural value).

Type of Harm	Site Type										Total
	Cultural area/value	Open artefact site	Rock shelter with artefacts	Rock shelter with artefacts and art	Rock shelter with artefacts and ochre quarry	Rock shelter with artefacts and waterhole/well	Rock shelter with PAD	Scarred tree	Scarred tree (possible Aboriginal)	Waterhole/well	
possibly direct		1									1
possibly direct or none		36	4				89		5	3	137
probable direct, possibly indirect			2								2
probably direct	3	71	1	1	1		7	1	3	1	89
probably direct or none			1								1
probably none		25	1			1	28	1	10		66
Total	3	133	9	1	1	1	124	2	18	4	296

Degree of Harm	Site Type										Total
	Cultural area/value	Open artefact site	Rock shelter with artefacts	Rock shelter with artefacts and art	Rock shelter with artefacts and ochre quarry	Rock shelter with artefacts and waterhole/well	Rock shelter with PAD	Scarred tree	Scarred tree (possible Aboriginal)	Waterhole/well	
possibly partial or none		2									2
possibly total		1									1
possibly total or none		32	4				89		5	3	133
possibly total, partial or none		2									2
probably none		25	1			1	28	1	10		66
probably partial		1									1
probably partial or total		1	2								3
probably total	1	69	1	1	1		7	1	3	1	85
probably total in Zone 1, partial in Zone 2 and partial in Zone 3	2										2
probably total or none			1								1
Total	3	133	9	1	1	1	124	2	18	4	296

Table 12: Summary of type of potential impacts of Extension Project (consequence of harm) for each Aboriginal site type and level of heritage significance (refer to Appendix 7 for potential impacts for every individual Aboriginal site/cultural value).

Consequence of Harm / Significance	Site Type										Total
	Cultural area/value	Open artefact site	Rock shelter with artefacts	Rock shelter with artefacts and art	Rock shelter with artefacts and ochre quarry	Rock shelter with artefacts and waterhole/well	Rock shelter with PAD	Scarred tree	Scarred tree (possible Aboriginal)	Waterhole/well	
possibly partial loss of value or no loss of value		2									2
low-possibly moderate L, low R		1									1
moderate L, low R		1									1
possibly total loss of value		1									1
low L, low R		1									1
possibly total loss of value or no loss of value		32	4				89		5	3	133
low L, low R		24	3				69		5	3	104
low-possibly moderate L, low R		8					3				11
uncertain			1				17				18
possibly total loss of value or partial loss of value or no loss of value		2									2
low-moderate L, low R		1									1
low-possibly moderate L, low R		1									1
probably no loss of value		25	1			1	28	1	10		66
low L, low R		18					8	1	10		37
low-possibly moderate L, low R		4					3				7
uncertain		3	1			1	17				22
probably partial loss of value		1									1
low L, low R		1									1
probably partial loss of value or total loss of value		1	2								3
low L, low R		1									1
moderate L, low R			2								2
probably total loss of value	1	69	1	1	1		7	1	3	1	85
high L, low R	1										1
high L, low-possibly moderate R				1	1						2
low L, low R		61	1				7	1	3	1	74
low-possibly moderate L, low R		8									8
probably total loss of value in Zone 1 and partial loss of value in Zones 2 and 3	2										2
low L, low R	2										2
probably total loss of value or no loss of value			1								1
uncertain			1								1
Total	3	133	9	1	1	1	124	2	18	4	296

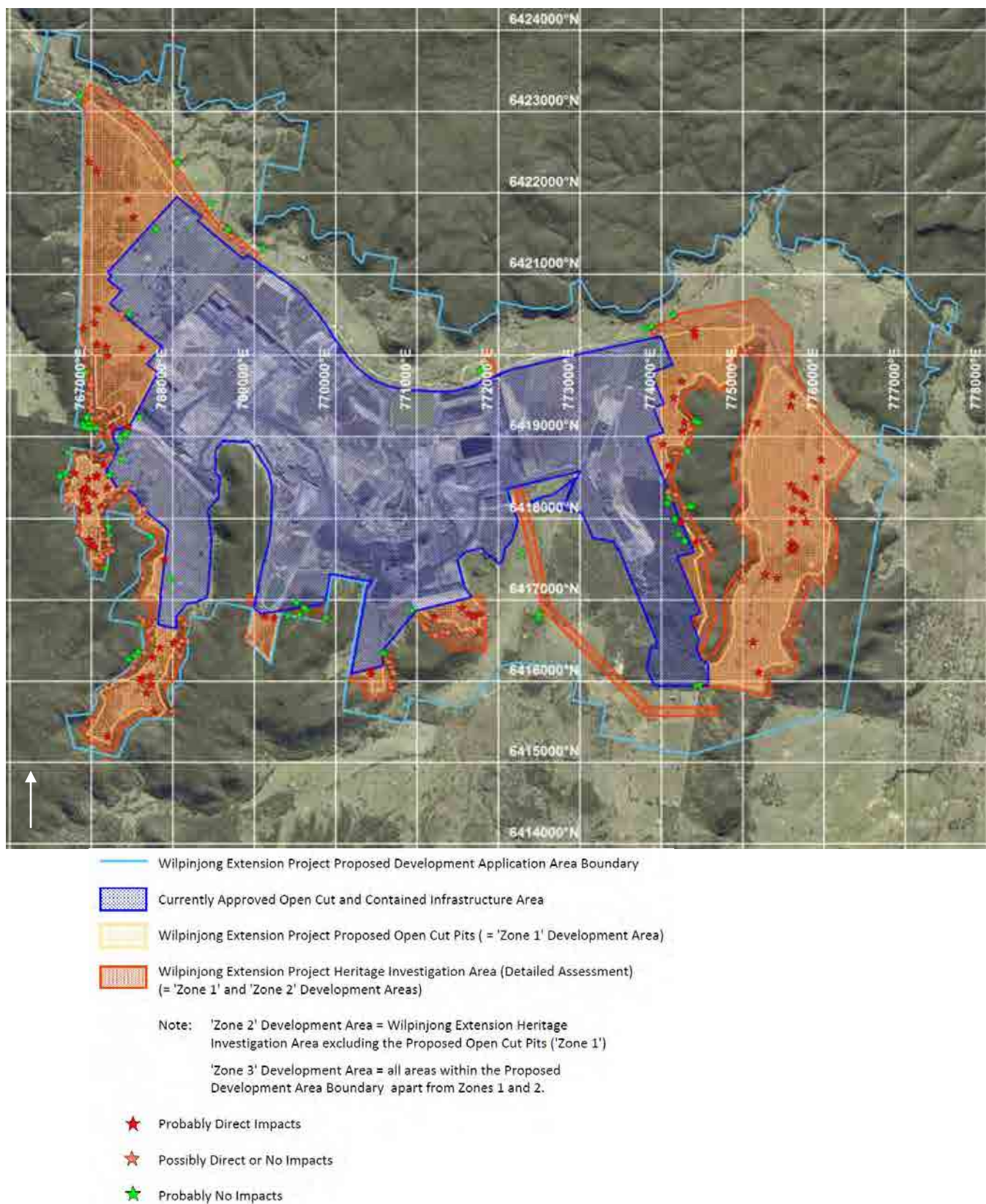


Figure 17: Heritage investigation area for Wilpinjong Extension Project showing distribution of relevant Aboriginal sites and potential type of harm²³ (one kilometre MGA grid; aerial photograph courtesy WCPL).

²³ From the Extension Project only, prior to the implementation of the recommended management strategy.

9.1 Potential Surface Impacts

The primary impacts of the proposed Extension Project will occur directly through surface development works and will principally affect open artefact sites (refer to Tables 11 and 12).

As is evident in Tables 11 and 12 and Appendix 7, the key conclusions relating to potential impacts on Aboriginal heritage include:

- ❑ Impacts will occur to a broad area, totalling over ten square kilometres;
- ❑ Within most of this area (development Zones 1 and 2), a low to very low density sub-surface deposit of artefacts may occur, consistent with the survey results and occupation model. In general, this evidence will be consistent with background discard, and although a low frequency of activity areas (with consequent higher artefact density) may be present, will not represent focused occupation. The potential for sub-surface deposits of artefacts that may be of high research value to occur within these portions of the investigation area is generally low;
- ❑ Within small portions of this area (the 'modified' areas and other minor, localised portions of development Zones 1 and 2 in which the upper soil unit has been totally removed), previous land use has caused such substantial impacts that there is generally negligible potential for any Aboriginal heritage evidence to survive;
- ❑ Within small portions of this area (development Zones 1 and 2) that are located closer to a third or higher-order watercourse or other areas of possible water retention (for example, former ponds, swamps or marshes) and that may be characterised as being within a secondary resource zone²⁴ there is a moderate or high potential for sub-surface deposits of artefacts to occur, including deposits that may be of research value. More focused occupation (eg. encampments, or events of longer duration or involving larger numbers of people) and/or repeated Aboriginal occupation may have occurred in these areas. These areas potentially include (refer to mapping in Appendix 3):
 - Portions of Areas A, G and H close to Wilpinjong Creek and its associated creek flats (survey areas A1, A2, A5, A6, A9, A11, A12, A14, A18, A19 and A41, G1-7 and H1-3 of gentle or level-very gentle gradient);
 - Portions of Area A close to the lower section of Planters Creek (survey areas A41-44 of gentle or level-very gentle gradient);
 - Portions of Area B close to the third order Spring Creek (survey areas B9, B13, B15 and B16 of gentle or level-very gentle gradient);
 - Portions of Area C close to the third order Spring Creek tributary (survey areas C17, C28, C31, C38 and C47 of gentle or level-very gentle gradient);
 - Portions of Area F close to the higher order Cumbo Creek (survey areas F1-3, F22, F24, F26 and F37 of gentle or level-very gentle gradient); and

²⁴ These areas can potentially be classified as secondary resource zones. However, without systematic excavation of a representative sample of these contexts, including at varying distances from the water sources, verification of this modelling and identification of the true nature and distribution of sub-surface evidence within these areas may not be possible. According to the modelling in Section 3.4, occupation of these portions of the investigation area may have included camping by small parties of hunters/gatherers and nuclear/extended family groups, in addition to hunting and gathering and transitory movement between locations. Occupation of these areas may have occurred at a higher intensity than in the surrounding areas.

- Portions of Area G close to the mid-lower section of the un-named watercourse in Slate Gully (survey areas G65, G97, G98 and G118 of gentle or level-very gentle gradient);
- Within the impact area (development Zones 1 and 2), the potential for other forms of heritage evidence to occur (for example, additional rock shelters, scarred trees, stone arrangements or grinding groove sites), that have not already been identified, is generally very low or negligible (given the comprehensive nature of the survey coverage, the sampling strategy and the typically obtrusive nature of these site types);
- Impacts will occur to the contemporary cultural values identified by the Aboriginal stakeholders, including those associated with the entire investigation area (relating to traditional land use and ongoing cultural and spiritual connections to the land), use of subsistence and other resources, and specifically to the Slate Gully rocky hill/site complex (of high heritage significance);
- Of the 133 identified open artefact sites:
 - Total impacts will probably occur to approximately 69 sites (52% of the open artefact sites), but 88% of these are of low heritage significance, with the remaining 12% of low to possibly moderate significance;
 - Total or partial impacts will probably occur to two sites (both of low heritage significance);
 - Total impacts, partial impacts or no impacts will possibly occur to two sites (one of low to moderate heritage significance and one of low to possibly moderate significance);
 - Partial impacts or no impacts will possibly occur to two sites (one of low to possibly moderate heritage significance and one of moderate significance);
 - Total impacts will possibly occur to one site (of low heritage significance);
 - Total impacts or no impacts will possibly occur to 32 sites (24% of the open artefact sites), with 75% of these being of low heritage significance and the remaining 25% of low to possibly moderate significance;
 - 25 sites (19% of the open artefact sites) will not be subject to any impacts²⁵ (72% of these are of low heritage significance, 16% of low to possibly moderate significance and 12% of uncertain significance);
- Of the nine rock shelters with artefacts, total impacts will probably occur to one shelter (of low heritage significance), total or partial impacts will probably occur to two shelters²⁶ (of moderate significance), five shelters may be subject to total impacts or no impacts (of which three are of low significance and two of uncertain significance), and one shelter (of uncertain significance) will not be subject to any impacts;
- The single rock shelter with artefacts and art (of high heritage significance within a local context and low to possibly moderate significance within a regional context) will be subject to total impacts;
- The single rock shelter with artefacts and ochre quarry (of high heritage significance within a local context and low to possibly moderate significance within a regional context) will be subject to total impacts;

²⁵ Noting that some sites may be subject to impacts from the approved Project where they are situated within the approved Open Cut and Contained Infrastructure Area.

²⁶ Recorded here as one combined site, WCP118/119.

- ❑ The single rock shelter with artefacts and waterhole/well (of uncertain heritage significance) will not be subject to any impacts;
- ❑ Of the 124 rock shelters with PADs, total impacts will probably occur to seven shelters (6% of the total number of rock shelters with PADs; all of low heritage significance), while 89 shelters (72% of the total number of rock shelters with PADs) may be subject to total impacts or no impacts (of which 78% are of low significance, 3% of low to possibly moderate significance and the remainder of uncertain significance) and 28 shelters (23% of the total) will not be subject to any impacts (including 28% of low significance, 11% of low to possibly moderate significance and the remainder of uncertain significance);
- ❑ Of the 20 possible Aboriginal scarred trees, total impacts will probably occur to four trees (of low heritage significance), while five trees may possibly be subject to total impacts or no impacts and 11 trees (55%) will not be subject to any impacts; and
- ❑ Of the four waterhole/wells, total impacts will probably occur to one site (of low heritage significance), while three sites may be subject to total impacts or no impacts.

In overall terms, impacts are expected to occur to approximately 31% of the identified heritage sites and cultural values, while impacts are not expected to occur to 22% of the identified heritage sites, and the remaining 47% of the identified heritage sites may or may not be subject to total or partial impacts, depending upon the detailed design of ancillary infrastructure. The potential impacts on Aboriginal sites within Zones 2 and 3 will not be fully known until detailed design has occurred and avoidance of direct impacts may be feasible for many of these sites.

In terms of sites and values of heritage significance, the key impacts of the Extension Project will be to the visually prominent hill with extensive rock formations in the valley floor of Slate Gully, which hosts a rock shelter with artefacts and art (WCP578) of high significance, a rock shelter with artefacts and ochre quarry (WCP579) of high significance, a rock shelter with PAD (WCP580) and a waterhole/well (WCP594), with an artefact scatter (WCP577) at the base (refer to Figures 15 and 16). The only two sites within the investigation area (Zones 1 and 2) assessed as being of any potential significance within a regional context, the rock shelter with artefacts and ochre quarry (WCP579) and the rock shelter with artefacts and art (WCP578), are both located on the Slate Gully rocky hill. This rocky hill and site complex has also been identified by the registered Aboriginal parties as being of high cultural significance. The rocky hill site complex is situated in 'Area G', approximately in the centre of the proposed open cut pit (development Zone 1), typically within 300 to 450 metres of the proposed pit margins.

9.2 Potential Indirect Impacts

The potential for indirect impacts to occur to Aboriginal heritage evidence must also be considered. Indirect impacts from blasting activities (for example, associated with vibration and/or overpressure) and/or dust could possibly occur to rock shelter sites and PADs, although are not anticipated to affect other site types.

Blasting:

The effects of vibration and overpressure from blasting activities on Aboriginal sites, such as rock shelters, has been subject to minimal empirical research, but cannot be discounted (Kuskie 2011). The potential effects of blasting on rock shelters is likely to relate to numerous variables, including the size and location and nature of the blast, direction of the blast, distance from the shelter, morphology of the shelter (eg. size, shape, level of exfoliation, pre-existing cracks or structural weaknesses, and presence of susceptible features such as protruding ledges and overhangs) and type of rock (eg. conglomerate or sandstone).

Potential indirect impacts from blasting have been subject to assessment and monitoring for the approved Project under the Blast Monitoring Plan. SLR Consulting (2013) undertook an assessment of potential vibration impacts from blasting on Castle Rock, a prominent rocky hill with a large rock shelter (WCP72) situated within 150-200 metres of the existing open cut pit and 200 metres from Modification 5 (Kuskie 2013). SLR Consulting (2013) identified a vibration damage criteria of 460 millimetres per second (mm/s) for Castle Rock, whereas expected levels from Modification 5 were 85.8 mm/s, well below the damage criteria. Significantly, despite the close proximity of site WCP72 to the existing open cut pit and blasting activity (approximately 200 metres), no evidence of new cracking having occurred after the original recording in 2006 has been identified (Navin Officer 2015).

SLR Consulting (2015) has assessed potential ground vibration impacts in relation to the Extension Project. The assessment references research findings on the dynamic stability of sandstone indicating that intermittent rock fall or observable damage was not observed until vibration levels exceeded 460 mm/s and therefore adopted a conservative safe blast design vibration criterion of 250 mm/s (5% exceedance). Predicted vibration safe working distances from the range of potential pre-strip, overburden blasts and coal/partings blast designs to the Aboriginal rock shelter sites were considered (SLR Consulting 2015). The results indicate that, based on WCPL blast designs, even with a typical maximum overburden blast, a safe working distance is achieved at less than 100 metres (82 metres modelled), based on SLR Consulting's (2015) 250 mm/s criteria.

Rock shelter sites WCP 72, WCP 152 and WCP 153 are located further than 100 metres from the approved mine and over 300 metres from the proposed open cut extensions. Notwithstanding that a general safe vibration criterion of 250 mm/s has been advised by SLR Consulting (2015), WCPL will continue to conservatively apply a blast design target of 80 mm/s when mining in close proximity to sites WCP 72, 152 and 153. Consequently, the impacts of vibration and/or dust on these sites are unlikely to be materially affected by the Extension Project and do not require further management consideration. Potential vibration impacts to these sites can continued to be managed in accordance with the existing Project Approval, ACHMP and Blast Management Plan.

Assuming a zone of potential impacts from blasting of a maximum 100 metres width from the margin of the proposed open cut pits, consideration is required of the:

- a) Recorded Aboriginal sites within this zone that may be susceptible to blasting impacts;
- b) Extent to which this zone has been subject to heritage survey coverage, such that site types susceptible to blasting may have been identified; and
- c) Any potential for additional sites to occur within this zone that may be susceptible to impacts.

Recorded Aboriginal sites within this zone that may be susceptible to blasting impacts:

The following 60 rock shelter sites/PADs are located within the 100 metre zone (from the margin of the Extension Project additional open cut pits²⁷) and are potentially susceptible to indirect impacts from blasting. The nature of these impacts (nil, or minor cracking or rock fall, or more substantive cracking or rock fall) are uncertain, and may vary substantially between sites depending on the variables outlined above. Sites within the existing approved Open Cut and Contained Infrastructure Area (impacts already approved) or outside of the Extension Project in Moolarben Stage 2 (subject to management under the Moolarben project) are excluded from further consideration here:

- ❑ WCP 118/119 of moderate heritage significance (partial or total impacts are anticipated to occur to this site as a result of ancillary works associated with the immediately adjacent open cut pit and therefore the management of the site is addressed on this basis, with further consideration of the potential effects of blasting not warranted);
- ❑ WCP 307, 465, 466 and 504 of low to possibly moderate significance;
- ❑ WCP 312, 327, 328, 334 and 338, of uncertain significance; and
- ❑ WCP 44, 115, 116, 117, 120, 168, 229, 232, 233, 310, 316, 467, 471, 473, 474, 475, 476, 482, 483, 489, 499, 500, 501, 502, 503, 506, 507, 512, 513, 514, 515, 516, 517, 520, 521, 522, 526, 528, 532, 534, 535, 560, 561, 566, 567, 583, 585, 586 and 588 of low heritage significance.

Extent to which this zone has been subject to heritage survey coverage and potential for additional rock shelter sites/PADs:

Almost all of the 100 metre zone (from the margin of the Extension Project additional open cut pits, and excluding the existing approved Open Cut and Contained Infrastructure Area) has been subject to archaeological survey coverage, with the following exceptions:

- ❑ Minor areas on the western margin of Area A which are within the approved Moolarben Stage 2 project and will be subject to management under that approval and do not require further consideration here;
- ❑ Minor areas along the western margin of Area B, south-western and south-eastern margins of Area C, western, southern and eastern margins of Area D, and the eastern margin of Area G east of Pit 3 (not in Slate Gully) in which there is potential for rock shelter sites and for which survey coverage is warranted in order to identify if any sites are present, particularly sites of significance; and
- ❑ Other minor areas along the margins of the Extension Project open cut pits in which the potential for rock shelter sites is low, and as such, additional survey coverage is not warranted with respect to the potential impacts of blasting.

²⁷ Sites within the 100 metre zone around the margin of existing approved open cut pits are managed under the approved Project and do not require further consideration here under the Extension Project.

Dust:

Dust from blasting activities is another source of potential impacts to rock shelter sites, but would only be of particular relevance to rock shelter sites that host art.

Only eight rock shelter sites that host art are recorded on the WCPL Aboriginal Site Database (although potentially other sites may exist in areas that have not yet been subject to systematic archaeological survey). One of these sites (WCP578) is situated directly within the proposed open cut pit (Area G) and is subject to direct impacts. Four of these sites are situated further than one kilometre from any current or proposed open cut pit. However, three sites are situated close to the approved open cut pits, WCP 72, 152 and 153. Sites WCP 152 and 153 are situated within 200 metres of approved, but not yet mined, open cut pits, while WCP72 is within 200 metres of a mined pit, but is situated on the opposite side of a major rock formation to the pit (which shields the shelter from the pit). However, site WCP72 is situated within 250 metres of an approved, but not yet mined pit, located closer to the entrance of the shelter.

The Extension Project will not result in mining activities approaching closer to sites WCP 72, 152 or 153 than is approved under the existing Project. Consequently, the impacts of dust on these sites are unlikely to be materially affected by the Extension Project and do not require further management consideration. Potential dust impacts to these sites can continued to be managed in accordance with the existing Project Approval, ACHMP and Air Quality and Greenhouse Gas Management Plan.

Presently, dust deposition levels at the rock shelter with art sites WCP 72, 152 and 153 are monitored monthly whenever mining operations are conducted within one kilometre of those sites. Further assessment of these rock art sites by qualified experts has also been undertaken (Brennan 2013, Navin Officer 2015).

Navin Officer (2015) noted that there were no significant changes to the rock art panels or rock shelter at site WCP153 between the original recording in 2006 and the recent inspection in December 2014. At site WCP152, new cracks were identified on several rock panel surfaces/edges, which Navin Officer (2005) concluded were due to natural and pre-existing processes. At site WCP72, Navin Officer (2005) observed an increase in darker coloured dust compared to the original baseline recording in 2006. Considering that the distribution of dust is comparable to that originally recorded, and that the deep, hard 'duricrust' of animal faecal/urine consolidated soil has diminished in extent (a possible outcome of the exclusion of stock and subsequent erosive processes), it is possible that the source of the increased and darker coloured dust is wind erosion and re-deposition from the floor deposits. The distribution of dust deposits is indicative of such an origin, rather than from mining related sources (for which a more widespread distribution of dust would be expected). Navin Officer (2015) identified the need for further analysis of the composition of the dust deposits to conclusively identify the potential source.

The distance from the proposed open cut pits and other sources of mining related dust (such as haul roads) at which rock shelter with art sites may be susceptible to dust impacts is uncertain. The results of the WCP 72, 152 and 153 monitoring indicate that this distance may be relatively small (in the hundreds of metres).

9.3 Regional Context and Cumulative Impacts

An objective of the NP&W Act (Section 2A) is the "conservation of objects, places or features ... of cultural value within the landscape, including, but not limited to ... places, objects and features of significance to Aboriginal people ...". This objective is to be achieved by applying the principles of ecologically sustainable development (Section 2A), defined in Section 6 of the *Protection of the Environment Administration Act 1991* as requiring the integration of *economic* and *environmental* considerations (including cultural heritage) in the decision-making process. In regard to Aboriginal cultural heritage, ecologically sustainable development can be achieved by applying the principle of intergenerational equity and the precautionary principle (DECCW 2009b), which are discussed in Section 8.2.

Hence, the extent to which the heritage resource present within the Extension Project investigation area may exist elsewhere in the region is therefore highly relevant to an assessment of the potential impacts of the Extension Project with respect to the principles of ecologically sustainable development, intergenerational equity and the precautionary principle, along with the significance assessment of the sites (representative value) and an assessment of the cumulative impacts of the Extension Project.

An analysis of the evidence from the investigation area within a regional context has been undertaken (refer to Section 5.3.4). However, there are various problems and constraints that limit comparison of the evidence within a regional context. Notable constraints to the assessment are the absence of quantitative baseline data from the region, along with the limited extent of the region that has been subject to systematic archaeological sampling, and the problems inherent with the quality and suitability of the information from some existing studies. No regional heritage assessments have been undertaken to any level of detail sufficient to provide suitable quantitative or baseline data for comparison.

Two avenues of inquiry can be pursued, as to whether similar heritage resources to those identified within the investigation area exist elsewhere within the region:

- 1) By comparison of the *identified resource* with other heritage studies in the region and known site databases; and
- 2) By examination of topographic mapping and aerial photographs to identify if comparable environmental contexts exists elsewhere in the region, in which a similar *potential resource* may occur.

The identified heritage resource and cultural values of the Extension Project investigation area have been analysed in a regional context in Section 5.3. The nature of much of the evidence from the investigation area is consistent with the results from the previous heritage assessment for the EA (Navin Officer 2005).

However, several aspects of the heritage evidence located within the Extension Project investigation area (for detailed assessment) represent less commonly reported or unusual examples of evidence, for example the porcellanite artefact and kaolin/pipeclay ('white ochre') quarry in site WCP579, and the site complex on the Slate Gully rocky hill.

Apart from these sites, similar heritage evidence is also known to occur within nearby areas (eg. Hamm 2006a, Hamm 2008a, Kuskie 2009, 2013e) and in conserved areas, including Munghorn Gap Nature Reserve and Goulburn River National Park.

Within these nearby conserved areas, many comparable environmental contexts to the current investigation area also exist. Although detailed quantitative comparison is not possible, it is inferred that similar heritage evidence to that identified within the current investigation area will frequently occur in these conserved areas. The Goulburn River National Park covers an area of 70,161 hectares, with the adjoining Munghorn Gap Nature Reserve covering a further 5,935 hectares (DEC 2003).

Hence, analysis of the potential resource in the region supports the conclusions above that the impacts of the proposed Extension Project on Aboriginal heritage would be low within a regional context (prior to the implementation of any management and mitigation measures).

Following a conclusion that the impacts of the proposed Extension Project would be low within a regional context, it logically follows that the cumulative impact of the Extension Project within a regional context (in combination with other mining projects in the region such as the adjacent Moolarben and nearby Ulan mines) will be low.

The proposed Extension Project is not inconsistent with the principle of intergenerational equity as outlined in Section 8.2. With the implementation of the mitigation measures as outlined in Sections 10 and 11, the proposed Extension Project would not cause, within a regional context, a loss of heritage resources that could be viewed as being very rare or unique or unlikely to exist elsewhere, with the exception of the site complex on the Slate Gully rocky hill, which is considered to be a less commonly reported or unusual example of evidence. However, implementation of proposed mitigation measures (refer to Sections 10 and 11), would reduce and mitigate the impacts of the Extension Project on this site complex.

In relation to the precautionary principle (refer to Section 8.2), the comprehensive nature of the archaeological survey and assessment and consultation process substantially reduces the risk of lack of scientific certainty. The present study sampled the geographic extent of the investigation area, consistent with the DEC (2005) *Guidelines for Aboriginal Cultural Heritage Impact Assessment and Community Consultation*.

10. POTENTIAL MITIGATION AND MANAGEMENT STRATEGIES

10.1 General Strategies

General strategies for the management of the identified and potential Aboriginal heritage resources and cultural areas/values within the Extension Project investigation area are presented below. Specific options are discussed in Section 10.2 and the recommended strategies are presented in Section 11.

A key consideration in selecting a suitable strategy is the recognition that Aboriginal heritage is of primary importance to the local Aboriginal community, and that decisions about the management of the sites should be made in consultation with the registered Aboriginal parties.

10.1.1 Strategy A (Further Investigation)

In circumstances where an Aboriginal heritage site is identified (particularly an open artefact site or rock shelter), but the extent of the site, the nature of its contents, its level of integrity and/or its level of significance cannot be adequately assessed solely through surface survey (generally because of conditions of low surface visibility or sediment deposition), sub-surface testing may be an appropriate strategy to further assess the site. Sub-surface testing may also be appropriate in locations where artefact deposits are predicted to occur (for example, in rock shelters or in open contexts) through application of a predictive model, in order to identify whether such deposits exist and their nature, extent, integrity and significance.

Test excavations can take the form of auger holes, shovel pits, mechanically excavated trenches or surface scrapes. The selection of a methodology (including a sampling strategy) is a process that involves (*cf.* Boismier 1991):

- 1) Identification of the specific environmental/cultural characteristics of the investigation area;
- 2) Construction of a model of Aboriginal occupation for the locality;
- 3) Definition of the expected nature and distribution of evidence (predictive model);
- 4) Formation of research questions and a methodology to retrieve the required data/evidence, in consideration of the expected nature and distribution of evidence; and
- 5) Analytical techniques for the evidence recovered that are appropriate to address the research questions and project objectives.

A Section 90 AHIP is not required for test excavations undertaken in compliance with the *Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales* (DECCW 2010b), although implementation of the *Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010* policy (DECCW 2010c) is required.

However, under the *Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales*, archaeological test excavation is necessary when (regardless of whether or not there are objects present on the ground surface) it can be demonstrated through Requirements 1, 2, 3, 4, and 5 of the Code that sub-surface Aboriginal objects with potential conservation value have a high probability of being present in an area, and the area cannot be substantially avoided by the proposed activity.

A Section 90 AHIP is also not required under Section 89J of Part 4 of the EP&A Act (or under Section 75U{4} of the former Part 3A), for any investigative or other activities required to be carried out for the purpose of complying with environmental assessment requirements issued in connection with a development application for State Significant Development.

In all other circumstances a Section 90 AHIP is normally required from the OEH to undertake sub-surface testing. The OEH determination of AHIP applications is guided by the OEH (2011c) *Guide to Aboriginal Heritage Impact Permit Processes and Decision-Making* policy. Typically, approval of an AHIP can take up to 60 days, following receipt by the OEH of all necessary information.

This is a pro-active strategy, which should result in the identification, assessment and management of the Aboriginal heritage resource prior to any development activity occurring. Following assessment of each Aboriginal site, management strategies as outlined in Sections 10.1.2 - 10.1.5 can be applied.

10.1.2 Strategy B (Conservation)

Conservation is a suitable strategy for all heritage sites, but particularly those of high archaeological significance and/or high cultural significance. Conservation is also appropriate for specific archaeological resources and environmental/cultural contexts, as part of a regional strategy aimed at conserving a representative sample of identified and potential heritage resources.

Options exist within development proposals that can be utilised for the conservation of identified or potential Aboriginal heritage resources, including exclusion of development from zones of high heritage significance or potential, preservation of areas within formal conservation zones, or the re-design of works to avoid or minimise impacts to specific areas.

10.1.3 Strategy C (Mitigated Impact)

In circumstances where an Aboriginal site may be of archaeological and/or cultural significance, but the options for conservation are limited and the surface collection of artefacts or excavation of deposits could yield benefits to the Aboriginal community and/or the archaeological study of Aboriginal occupation, mitigation measures (salvage) may be warranted.

Salvage in these circumstances may include the collection of surface artefacts and/or systematic excavation of artefact or midden deposits. Salvage of other site types may also be warranted, for example scarred trees. Salvage of a scarred tree may involve cutting and removing the tree or the portion of the tree containing the scar.

The imperative for salvage measures can be assessed in relation to:

- ❑ The nature of the identified and expected evidence, its significance and its research potential (ie. the potential for salvage to provide additional, useful evidence that will enhance the overall understanding of the nature of human occupation in the locality);
- ❑ The views of the Aboriginal stakeholders, as salvage may be warranted to minimise the impacts of development on the cultural values of the evidence; and
- ❑ The extent of potential development impacts on particular sites or potential resources.

Under the terms of the NP&W Act it is an offence to harm or desecrate an object that the person knows is an Aboriginal object, or to harm an Aboriginal object. As such, a Section 90 AHIP must normally be obtained from the OEH prior to impacting any Aboriginal objects, including through mitigation activities. The OEH determination of AHIP applications is guided by the OEH (2011c) *Guide to Aboriginal Heritage Impact Permit Processes and Decision-Making* policy. Typically, approval of an AHIP can take up to 60 days, following receipt by the OEH of all necessary information.

A Section 90 AHIP is generally not required for impacts to Aboriginal objects where the project is for State Significant Development under Part 4 or Part 3A of the EP&A Act (such as the current Project), and commitments relating to the management of and mitigation of impacts to Aboriginal heritage *in lieu* of a Section 90 AHIP (typically in the form of an Aboriginal Cultural Heritage Management Plan) are approved by the DP&E and implemented.

Salvage typically involves the development of a detailed research design (including the nature of the methodology and sampling strategy, as discussed in Section 10.1.1). Where an AHIP is required, an Aboriginal heritage impact assessment must be undertaken in accordance with the DECCW (2010b) *Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales* and Aboriginal community consultation in accordance with the DECCW (2010c) *Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010* policy.

10.1.4 Strategy D (Unmitigated Impact)

The strategy of unmitigated impact involves the proponent causing impacts to the heritage evidence without any mitigation measures. This strategy is typically suitable when the heritage evidence is of low scientific and cultural significance, the registered Aboriginal parties hold no objections, and it is unfeasible to implement any other strategy.

Under the terms of the NP&W Act it is an offence to harm or desecrate an object that the person knows is an Aboriginal object, or to harm an Aboriginal object. As such, a Section 90 AHIP must normally be obtained from the OEH prior to impacting any Aboriginal objects. The OEH determination of AHIP applications is guided by the OEH (2011c) *Guide to Aboriginal Heritage Impact Permit Processes and Decision-Making* policy. Typically, approval of an AHIP can take up to 60 days, following receipt by the OEH of all necessary information.

A Section 90 AHIP is generally not required for impacts to Aboriginal objects where the project is for State Significant Development under Part 4 or Part 3A of the EP&A Act (such as the current Project), and commitments relating to the management of and mitigation of impacts to Aboriginal heritage *in lieu* of a Section 90 AHIP (typically in the form of an Aboriginal Cultural Heritage Management Plan) are approved by the DP&E and implemented.

Where an AHIP is required, an Aboriginal heritage impact assessment must be undertaken in accordance with the DECCW (2010b) *Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales* and Aboriginal community consultation in accordance with the DECCW (2010c) *Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010* policy.

10.1.5 Strategy E (Monitoring)

An alternative strategy for zones where archaeological deposits are predicted to occur is to monitor construction, particularly any initial earthmoving and soil removal works, for the presence of artefacts, shell or skeletal remains.

Monitoring is one of the primary strategies for managing the possible occurrence of Aboriginal skeletal remains. Monitoring for the presence of shell and stone artefacts is also often of value to the Aboriginal community, who may be seeking to identify and salvage material that was not visible on the surface during a preliminary study. The sieving of graded deposits is also a practical measure that enhances the benefits of monitoring for artefacts. However, the nature of construction methods (eg. the use of earthmoving machinery to rapidly excavate large quantities of soil) tends to limit the potential for successful identification of heritage evidence during monitoring.

Monitoring for artefacts (in preference to controlled excavation) is not a widely accepted method within the context of a scientific investigation, because it could result in substantial and costly delays to construction (particularly if a Section 90 AHIP or Part 4 State Significant Development or Part 3A approval is not in force), late revisions to development plans, and/or cause undesirable impacts to sites of significance. However, monitoring for the presence of artefacts and other features during initial earthworks can be of scientific benefit and benefit to the Aboriginal community, by enabling the identification and retrieval of cultural evidence that may not otherwise have been recorded or salvaged.

10.2 Assessment of Specific Management Options for Aboriginal Sites and Cultural Values

The assessment of specific strategies for the management of the identified and potential Aboriginal heritage resources and cultural values within the Extension Project area can be considered in relation to various criteria, such as the nature of the heritage evidence, its significance, the nature of the potential impacts, and the views of the registered Aboriginal parties. The recommended management strategies and the primary rationale for each strategy for each Aboriginal site or cultural value are presented in Section 11 and Appendix 7.

It is noted that approval for the Extension Project is being sought under Division 4.1 of Part 4 the EP&A Act. In this case, management of the heritage resource post-approval within the Extension Project area will need to occur via an ACHMP approved by the DP&E, rather than via a Section 90 AHIP approved by the OEH.

An ACHMP (WCPL 2008) has been developed and implemented for the approved project area in consultation with the North East Wiradjuri Native Title Party. Subsequent to DP&E approval of Modification 5 (refer to Kuskie 2013a), the ACHMP (*WI-ENV-MNP-007*) has been revised and updated in consultation with the registered Aboriginal parties. The revised ACHMP was lodged with the DP&E for approval in 2014 and pending approval, will form the basis for ongoing management of Aboriginal heritage within the approved Wilpinjong Coal Mine area.

However, without further amendment, the revised ACHMP does not necessarily apply to or cover the proposed activities of the Extension Project. As such, further amendments to the ACHMP would be required to address the management of heritage post-approval of the Extension Project.

10.2.1 Open Artefact Sites and Potential Artefact Evidence

In relation to the identified open artefact sites and potential artefact evidence within the majority of the Extension Project area (ie. the 'modified' areas and all areas outside of the secondary resource zones), the requirement for further investigation by sub-surface testing is limited by:

- ❑ The generally low significance of the identified artefact evidence within these portions of the investigation area;
- ❑ The results of the survey, indicating a generally low to very low density of potential artefact evidence within these portions of the investigation area;
- ❑ The model of Aboriginal occupation for the locality, supported by the survey results, indicating that Aboriginal occupation of these portions of the investigation area was probably of a low intensity, and that similar potential resources will remain unaffected by the Extension Project in adjacent areas of the same environmental contexts; and
- ❑ The consequent generally low potential for sub-surface deposits of artefacts that may be of high research value to occur within these portions of the investigation area.

As such, sub-surface test excavation within these areas is unlikely to add significantly to this assessment and on this basis is not considered to be warranted. The potential impacts of the Extension Project in these areas can be adequately addressed through other measures.

For similar reasons, the imperative for implementing formal conservation measures for the identified or potential artefact evidence within these areas is also limited. Nevertheless, as identified in Section 9.1, numerous open artefact sites may not be subject to impacts, depending upon the detailed design of ancillary infrastructure²⁸.

Where impacts from surface works would be avoided to identified heritage evidence, appropriate site-specific precautionary measures, such as informing relevant staff and contractors of the nature and location of the items and need to avoid impacts, potentially along with temporary protective fencing and signage, may need to be implemented for those sites within close proximity of the area of works.

Management of the open artefact sites that may be subject to impacts in these areas (outside of the secondary resource zones) may feasibly involve:

- ❑ Unmitigated impact; or
- ❑ Mitigated impact, such as surface collection of identified artefacts.

Systematic collection by Aboriginal community representatives and a qualified archaeologist of the identified artefact evidence may serve to partially mitigate the impacts of the Extension Project on the cultural values of this evidence. This may be particularly appropriate for several open artefact sites, as specified in Appendix 7, that are assessed as being of low to possibly moderate significance.

²⁸ For all sites within Zones 2 and 3, an initial reassessment of potential impacts after detailed design plans are finalised is required, and will guide the management strategy applied (refer to Appendix 7).

Considering the factors discussed above, additional mitigation measures such as broad-area hand excavation or surface scrapes and localised hand excavation may not be warranted within these areas outside of the secondary resource zones. Considering the low heritage significance and challenges associated with relocation of evidence, systematic collection of the other open artefact sites within this area is not warranted, with heritage outcomes better achieved through the proposed mitigation measures discussed below.

Further investigation and mitigation measures may be warranted for the portions of the Extension Project investigation area (development Zones 1 and 2) that are located closer to a third or higher-order watercourse or other areas of possible water retention (for example, former ponds, swamps or marshes) and that may be characterised as being within a secondary resource zone, in which there is a moderate or high potential for sub-surface deposits of artefacts to occur, including deposits that may be of research value. These areas potentially include (refer to Appendix 3 for mapping):

- ❑ Portions of Areas A, G and H close to Wilpinjong Creek and its associated creek flats (survey areas A1, A2, A5, A6, A9, A11, A12, A14, A18, A19 and A41, G1-7 and H1-3 of gentle or level-very gentle gradient);
- ❑ Portions of Area A close to the lower section of Planters Creek (survey areas A41-44 of gentle or level-very gentle gradient);
- ❑ Portions of Area B close to the third order Spring Creek (survey areas B9, B13, B15 and B16 of gentle or level-very gentle gradient);
- ❑ Portions of Area C close to the third order Spring Creek tributary (survey areas C17, C28, C31, C38 and C47 of gentle or level-very gentle gradient);
- ❑ Portions of Area F close to the higher order Cumbo Creek (survey areas F1-3, F22, F24, F26 and F37 of gentle or level-very gentle gradient); and
- ❑ Portions of Area G close to the mid-lower section of the un-named watercourse in Slate Gully (survey areas G65, G97, G98 and G118 of gentle or level-very gentle gradient).

A systematic program of further investigation and salvage would assist in developing a greater understanding of the heritage resource in these locations, assist management of potential future impacts (through testing and refinement of the occupation model and predictive model and therefore improved understanding of the nature and distribution of evidence), and assist in mitigating the impacts of the approved Project and additional impacts from the Extension Project on these identified and potential resources.

Salvage would also permit any evidence identified to be retrieved for curation by the Aboriginal community, thereby also assisting to mitigate impacts on the contemporary cultural values identified by the Aboriginal stakeholders, including those associated with the entire investigation area (relating to traditional land use and ongoing cultural and spiritual connections to the land) and use of subsistence and other resources.

With respect to the proposed Extension Project and potential revisions to the ACHMP to address the Project, in consideration of currently accepted best-practice methods and techniques in archaeological salvage, the requirements for further investigation and salvage of these areas of potential are refined and clarified below. It is proposed to incorporate these within a revised ACHMP that addresses the Extension Project (refer to Section 11).

The key elements of any program of further investigation and mitigation of these areas of moderate to high heritage potential would comprise:

- ❑ Conduct of the program by appropriately qualified and experienced archaeologists²⁹ and representatives of the registered Aboriginal parties;
- ❑ A systematic, holistic approach that addresses all potential zones/areas within one research program³⁰; and
- ❑ A systematic approach that involves consideration of the model of Aboriginal occupation for the locality (refer to Section 3.4), identification of the specific environmental/cultural characteristics of the investigation areas (eg. refer to Section 2), definition of the expected nature and distribution of evidence (predictive model; refer to Section 3.5), formation of relevant research questions and a methodology to retrieve the required data/evidence in consideration of the expected nature and distribution of evidence (refer below) and analytical techniques for the evidence recovered that are appropriate to address the research questions and project objectives (refer below).

In relation to relevant aims and research questions, these may include:

- ❑ Clarification of the integrity of deposits and identification of any means in which the effects of post-depositional processes could be controlled for;
- ❑ What Aboriginal activities occurred within the investigation area?
- ❑ What types of Aboriginal occupation occurred within the investigation area (eg. camping, hunting/gathering, transitory movement, etc.)?
- ❑ Were the types of activity and nature of occupation related to environmental factors (eg. landform element, slope, proximity to water source)?
- ❑ Does spatial patterning of activity areas occur?
- ❑ Did single or multiple episodes of occupation occur?
- ❑ Did episodes of occupation occur at different times over the entire time-span of occupation of the region?
- ❑ What duration of time did each episode of occupation last?
- ❑ Is there potential for older (ie. early Holocene or late Pleistocene) evidence?
- ❑ How intensive was occupation of the investigation area, in both a local and regional context?
- ❑ Did microblade and microlith production occur on-site?
- ❑ Were other stone tools manufactured on-site?
- ❑ Was maintenance of stone tools conducted on-site?
- ❑ Was knapping of flakes largely casual and opportunistic, meeting requirements on an 'as needed' basis?

²⁹ Minimum BA (Honours) degree in Aboriginal archaeology and ten years full-time experience in Aboriginal archaeology for the lead archaeologist, and BA (Honours) degree in Aboriginal archaeology and two years full-time experience in Aboriginal archaeology for assistant archaeologists.

³⁰ In contrast to isolated, separate programs of investigation that focus only on single areas.

- ❑ Were wooden implements produced and/or maintained on-site?
- ❑ What stone materials were favoured for use and why?
- ❑ Where were the stone materials procured?
- ❑ How does the evidence and human behaviour represented in the investigation area compare with evidence from other locations in the region (eg. Kuskie 2009)? and
- ❑ How does the evidence from the investigation area relate to the regional model of occupation proposed by Kuskie (2009) and predictive model for the locality (refer to Sections 3.4 and 3.5)?

In relation to a suitable sampling strategy to retrieve the required data/evidence in consideration of the expected nature and distribution of evidence and relevant research questions and extent of potential development impacts, this may include sampling of the zones marked on Figure 18, including³¹:

- ❑ *Survey Areas A9/11/12* (in development Zone 2), focusing on site #36-3-653 of low to possibly moderate heritage significance: This area represents a portion of Areas A, G and H close to Wilpinjong Creek and its associated creek flats (survey areas A1, A2, A5, A6, A9, A11, A12, A14, A18, A19 and A41, G1-7 and H1-3 of gentle or level-very gentle gradient) however is situated within development Zone 2 and testing/salvage should only occur if development impacts are proposed directly within Survey Areas A9, A11 and/or A12;
- ❑ *Survey Areas A18* (in development Zone 2): This area represents a portion of Areas A, G and H close to Wilpinjong Creek and its associated creek flats (survey areas A1, A2, A5, A6, A9, A11, A12, A14, A18, A19 and A41, G1-7 and H1-3 of gentle or level-very gentle gradient) however is situated within development Zone 2 and testing/salvage should only occur if development impacts are proposed directly within Survey Area A18;
- ❑ *Survey Area A41* (in development Zone 2), focusing on site WCP282 of moderate heritage significance, but with consideration of nearby sites WCP 279, 280, 284 and 285 of low to possibly moderate significance: This area represents a portion of Areas A, G and H close to Wilpinjong Creek and its associated creek flats (survey areas A1, A2, A5, A6, A9, A11, A12, A14, A18, A19 and A41, G1-7 and H1-3 of gentle or level-very gentle gradient) and a portion of Area A close to the lower section of Planters Creek (survey areas A41-44) however is situated within development Zone 2 and testing/salvage should only occur if development impacts are proposed directly within Survey Area A41;
- ❑ *Survey Areas B9/13* (in development Zone 1), focusing on sites WCP 209, 326 and 492 of low to possibly moderate heritage significance: This area represents a portion of Area B close to the third order Spring Creek (survey areas B9, B13, B15 and B16 of gentle or level-very gentle gradient) and is situated within development Zone 1;
- ❑ *Survey Areas B15/16* (in development Zone 1): This area represents a portion of Area B close to the third order Spring Creek (survey areas B9, B13, B15 and B16 of gentle or level-very gentle gradient) and is situated within development Zone 1;

³¹ For survey areas and zones of potential in development Zone 2, testing/salvage should only occur if development impacts are proposed directly within the specified survey areas. If impacts are not proposed within those survey areas, testing/salvage would not be required.

- ❑ *Survey Areas C31/38* (in development Zone 1), focusing on site WCP530 of low to possibly moderate heritage significance: This area represents a portion of Area C close to the third order Spring Creek tributary (survey areas C17, C28, C31, C38 and C47 of gentle or level-very gentle gradient) and is situated within development Zone 1;
- ❑ *Survey Areas G65/97/98/118* (in development Zone 1), focusing on sites WCP 454 and 572 of low to possibly moderate heritage significance and WCP577 adjacent to the high significance Slate Gully rocky hill: This area represents a portion of Area G close to the mid-lower section of the un-named watercourse in Slate Gully (survey areas G65, G97, G98 and G118 of gentle or level-very gentle gradient) and is situated within development Zone 1;
- ❑ *Survey Areas G2-6* (in development Zone 2), focusing on sites WCP 273 and 559 and #36-3-666 of low to possibly moderate significance: This area represents a portion of Areas A, G and H close to Wilpinjong Creek and its associated creek flats (survey areas A1, A2, A5, A6, A9, A11, A12, A14, A18, A19 and A41, G1-7 and H1-3 of gentle or level-very gentle gradient) however is situated within development Zone 2 and testing/salvage should only occur if development impacts are proposed directly within Survey Areas G2-G6; and
- ❑ *Survey Areas H1-3* (in development Zone 2), focusing on sites WCP 457 and 458 of low to possibly moderate significance: This area represents a portion of Areas A, G and H close to Wilpinjong Creek and its associated creek flats (survey areas A1, A2, A5, A6, A9, A11, A12, A14, A18, A19 and A41, G1-7 and H1-3 of gentle or level-very gentle gradient) however is situated within development Zone 2 and testing/salvage should only occur if development impacts are proposed directly within Survey Areas H1-H3.

In relation to a suitable methodology to retrieve the required data/evidence in consideration of the expected nature and distribution of evidence and relevant research questions and aims, this may include:

- ❑ *Systematic surface collection* of the identified artefact evidence. Procedures may involve delineation of the area of the site and proposed impacts, followed by systematic collection of artefacts within the area of proposed impact, with artefact locations recorded (eg. by using measurements off baselines, or by collection within a grid such as 5 x 5 metre squares, and/or by GPS). Each site should be photographed and recorded, a plan prepared with the artefact locations, and the artefacts subject to washing and drying if required, followed by recording and curation;
- ❑ *Test excavation* of samples within the zone of potential, where development impacts are proposed. Procedures may involve establishment of transects with reference to the location of the water source and zone of heritage potential, zone of development impacts, location of identified evidence, local conditions of ground disturbance and potential depth of sub-surface deposits. Different zones may require different sampling strategies, but in general transects of up to 100 metres length extending perpendicular from the water source, supplemented by similar transects parallel to the water source, may be appropriate. Test excavation may involve units measuring 1 x 1 metre each in area excavated at intervals of no greater than five metres along each transect, by shovel and trowel in 0.1 metre 'spits' to the depth of the A unit soil/top of B unit soil or visible or predicted cultural deposits. Soil from each level within an excavation unit would be separately sieved through 2-3 millimetre mesh and material remaining in the sieve sorted by a qualified archaeologist to retain all cultural items;

- ❑ *Broad area hand excavation* to mitigate impacts and investigate and salvage potential deposits of research value, by expanding on test excavation units that exhibit a relatively high density of evidence, indicative of focused Aboriginal occupation. This would involve similar procedures to the test excavations, with the excavation area determined by the archaeologist in consultation with the registered Aboriginal stakeholders, with respect to the nature and extent of the evidence and potential impacts. It would involve hand excavation by shovel and trowel of multiple contiguous one square metre units to the depth of the A unit soil/top of B unit soil or visible or predicted cultural deposits, such that evidence that comprises the feature/activity area is retrieved in a manner consistent with obtaining information to address relevant research aims and mitigate the impacts of the Extension Project; and
- ❑ *Surface scrapes, accompanied by localised hand excavation of any features of significance* that are identified, to mitigate impacts and investigate and salvage potential deposits or features of research value. Surface scrapes would be appropriate as the final phase of investigation/salvage, prior to development impacts. Surface scrapes may involve the systematic mechanical exposure of a sample of the potential deposit from within the development impact zone in the zone of potential, to enable investigation of the spatial distribution of artefacts and features over a broader area, with collection of any artefacts identified and controlled hand excavation of any features of significance (eg. hearths or dense artefact clusters) that may be uncovered. This may involve use of a dozer or similar machinery to systematically expose the A unit soil by progressively removing thin layers (eg. five centimetres) of soil. After each layer is removed, the surface could be inspected on foot and any visible evidence collected, with recording of provenance and other relevant information. Where features of potential significance are identified, hand excavation would occur to retrieve the feature. For many artefact clusters, this may involve excavation by hand of one or more contiguous one square metre units, with deposits sieved and cultural materials retained for analysis (as per the procedures above for test excavation and broad area hand excavation).

All lithic items retrieved would be inspected under a low-magnification microscope, which would assist in accurate identification of stone materials, artefact types, use-wear, retouch and other attributes. Individual items of significance would be photographed and/or illustrated. Additional analysis, such as radiometric dating of charcoal samples may also be required, along with use-wear and residue analysis of tools exhibiting use-wear or residue. Reporting of results would need to occur to current OEH standards, focused on addressing the relevant research aims and refining the occupation model and predictive model for the locality.

Curation of any recovered evidence would need to be resolved with the registered Aboriginal parties, with potentially a Care Agreement required under Section 85A of the NP&W Act. A process for determining the curation method has been established in the existing ACHMP, however in relation to any evidence retrieved from the Extension Project area, further consultation with all of the registered Aboriginal parties may be required.

Aboriginal Site Impact Recording Forms (or new site records where appropriate) would need to be completed and provided to the OEH.



- Wilpinjong Extension Project Proposed Development Application Area Boundary
- Currently Approved Open Cut and Contained Infrastructure Area
- Wilpinjong Extension Project Proposed Open Cut Pits (= 'Zone 1' Development Area)
- Wilpinjong Extension Project Heritage Investigation Area (Detailed Assessment) (= 'Zone 1' and 'Zone 2' Development Areas)
- Proposed Sampling Areas for Test Excavation and Mitigation of Impacts to Open Artefact Evidence if Subject to Development Impacts

Figure 18: Proposed sampling areas for test excavation and mitigation of impacts for open artefact evidence within zones of moderate or high potential (one kilometre MGA grid; aerial photograph courtesy WCPL).

10.2.2 Rock Shelter Sites and PADs

In terms of sites and values of heritage significance, the key impacts of the Extension Project will be to the visually prominent hill with extensive rock formations in the valley floor of Slate Gully, which hosts a rock shelter with artefacts and art (WCP578) of high significance, a rock shelter with artefacts and ochre quarry (WCP579) of high significance, a rock shelter with PAD (WCP580) and a waterhole/well (WCP594), with an artefact scatter (WCP577) at the base (refer to Figures 15 and 16). The only two sites within the investigation area (Zones 1 and 2) assessed as being of any potential significance within a regional context, WCP578 and WCP579, are located on the Slate Gully rocky hill. This rocky hill and site complex has also been identified by the registered Aboriginal parties as being of high cultural significance.

The rocky hill site complex is situated in 'Area G', approximately in the centre of the proposed open cut pit (development Zone 1), typically within 300 to 450 metres of the proposed pit margins. As a consequence, avoidance of impacts to the site complex is highly problematic without a major revision to the mine plan and resulting non-extraction of substantial quantities of coal, at a significant economic cost to the proponent and the State.

While avoidance of impacts to this site complex would generally be warranted on the basis of the assessed level of heritage significance, alternative strategies may mitigate to some extent the impacts of the Extension Project. It is also noted that under the Extension Project, direct impacts will continue to be avoided to the large rock shelter with artefacts and art (WCP72) at Castle Rock. For the shelters of high heritage significance (WCP578 and WCP579), alternative strategies would involve systematic excavation of the deposits within and adjacent to the dripline to mitigate impacts to the scientific and cultural values and to investigate relevant research issues, along with additional research to address the impacts to the ochre quarry and rock art.

The key elements of any program of further investigation and mitigation of impacts at sites WCP578 and WCP579 would comprise:

- ❑ Conduct of the program by appropriately qualified and experienced archaeologists³² and representatives of the registered Aboriginal parties, prior to any impacts occurring to the rocky hill; and
- ❑ A systematic, holistic approach that involves consideration of the model of Aboriginal occupation for the locality (refer to Section 3.4), relevant research questions (refer below) and an appropriate methodology to retrieve the required data/evidence in consideration of the expected nature of evidence, research questions and project objectives (refer below).

In relation to relevant aims and research questions, these may include:

- ❑ Clarification of the integrity of deposits and identification of any means in which the effects of post-depositional processes could be controlled for;
- ❑ What Aboriginal activities occurred at the sites?
- ❑ What types of Aboriginal occupation occurred (eg. camping, hunting/gathering, transitory movement, etc.)?

³² Minimum BA (Honours) degree in Aboriginal archaeology, ten years full-time experience in Aboriginal archaeology and three months prior experience on Aboriginal rock shelter excavations for the lead archaeologist, and BA (Honours) degree in Aboriginal archaeology, two years full-time experience and one months prior experience on Aboriginal rock shelter excavations in Aboriginal archaeology for assistant archaeologists.

- ❑ How do the nature of activities and occupation vary between the sites?
- ❑ Were the types of activity and nature of occupation related to environmental factors or cultural factors?
- ❑ Were the types of activity and nature of occupation related to restricted or non-restricted access, or 'women's business' or 'men's business'?
- ❑ What behaviour does the rock art motifs represent?
- ❑ Does spatial patterning of activity areas occur?
- ❑ Did single or multiple episodes of occupation occur?
- ❑ Did episodes of occupation occur at different times over the entire time-span of occupation of the region?
- ❑ What duration of time did each episode of occupation last?
- ❑ Is there older evidence (ie. early Holocene or late Pleistocene)?
- ❑ Were stone tools manufactured on-site?
- ❑ Was maintenance of stone tools conducted on-site?
- ❑ Were wooden implements produced and/or maintained on-site?
- ❑ What stone materials were favoured for use and why?
- ❑ Where were the stone materials procured?
- ❑ Where was the porcellanite obtained from (eg. the upper Hunter Valley or from a more local source) and does its procurement indicate the movement of Wonnarua people from the upper Hunter Valley to Slate Gully, or visits to the upper Hunter Valley by north-eastern Wiradjuri people who returned with the material, or trade between the two groups?
- ❑ Was the kaolin/pipeclay ('white ochre') quarried and what were its uses and distribution?
- ❑ How does the evidence and human behaviour represented in the sites compare with evidence from other rock shelters in the region (eg. Moore 1970, Kuskie 2012)? and
- ❑ How does the evidence from the investigation area relate to the regional model of occupation proposed by Kuskie (2009) and predictive model for the locality (refer to Sections 3.4 and 3.5)?

In relation to a suitable methodology and sampling strategy to retrieve the required data/evidence, this may include:

- ❑ *Systematic surface collection* of the identified artefact evidence, using similar procedures as specified for the open artefact sites;
- ❑ *Detailed recording* of the ochre quarry evidence and rock art (including by photography and accurate surveying, such as laser-scanning), and where feasible, removal of samples for further analysis (eg. chemical analysis and dating); and

- ❑ *Salvage excavation* of sites WCP578 and WCP579. This would involve establishment of a baseline in each shelter and preparation of an accurate plan, and hand excavation by trowel of multiple contiguous units each measuring 0.5 x 0.5 metres, to retrieve at least 80% of the deposit within each shelter, along with relevant adjacent deposits forward of the dripline. Units would be excavated in successive levels ('spits') of five centimetres depth, within individual soil units, to bedrock or the depth of the A unit soil/top of B unit soil or visible or predicted cultural deposits. Soil from each level within an excavation unit would be separately sieved through 2-3 millimetre mesh and material remaining in the sieve sorted by a qualified archaeologist to retain all cultural items. Charcoal samples would be retained and where suitable for radiocarbon or other methods of direct dating, submitted to an accredited laboratory for dating;

All lithic items retrieved would be inspected under a low-magnification microscope, which would assist in accurate identification of stone materials, artefact types, use-wear, retouch and other attributes. Individual items of significance would be photographed and/or illustrated. Additional analysis, such as radiometric dating of charcoal samples may also be required, along with use-wear and residue analysis of tools exhibiting use-wear or residue. Reporting of results would need to occur to current OEH standards, focused on addressing the relevant research aims.

Curation of any recovered evidence would need to be resolved with the registered Aboriginal parties, with potentially a Care Agreement required under Section 85A of the NP&W Act. A process for determining the curation method has been established in the existing ACHMP, however in relation to any evidence retrieved from the Extension Project area, further consultation with all of the registered Aboriginal parties may be required.

Aboriginal Site Impact Recording Forms would need to be completed and provided to the OEH.

Several other rock shelter sites of moderate significance (WCP 118/119) will also be subject to total or partial impacts from the Extension Project. This combined shelter site is located around a large boulder on the margin of the proposed open cut pit in Area B. Surface collection and salvage excavation of a sample of shelter deposits, including in areas adjacent to and forward of the driplines, to mitigate impacts and address locally relevant research questions, is warranted. The probability of direct impacts, along with the conduct of such a salvage program, would negate the need for any further consideration of indirect impacts such as blasting.

A number of rock shelters with PADs may be subject to direct or indirect impacts, but as these are of low heritage significance, and a program of mitigation focused on the Slate Gully rocky hill site complex, zones of moderate to high heritage potential and site WCP 118/119 would occur, further investigation or mitigation of these shelters is not warranted. Where impacts can be avoided however, as may be feasible for a number of these shelters within Zones 2 and 3, appropriate site-specific precautionary measures may be warranted for those sites/PADs within close proximity of the area of works.

The Extension Project will not result in mining activities approaching closer to sites WCP 72, 152 or 153 than is approved under the existing Project. Consequently, the impacts of blasting vibration and/or dust on these sites are unlikely to be materially affected by the Extension Project and do not require further management consideration in relation to the Extension Project. Potential vibration and dust impacts to these sites can continued to be managed in accordance with the existing Project Approval, ACHMP and Air Quality and Greenhouse Gas Management Plan and Blast Management Plan.

A total of 60 rock shelter sites/PADs are located within the 100 metre zone (from the margin of the Extension Project additional open cut pits) in which impacts from blasting may occur (refer to Section 9.2). Management strategies for these sites are outlined in Appendix 7. For the 49 sites/PADs of low heritage significance, further action is not warranted (refer above). For the five sites of uncertain significance, procedures involving verification of the site locations, assessment of impacts, reassessment of significance and avoidance of impacts if the sites are of low to moderate or higher significance are included in Appendix 7. Avoidance of impacts may be feasible for sites WCP 307, 465, 466 and 504 of low to possibly moderate significance. If impacts cannot be avoided to site WCP504, further investigation is warranted to determine its significance and whether salvage is required to mitigate impacts. Partial or total impacts are anticipated to occur to WCP 118/119 as a result of ancillary works associated with the immediately adjacent open cut pit and therefore the management of the site is addressed on this basis, with further consideration of the potential effects of blasting not warranted (refer to Appendix 7).

As identified in Section 5.2.1, many of the Kayandel (2006) sites/PADs (in the range WCP 289 - 376) that were reported as occurring within the Extension Project area could not be identified in or within the immediate vicinity of the reported locations during the present survey. For several sites, it was established by physical inspection that the Kayandel (2006) site had been reported with the incorrect grid reference datum. However, for other sites it was established that the datum was correct, and for other sites, a margin of error in the earlier GPS recordings was evident. It is problematic to resolve this issue for each site without on-ground verification (through inspection of the alternative AMG and MGA locations and a sufficient radius around each to encompass margins of error that could be expected with a hand-held GPS unit in 2006). Such inspection should occur for all sites as noted in Appendix 7, in order to identify the true site locations, correct the grid references within the WCPL Aboriginal Site Database, record the sites to an appropriate level of detail, assess potential impacts and significance, and verify appropriate management strategies in accordance with the options outlined in Appendix 7.

10.2.3 Other Site Types

In relation to the 20 possible Aboriginal scarred trees, total impacts will probably occur to four trees (of low heritage significance), while five trees may be subject to total impacts or no impacts and 11 trees will not be subject to any impacts.

For any possible scarred trees that may be subject to impacts, consistent with the current ACHMP, implementation of procedures to verify the precise location of these trees and nature of these scars and reassess their significance may be warranted prior to any impacts occurring. Considering the likely non-Aboriginal nature of most, if not all of these scars (refer to Section 5.2.4), and the assessment of low heritage significance, unmitigated impact represents a feasible management strategy where it is determined that the scar has probably derived from a non-Aboriginal cause. If the assessment determines that an Aboriginal origin for the scar is likely, salvage is feasible following procedures outlined in the approved ACHMP. Where the tree is located in development Zone 2 or Zone 3, avoidance of impacts may be feasible.

Of the four waterhole/wells, total impacts will probably occur to one site (of low heritage significance), while three sites may be subject to total impacts or no impacts. As these are natural features of low heritage significance, unmitigated impact represents a feasible management strategy if impacts cannot be avoided.

10.2.4 Cultural Values

Of the cultural areas/values identified by the Aboriginal parties, the ongoing cultural and spiritual connection with the Extension Project area itself, the use of subsistence and other resources, and the Slate Gully rocky hill/site complex (of high heritage significance), will be affected by the Extension Project.

Should the Extension Project proceed, avoidance of impacts would not be feasible. However, the mitigation and management measures outlined in Sections 10.2.1 - 10.2.3 may serve to mitigate and offset to some extent the impacts of the Extension Project on cultural values. Additional culturally appropriate offsets or mitigation measures may be warranted, given the proposed impacts to a broad area, totalling over ten square kilometres, and the Slate Gully rocky hill/site complex of high heritage significance.

10.2.5 Additional Survey Investigation

Subsequent to completion of the survey and draft report, a minor variation occurred to the northern alignment of the 330 kV electricity transmission line involving two tower locations and approximately three hectares of land within Zone 3, but outside of Area H and Zone 2 (refer to Figure 19). The revised alignment moves the proposed transmission line closer to sites WCP174 (large open artefact site on Wilpinjong Creek recorded by Navin Officer {2005} with over 500 estimated surface artefacts and assessed by Navin Officer as being of high significance within a local context) and #36-3-0665 ('WC IF3', an isolated artefact recorded by Ozark {2005}). The revised alignment may also result in varied impacts to sites WCP 457 and 458. The management of sites WCP 457 and 458 are addressed in Section 10.2.1 and Appendix 7, with these sites of low to possibly moderate significance forming part of the proposed test and salvage excavation zone 'H1-3'.

Systematic heritage survey of this area is warranted prior to any impacts occurring in accordance with the survey methodology for the present investigation. This would enable identification of and management of any heritage evidence (including sites WCP174 and #36-3-0665) in accordance with procedures specified in Section 10.2.1 for sites WCP 457 and 458 and test and salvage excavation zone 'H1-3'.

The variation to the proposed impact area within the vicinity of Wilpinjong Creek occurs within the same area of moderate or high potential for sub-surface deposits of artefacts, including deposits that may be of research value, as for Area H. The variation would result in an increase in impacts in the zone of potential adjacent to Area H, but a reduction of impacts within a portion of Area H, and is unlikely to result in either a net increase or decrease in overall impacts on heritage. Within this area, the only form of evidence likely to be present is the identified open artefact sites and sub-surface deposits. Hence, if the varied alignment proceeds, test and salvage excavation zone 'H1-3' should be extended to cover the varied impact area, and the same procedures applied as for sites WCP 457 and 458 and test and salvage excavation zone 'H1-3'.

In addition to this area, approximately three hectares of the investigation area for detailed assessment was not subject to systematic archaeological survey sampling due to revisions to the Zone 2 boundary after completion of the field survey. If impacts are proposed, systematic heritage survey of these areas should also occur prior to any impacts occurring in accordance with the survey methodology for the present investigation. This would enable identification of and management of any heritage evidence in accordance with procedures specified in the ACHMP.

Other minor potential impact areas within Zone 3 may be defined as detailed design of ancillary works progresses, and some of these areas may not have been subject to heritage survey. Procedures should be specified within the ACHMP to include systematic heritage survey of these impact areas prior to any impacts occurring, with any identified heritage evidence also managed in accordance with procedures specified in the ACHMP.

Detailed design plans relevant to potential surface impacts within Zone 2 have not been finalised. When detailed design plans have been finalised, the potential impacts on identified Aboriginal heritage sites should be reassessed and management strategies implemented as outlined in Appendix 7.

Small portions of the 100 metre zone (from the margin of the Extension Project additional open cut pits, excluding the existing approved Open Cut and Contained Infrastructure Area) in which blasting impacts may occur, have not been subject to archaeological survey coverage. Systematic heritage survey is warranted of these areas (minor areas along the western margin of Area B, south-western and south-eastern margins of Area C, western, southern and eastern margins of Area D, and the eastern margin of Area G east of Pit 3) in order to identify if any rock shelter sites are present and allow their management in accordance with procedures specified in the ACHMP.

Continued monitoring of the rock shelter with art sites WCP 72, 152 and 153 is warranted in relation to the potential effects of dust, with the information used to identify the approximate distance from the open cut pits and other sources of mining related dust (such as haul roads) at which rock shelter with art sites may be susceptible to dust impacts. Notwithstanding the wide extent of heritage survey coverage at Wilpinjong and the relatively infrequent occurrence of rock art, this information can be used to identify any potential zones which may be affected by dust and in which there is potential for rock shelters with art, with targeted surveys undertaken of areas not currently subject to survey sampling. Any shelters identified can be managed in accordance with procedures specified in the ACHMP.

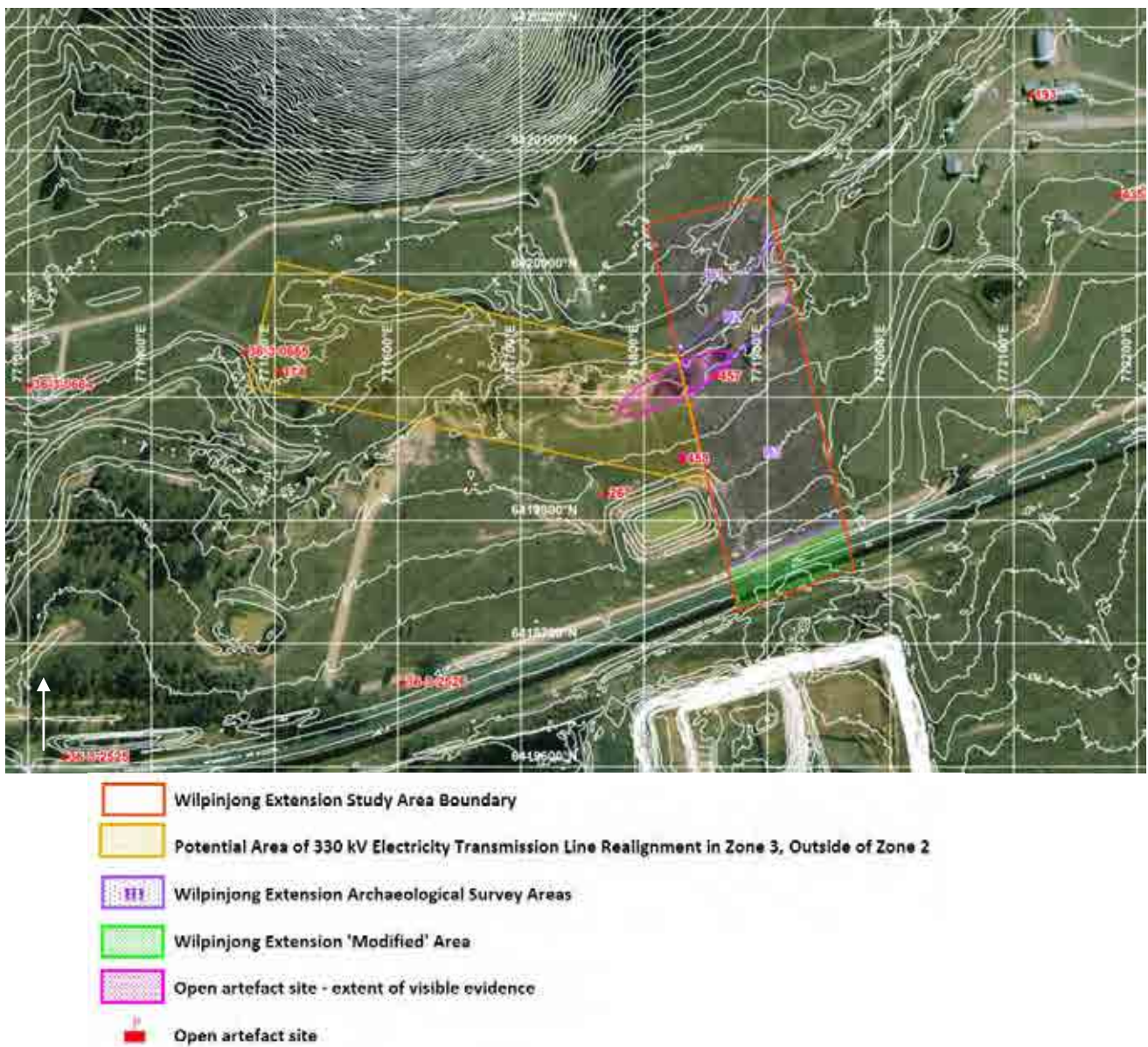


Figure 19: Variation to the northern alignment of the 330 kV electricity transmission line within Zone 3, adjacent to Area H and Zone 2 (100 metre MGA grid; one metre contours; aerial photograph courtesy WCPL).

11. RECOMMENDATIONS

This Aboriginal cultural heritage assessment of the Wilpinjong Extension Project has been prepared by South East Archaeology for WCPL in relation to an approval being sought from the DP&E for the Extension Project under Division 4.1 of Part 4 the EP&A Act.

The potential impacts of the proposed Extension Project on each of the Aboriginal sites and cultural areas/values within or immediately adjacent to the investigation area for detailed assessment (development Zones 1 and 2) has been assessed in Section 10 and is detailed in Appendix 7 and summarised in Tables 11 and 12. The level of impacts will be reduced to some extent by the implementation of various mitigation measures and management strategies.

In the absence of appropriate management and mitigation measures, it is concluded that the impacts of the proposed Extension Project on Aboriginal heritage would be moderate to low within a local context and low within a regional context. With the implementation of mitigation measures, the impacts will be low within a local context and very low within a regional context.

In overall terms, impacts are expected to occur to approximately 31% of the identified Aboriginal heritage sites and cultural values, while impacts are not expected to occur to 22% of the identified heritage sites, and the remaining 47% of the identified heritage sites may or may not be subject to total or partial impacts, depending upon the detailed design of ancillary infrastructure. The potential impacts on Aboriginal sites within development Zones 2 and 3 will not be fully known until detailed design has occurred and avoidance of direct impacts may be feasible for many of these sites.

Impacts will occur to a broad area, totalling over ten square kilometres, much of which is of low potential for sub-surface deposits of artefacts that may be of high research value. Within the impact area (development Zones 1 and 2), the potential for other forms of heritage evidence to occur (for example, additional rock shelters, scarred trees, stone arrangements or grinding groove sites), that have not already been identified, is generally very low or negligible (given the comprehensive nature of the survey coverage, the sampling strategy and the typically obtrusive nature of these site types).

However, while a number of open artefact sites, possible scarred trees, waterhole/wells and rock shelters with artefacts and rock shelters with PADs of low heritage significance may be subject to impacts, several cultural values, zones of heritage potential and identified sites of higher heritage significance may also be subject to impacts, particularly:

- ❑ Small portions of development Zones 1 and 2 that are located closer to a third or higher-order watercourse or other areas of possible water retention that may be characterised as being within a secondary resource zone, where there is a moderate or high potential for sub-surface deposits of artefacts to occur, including deposits that may be of research value (refer to mapping in Appendix 3 and Sections 9 and 10);
- ❑ The contemporary cultural values identified by the Aboriginal stakeholders, including those associated with the entire investigation area (relating to traditional land use and ongoing cultural and spiritual connections to the land) and the use of subsistence and other resources; and

- ❑ The visually prominent hill with extensive rock formations in the valley floor of Slate Gully, which hosts a rock shelter with artefacts and art (WCP578) of high significance, a rock shelter with artefacts and ochre quarry (WCP579) of high significance, a rock shelter with PAD (WCP580) and a waterhole/well (WCP594), with an artefact scatter (WCP577) at the base (refer to Figures 15 and 16). This rocky hill and site complex has also been identified by the registered Aboriginal parties as being of high cultural significance.

The following recommendations are made on the basis of legal requirements under the EP&A Act and NP&W Act, the results of the investigation and consultation with the registered Aboriginal parties:

- 1) The existing ACHMP (WCPL 2008 or subsequent versions) for the approved Wilpinjong Coal Mine will be revised to incorporate the following provisions relating to Aboriginal heritage for the Extension Project. These provisions will be formulated in consultation with the registered Aboriginal parties (refer to Table 7) and subject to DP&E approval, will specify the policies and actions required to manage the potential impacts of the Extension Project on Aboriginal heritage within the Development Application area after approval is granted:
 - a) In order to mitigate the impacts of the Extension Project on scientific and cultural values and to retrieve and conserve samples of the heritage evidence, further investigation and mitigation measures will be implemented prior to any impacts occurring to specified sites, values and areas, including:
 - i) Management strategies for all identified Aboriginal sites and values as listed in Appendix 7 ('Management Strategy - Recommended Strategy' column), guided initially where relevant by a reassessment of potential impacts for sites and areas within Zones 2 and 3 after detailed design plans are finalised;
 - ii) Systematic surface collection of the identified artefact evidence from open artefact sites as specified in Appendix 7, involving procedures outlined in Section 10.2.1;
 - iii) Test excavation, broad area hand excavation and surface scrapes with localised hand excavation of potential artefact deposits within areas of moderate to high heritage potential listed in Section 10.2.1 and marked on Figure 18 if subject to potential development impacts (Survey Areas A9/11/12, A18, A41, B9/13, B15/16, C31/38, G65/97/98/118, G2-6 and H1-3), involving the systematic holistic approach, research aims and questions, sampling strategy, personnel and methods as outlined in Section 10.2.1;
 - iv) Salvage excavation of deposits within the Slate Gully rocky hill sites WCP578 and WCP579, involving the systematic approach, research aims and questions, sampling strategy, personnel and methods as outlined in Section 10.2.2. Surface collection of the identified artefact evidence, using similar procedures as specified for the open artefact sites, and detailed recording of the ochre quarry evidence and rock art (including by photography and accurate surveying, such as laser-scanning), and where feasible, removal of samples for further analysis (eg. chemical analysis and dating) will also occur;
 - v) Surface collection and salvage excavation of a sample of shelter deposits from sites WCP 118/119, including in areas adjacent to and forward of the driplines, to mitigate impacts and address locally relevant research questions;

- vi) Archaeological survey of all potential impact areas that have not subject to systematic survey sampling, using the same methodology as for the present investigation, including:
 - The portions totalling approximately three hectares of Zone 2 (refer to Figure 13 and detailed mapping in Appendix 3) that were not sampled, if impacts are proposed;
 - The portion of the northern revised alignment of the 330 kV electricity transmission line adjacent to Area H, if impacts are proposed, with all artefact evidence (including sites WCP174 and #36-3-0665) managed in accordance with the procedures specified in Section 10.2.1 and Appendix 7 for sites WCP 457 and 458 and test and salvage excavation zone 'H1-3' (hence, the test and salvage excavation zone 'H1-3' will be extended to encompass the revised impact area);
 - Within Zone 3, any other potential impact areas that may be defined as detailed design of ancillary works progresses, where significant ground disturbance may be proposed or in which identified sites occur in the immediate vicinity of; and
 - Small portions of the 100 metre zone (from the margin of the Extension Project additional open cut pits) in which blasting impacts may occur, which have not been subject to archaeological survey coverage (minor areas along the western margin of Area B, south-western and south-eastern margins of Area C, western, southern and eastern margins of Area D, and the eastern margin of Area G east of Pit 3) in order to identify if any rock shelter sites are present and allow their management in accordance with procedures specified in the ACHMP;
- vii) Continued monitoring of the rock shelter with art sites WCP 72, 152 and 153 will occur under the approved Project in relation to dust from blasting activities, with the information used to identify the approximate distance from the open cut pits and other sources of mining related dust (such as haul roads) at which rock shelter with art sites may be susceptible to dust impacts. This information will assist to identify any potential zones which may be affected by dust and in which there is potential for rock shelters with art, with targeted surveys undertaken of areas not currently subject to heritage survey sampling. Any shelters identified can be managed in accordance with procedures specified in the ACHMP;
- viii) Verification of the on-ground location of all Kayandel (2006) sites/PADs (in the range WCP 289 - 376) listed in Appendix 7, that were reported as occurring within the Extension Project area but could not be identified in or within the immediate vicinity of the reported locations during the present survey, will occur. This will involve inspection of the alternative AMG (AGD) and MGA (GDA) locations and a sufficient radius around each to encompass margins of error that could be expected with a hand-held GPS unit, in order to identify the true site locations, correct the grid references within the WCPL Aboriginal Site Database, record the sites to an appropriate level of detail, assess significance and verify appropriate management strategies in accordance with the options outlined in Appendix 7 based on the refined site locations;

- ix) For any possible scarred trees that may be subject to impacts (refer to Appendix 7), verification of the precise location of the trees and nature of the scar and a reassessment of significance will occur. If the assessment determines that an Aboriginal origin for the scar is likely and the tree is of some heritage significance, procedures outlined in the approved ACHMP will be implemented. Unmitigated impact represents an appropriate strategy for all other trees (eg. where it is determined that the scar has probably derived from a non-Aboriginal cause);
- b) All heritage mitigation and monitoring measures undertaken for the Extension Project will be adequately documented with reference to relevant OEH guidelines and consistent with Section 10.2 of this report. Reports will be prepared and provided to relevant stakeholders (such as the DP&E and the OEH and the registered Aboriginal parties) within appropriate timeframes;
- c) All heritage evidence salvaged under the Extension Project will be curated in an appropriate manner, as determined in consultation with the registered Aboriginal parties and the OEH during preparation of the revised ACHMP. If required an application will be made to the OEH under Section 85A of the NP&W Act for the curation of any salvaged items that are removed from any heritage site. Temporary storage of items at locations off the mine site (for example, during analysis and recording) will be allowed;
- d) Where impacts from surface works will be avoided to identified heritage evidence, appropriate site-specific precautionary measures, such as informing relevant staff and contractors of the nature and location of the items and need to avoid impacts, potentially along with temporary protective fencing and signage, will be implemented where relevant for those sites within close proximity of the area of works;
- e) As a general principle, all relevant contractors and staff engaged on the Extension Project who are undertaking tasks on site that may give rise to any interactions with Aboriginal heritage will receive heritage awareness training prior to commencing work on-site. The existing training package for the Wilpinjong Coal Mine will be reviewed in consultation with the registered Aboriginal parties and include, but not be limited to, the presentation of information about the Aboriginal culture and history of the locality, nature of the identified and potential Aboriginal heritage evidence within the Extension Project area, heritage management measures, and legal obligations;
- f) The Aboriginal Site Database established for this project that lists known Aboriginal sites within the WCPL lease area, in both tabular and GIS form, will be updated following the Extension Project approval for the revised approved Development Application area, and will continue to be maintained and regularly updated, with hard copies of information made available to any registered Aboriginal party upon request;
- g) Aboriginal Site Recording Forms will be lodged in a timely manner with the OEH for any previously unrecorded Aboriginal heritage evidence that is identified within the Extension Project area during the course of operations and/or further heritage assessments, and Aboriginal Site Impact Recording Forms will be lodged for any site that is subject to salvage or development impacts;
- h) Provisions will be included to guide the assessment of any future alterations that may be proposed to the mine plan or ancillary works within the Development Application area. This will include an assessment of the potential impacts of any changes on the heritage resource, and formulation of management strategies consistent with procedures outlined in the ACHMP;

- i) Provisions will be included to guide the management of any previously unrecorded Aboriginal heritage sites within the Extension Project area that may be identified during future investigations or works. Management provisions will vary in relation to the nature of any evidence identified, its significance and the nature of the proposed impacts, and may include temporary protection, further investigation, longer-term conservation or avoidance of impacts, mitigation, monitoring or unmitigated impact;
 - j) Should any skeletal remains be detected during the course of the Extension Project, work in that location will cease immediately and the finds will be reported to the appropriate authorities, including the Police, the OEH and the registered Aboriginal parties. Subject to the Police requiring no further involvement, the management of any Aboriginal skeletal remains will be determined in consultation with the DP&E, the OEH and the registered Aboriginal parties;
 - k) Archaeological investigations will only be undertaken by archaeologists qualified and experienced in Aboriginal heritage, as specified in Section 10.2, in consultation with and with the involvement of the registered Aboriginal parties, and will occur prior to any development impacts occurring to those specific areas or sites;
 - l) Provisions will be included to ensure that Aboriginal community representatives are permitted access to any identified sites or cultural areas within WCPL controlled Extension Project area land when requested, in consideration of safety and operational requirements at the time;
 - m) The revised ACHMP will be regularly verified to establish that it is functioning as designed (ie. policies adhered to and actions implemented) to the standard required;
 - n) The protocol for the involvement of Aboriginal stakeholders specified in the ACHMP will be updated in consultation with all registered Aboriginal parties;
- 2) Under the terms of the NP&W Act it is an offence to harm or desecrate an object that the person knows is an Aboriginal object, or to harm an Aboriginal object ('strict liability offence'). Therefore, no activities or work should be undertaken within the Aboriginal site areas as described in this report and marked on Appendix 3 without approval under Division 4.1 of Part 4 of the EP&A Act (or *in lieu* a valid Section 90 AHIP) and subsequent implementation of any relevant approval conditions;
- 3) Final copies of this report will be forwarded to each of the registered Aboriginal parties and the DP&E and the OEH.

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DISCLAIMER

The information contained within this report is based on sources believed to be reliable. Every effort has been made to ensure accuracy by using the best possible data and standards available. The accuracy of information generated during the course of this field investigation is the responsibility of the consultant.

However, as no independent verification is necessarily available, South East Archaeology provides no guarantee that the base data (eg. the OEH AHIMS) or information from informants (obtained in previous studies or during the course of this investigation) is necessarily correct, and accepts no responsibility for any resultant errors contained therein and any damage or loss which may follow to any person or party. Nevertheless this study has been completed to the highest professional standards.

GLOSSARY

Acidic volcanic - broad category of extrusive, fine-grained igneous stone, formed by rapid cooling.

Activity - the nature of behaviour that resulted in the discard of a lithic item. Categories include *non-specific stone flaking*, *bipolar flaking*, *microblade production*, *microlith production*, *loss or intentional discard of microliths* and *loss or discard of non-microlith tools*.

Activity area - a single location in which one or more *activity events* has resulted in the discard of items that constitute archaeological evidence. For example, an *activity area* may represent a single *activity* such as *microblade production*. However, this activity is comprised of numerous *activity events* (eg. each blow to the core can be described as an *activity event*), which result in multiple discarded items, each from different *activity events*.

Activity event (discard event) - the discard of lithic item(s) resulting from a single action performed during an *activity*. For example, a single blow to a core during a *non-specific stone flaking* event may result in the detachment of several flakes.

Archaeological site - any location that contains evidence of human activity.

Archaeological visibility - a mean estimate of the percentage of visible ground surface within a *sample area* or *site* that has potential to contain evidence of Aboriginal heritage.

Artefact - an object, normally portable, made or modified by the human hand (refer also to *stone artefact*).

Artefact density per square metre of effective survey coverage - mean number of artefacts within each square metre of visible ground surface with potential to contain Aboriginal artefacts that is physically inspected. Calculated by dividing the *number of artefacts* by *effective survey coverage*.

Artefact scatter - a locality that contains evidence of Aboriginal occupation in the form of stone artefacts. For the purposes of the assessment, artefact scatter sites were defined as the presence of one or more stone artefacts within a *survey area* (cf. Kuskie 2000). The survey areas are based on discrete, repeated *environmental contexts* or *archaeological terrain units*. Each spatially discrete location of evidence within a survey area is defined as a site locus, with the boundaries of the site locus defined by the visible extent of artefacts (ie. Aboriginal objects protected under the *National Parks & Wildlife Act 1974*). However, it is assumed that there is a similar probability for comparable evidence to occur elsewhere within the same survey area. Hence, while the visible site loci boundaries are defined by the extent of visible evidence, across the entire survey area in which a site is identified there exists a *potential resource* of comparable evidence.

Associated - where artefacts are identified to be in context with other material. Two main forms of association are where artefacts are identified to be of the same stone material and potentially belonging to the same reduction event, and where artefacts are associated with another feature such as a hearth.

Axe - (hatchet) - a multipurpose implement normally made from a hard basic volcanic stone, often finished by grinding the edge on an abrasive stone (ground-edge axe). Stone hatchets were an essential part of a male's tool-kit. Some of their uses included to cut saplings for building gunyahs, for stripping bark from trees, cutting notches in trees for climbing, and cutting toe-holds in trees to procure animals or honey from bee nests.

Backed artefact - a retouched flake with one or more margins retouched at a steep angle, and that margin is opposite a sharp edge. The steep margin is formed by bipolar or hammer and anvil knapping. This type of artefact is subdivided into asymmetrical (Bondi) and symmetrically (geometric) shaped backed artefacts.

Backed blade - refer to *backed artefact* or *microlith*.

Background scatter (background discard) - manuports and artefactual material that are insufficient either in number or in association with other material to suggest focused activity in a particular location.

Backing (retouch) - abruptly angled flaking (retouch) which has shaped a thick back part to an implement such as an elouera or a microlith. The process of flaking varies from bipolar impact (on some eloueras) to delicate application of pressure with a small stone ('chimbling' used to make microliths).

Basalt - a common volcanic rock formed from lava flow. It is typically dark, heavy and fine-textured and consists essentially of plagioclase and pyroxene.

Bench - landform element that is a short, very gently or gently inclined minimal mid-slope element (after McDonald *et al* 1984).

Bipolar flaking - a method of making flakes or retouched flake tools by breaking a piece of stone rested on a stone surface by repeatedly striking the core from above with a stone hammer. Bipolar reduction is evidenced by fracture/initiation (often wedging) at 'both' ends of the 'same' flake/scar and is quite different to simple Hertzian or bending initiation with regular terminations (feather, hinge, step etc.) on a small anvil rested core. It is often employed when core inertia becomes low and/or when platform angles become high, or to commence reduction of a small waterworn pebble.

Bondi point - a sub-type of microlith or *backed artefact* with abruptly angled backing retouch along one lateral margin (and often the butt end) so that it has an asymmetrical plan shape similar to a pen knife blade. This microlith type is commonly found east of the Great Divide as far north as Great Keppel Island.

Bondi point preform - a microblade or flake that has been partially backed by abruptly angled retouch scars along one lateral margin for the purpose of making a bondi point.

Bulb of force (bulb of percussion) - the rounded outwards swelling of the inside surface of a conchoidal flake beginning just below the partial or complete Hertzian cone. This swelling is caused by the uniform change of direction of the fracture front as the outward bending component of the applied force decays and is overtaken by the compressive component of the force.

Chert - a highly siliceous rock type formed biogenically from the compaction and precipitation of the silica skeletons of diatoms. Normally there is a high percentage of cryptocrystalline quartz. This rock type breaks by the process of conchoidal fracture and provides flakes that have sharp, durable edges.

Chord - the cutting edge of a microlith.

Cobble - waterworn stones of diameter greater than 64 mm and less than 256 mm. Archaeologists often refer to cobbles as pebbles (refer also to *pebble*).

Conjoin analysis - refitting or 'conjoining' artefacts assists with reconstructing prehistoric events (such as tool manufacture, tool use activities and cutting-edge rejuvenation) and determining chronology and assessing site integrity.

Core (synonymous with *nucleus*) - a piece of stone, often a cobble or pebble, but also quarried stone, which has been used for striking flakes. These flakes are called 'primary flakes' and may be further shaped by finer flaking, called 'retouch'. The term 'nucleus' refers to cores and flakes or cores that have been retouched.

Core fragment - a portion of a core, typically retaining one or more flake scars but not the platform.

Cortex - the weathered surface of a piece of stone altered by chemical and/or physical means. Pebble cortex is topographically smooth and occurs with a continuous curve.

Cortex amount - amount of the original weathered surface of the stone material, expressed as a percentage of the item's dorsal surface for flakes or total surface for other items.

Cortex type - nature of the original weathered surface of the stone material. Three types are identified: waterworn/pebble (rounded waterworn surface), tabular (smooth tabular shaped surface, may be waterworn) and terrestrial (rough cortex not consistent with tabular or waterworn surface).

Cortical initiation surface - an initiation surface on a pebble or cobble (refer to 'cortex' and 'initiation surface/platform').

Crystal quartz - a typically clear or translucent macrocrystalline form of quartz.

Debitage - commonly used term for the discarded debris from stone flaking. Usually there is a large quantity of flaking refuse or 'debitage' for every finished stone implement.

Detection limiting factors - factors that act to reduce *surface visibility* and *archaeological visibility*.

Discard - in relation to lithic scatters, discard means the incidental, intended or accidental placement of a lithic item on the ground surface.

Distal portion or end - the end of a flake or microblade (opposite to point of fracture origin on the ventral surface).

Dorsal face/facet - the outside surface(s) of a flake, opposite the inside (bulbar or ventral) surface, created during the formation of the flake (refer also to *ventral face*).

Drainage depression - landform element that typically comprises a shallow open depression with smoothly concave cross-section, rising to moderately inclined side slopes, eroded or aggraded by sheetwash (after McDonald *et al* 1984). For the purposes here, this unit also includes gullies (drainage depressions subjected to gully erosion), along with ground approximately 50 metres either side of the centre of the drainage depression.

Dripline - the outline of the furthest projection of the roof of a rock shelter.

Edge rounding - rounding wear along the cutting edge of a stone tool resulting from its use. This use-wear can be described as continuous or discontinuous and moderate or pronounced (refer also to *use-wear*).

Effective survey coverage - a measure of the quantity of visible ground surface physically inspected within a *sample area*, with potential to contain Aboriginal heritage evidence. Calculated by multiplying the *total sample area* of a *survey area* with the percentage of *archaeological visibility*. For a *total sample area* that includes multiple exposures, the *effective survey coverage* of each exposure was calculated separately and added to produce the reported figure.

Elongated flake - a flake at least twice as long as it is broad (by percussion axis).

Environmental context - discrete, recurring areas of land in which the same combination of landform element and class of slope are present.

Environmental/cultural context - a specific context that exists (generally within an individual archaeological terrain unit), that may host a different range of evidence (reflecting different types and frequencies of activities) than other locations within the same archaeological terrain unit or environmental context. For example, a particular spur crest may lead from a ridgeline used for transitory movement to a camp site bordering a food resource, whereas another spur crest may lead to a stone material source. Individual survey areas on these spur crests may host different types and proportions of evidence, reflecting different ways in which these landforms were utilised.

Exposure type - identification during the field survey of exposed soil units; eg. A horizon, A and B horizons or B horizon.

Feather termination - a normal ending to a flake, in which the fracture turns slightly to meet the fresh surface of the core at a very low angle, as in the ending of a feather.

Flake - a complete or substantially complete piece of lithic material detached from a core (nucleus), usually with evidence of hard indenter initiation, or occasionally bending initiation. The flake's primary fracture surface (ventral or inside surface) exhibits features such as fracture initiation, bulb of force, and undulations and lances. Very occasionally a conchoidal flake comprises only a bulb of force.

Flake - distal - a flake portion without its area of fracture initiation but with general shape characteristics and/or fracture surface attributes (usually conchoidal markings) indicating its status as an artefact fragment.

Flake - longitudinal - a flake longitudinally fractured from its proximal to its distal end. The breakage may be slightly tangential but are mostly axial in orientation. Such breakages tend to occur during knapping (such as longitudinal cone splits) rather than through post-depositional processes.

Flake - medial - a mid portion of a flake, without the proximal or distal ends.

Flake - proximal - the proximal portion of a flake retaining its area of primary fracture initiation, including 'step terminated flakes'.

Flake - utilised - refer to '*utilised flake or piece*'.

Flaked piece - refer to 'lithic fragment'.

Flat - landform element that is neither a crest nor a depression and is level or very gently inclined (after McDonald *et al* 1984).

Focused initiation surface - an initiation surface area defined by a complete or partial Hertzian cone, sometimes with lateral extensions forming a narrow platform which is less than twice the area of the ring crack.

Freehand percussion - striking a core held in one hand with a hammer (usually stone) held in the other.

Geometric microlith - a group of microliths distinguished by their various geometric plan-shapes such as triangle, trapeze and rectangle.

Grinding grooves - elongated narrow depressions in soft rocks (particularly sedimentary), generally associated with watercourses. The shaping and sharpening of edge ground hatchets creates the depressions.

Ground disturbance - an estimate of the extent of recent human impacts and impacts of natural processes, noted in low, moderate or high categories, modified after McDonald *et al* (1984:69). The low category includes no effective disturbance, minor vegetation removal and low intensity grazing and minimal erosion. The moderate category includes extensive vegetation removal, improved pasture grasses and moderate levels of erosion. The high category includes complete vegetation removal and cultivation, extensive erosion and areas where the A horizon soil has been removed.

Habitable floor area - the floor area of a rock shelter where the ceiling height is about one metre or more.

Hammerstone - a piece of stone used as a hammer to detach flakes from a core or in applying controlled pressure when retouching a tool's edge. Stone hammers are often quartzite or a volcanic stone, round or oval in shape, with concentrated hammer impact damage on at least one side or end. The presence of use-wear often is the only diagnostic attribute of this tool type.

Heat treatment - the intentional slow heating of stone, such as silcrete, to alter its structure (such as homogenising the matrix) and thereby improve its flaking properties.

Hertzian cone - similar in shape to the neck of a milk bottle with the top of the cone being the initiation of the circular fracture. On a flake surface the cone is not fully formed and is represented by one side, because the fracture-initiating force was applied from above at an angle of about forty-five degrees, not ninety degrees.

Hertzian initiation - a Hertzian cone initiation which leads to the formation of a conchoidal flake (refer to 'Hertzian cone').

Hillock - a hill top or crest, the crest length being less than the width of the landform element (after McDonald *et al* 1984).

Hinge termination - when the end of the flake or fracture continuously turns at ninety degrees to the surface of the core or outside surface of the flake (refer also to 'retroflexed hinge termination').

Implement (of stone) - synonym for a *stone tool*, usually denoting a tool that has been shaped by flaking (retouch).

Indurated mudstone - refer to *tuff*.

Indurated rhyolitic tuff - refer to *tuff*.

Initiation surface/platform - the surface of a stone that is struck with a hammerstone at a low angle, for the purpose of detaching a flake. This surface is where a flake-forming crack commences; commonly part of it is retained on the flake. The load applied to this surface may be delivered by a hammerstone or by continuous increasing pressure with a length of dense wood or bone.

Ironstone - a fine-grained, heavy and compact sedimentary rock, with the main components being the carbonate or oxide of iron, clay and/or sand.

Knapping floor - a series of flaking events (refer to *knapping event*) that are generally defined as involving a single stone core (but sometimes multiple cores of the same or different materials) and resulting in the deposition of stone flaking debris that may be later recorded in discrete areas or be mixed by post-depositional processes.

Knapping event - a single act of flaking a piece of stone, resulting in the *in-situ* deposition of stone flaking debris. Such an event may occur as part of a series of events (refer to *knapping floor*).

Landform element - specific type of topographical feature, following the definitions of McDonald *et al* (1984).

Lateral margin - the thin sides of a flake or microblade.

Lithic - in an archaeological context, items of a hard, usually siliceous, stone of a type selected by Aborigines for tool making. These items are often nondescript fragments, but some are finely shaped implements.

Lithic assemblage (of stone) - a collection of whole and fragmentary stone artefacts and manuports obtained from an archaeological site, either by collecting items scattered on the present ground surface (refer to *artefact scatter*) or by controlled excavation (refer also to *stone artefact*).

Lithic fragment - (or *flaked piece*) - a flaked piece of stone which lacks sufficient morphological attributes to identify it as a flake (a positive scar) or a core (only negative flake scars) or other specific type.

Lithic item - a piece of stone exhibiting fracture surfaces and not identified as a natural piece of stone.

Lithic item type - formal category of an artefact (including lithic fragments).

Lithic quarry - a site of stone procurement, typically used in the specific sense to refer to outcrops of bedrock, where there is clear evidence of procurement activity such as pits, discarded hammerstones and large deposits of primary flaking debris.

Loss or discard of non-microlith tools - activity category comprising the loss or intentional discard after use or caching for future use of implements other than microliths.

Loss or intentional discard of microliths - activity category comprising the discard of microlithic implements either during manufacture, after use or unintentionally.

Mean archaeological visibility of site - an estimate of the mean visible ground surface within a site that has potential to contain evidence of Aboriginal heritage (expressed as a percentage of the visible site area).

Mean artefact density - the average number of surface artefacts recorded within each square metre of visible ground surface with potential to contain Aboriginal artefacts that is physically inspected within a sample area (eg. a site locus or a survey area). Obtained by dividing the *number of artefacts* by the *effective sample area* and expressed as a number of artefacts per square metre of effective sample area. Alternatively, the average number of artefacts located within a volume of excavated deposit, per unit of volume (eg. cubic metre). *Conflated* artefact density refers to the number of artefacts located within a volume of excavated deposit, expressed as a mean of the surface area of the excavation (eg. # artefacts per square metre). This measure is designed to reduce the impact of sediment volume on density comparisons (eg. geomorphological processes will result in lower slopes having a deeper A unit soil than upper slopes).

Mean surface visibility - an estimate of the mean visible ground surface within a *sample area*.

Microblade - an elongated flake with one or more longitudinal ridges and a length greater than twice the width. This type of specialised flake is detached from a microblade core. They were probably fashioned into spear barbs, during recent prehistoric times.

Microblade core - a small core from which regularly shaped bladelets have been struck. Some microblade cores have only one or two microblade facets; others have numerous facets emanating from more than one striking platform.

Microblade portion - a piece of broken microblade (either proximal, distal, medial or longitudinal portion).

Microblade production - activity category describing a method of making small implements (eg. bondi points, geometric microliths) from regular blades struck from a small core.

Microlith - (synonymous with *backed blade*) - a variety of small, delicately retouched implements of various shapes, such as asymmetric (bondi) point, segment, crescent, triangle, trapeze, rectangle and oblique ended. These implements probably functioned as spear barbs.

Microlith production- backing retouch of microliths.

Multiple scars fracture initiation surface - an initiation surface which comprises more than one flake scar (refer also to 'initiation surface'). Includes fracture surfaces that are faceted.

Negative - a scar on an artefact (usually concave) caused by the removal of a flake.

Non-specific stone flaking - activity category of general or non-specific knapping activity. Artefacts do not identify a more specific activity. Includes debitage from primary flaking and from making flake tools.

Ochre - a clay containing sufficient iron oxide to enable it to be used as a pigment. Ochre occurs in red (haematite), yellow and brown (limonite and goethite) colours and may be a friable sediment or a hard metallic stone. Ochre paints vary in depth, richness and shade of colour, and in ease of grinding and staining ability, depending on the particular geological source of the raw ochre.

Outrepassé termination - (also 'plunging') a flake with a thick ending caused by the flake-forming fracture turning inwards within the core. This occurs when the fracture front approaches the bottom of a core.

Overhang - in relation to rock shelters, a form of shelter in which a rock wall is inclined in such a manner to provide some shelter from the elements, but is typically not eroded in the same manner as a rock shelter.

Pebble - a waterworn stone less than 64 mm in diameter. Refer also to *cobble*.

Pebble (waterworn) cortex - the topographically smooth weathered surface of a stone, which occurs with a continuous curve.

Plain fracture initiation surface - an initiation surface which comprises a single flake scar or continuous cortex surface (refer also to 'initiation surface').

Potential resource - archaeological evidence predicted to occur through application of a predictive model of site location.

Provenance - the location of a lithic item within an excavation or surface collection.

Proximal - the top part of a flake, beginning with the initiation surface or ridge. Likewise for an implement (or tool). The opposite end of the flake is termed the distal end.

Quarry (lithic quarry, stone procurement site) - a general term for the location of an exploited stone source (Hiscock and Mitchell 1993:32). Often in archaeological studies it is used in a more specific sense, to refer to places where stone was obtained by excavation from a bedrock source (*lithic quarry*).

Quartz - a mineral composed of crystalline silica (SiO₂). Quartz is a very stable mineral that does not alter chemically during weathering or metamorphism. It is hard, usually colourless or white ('milky'). In its massive form quartz occurs as geodes or veins, from which pebbles are formed by weathering. Despite the often unpredictable nature of fracture in quartz, the flakes tend to have sharp edges. Flakes made from quartz were widely used in Australia as convenient light-duty cutting tools.

Quartzite - a hard, silica rich stone formed from sandstone that has been recrystallised by heat (metaquartzite) or strengthened by slow infilling of silica in the voids between sand grains (orthoquartzite). The essential difference between sandstone and quartzite is that a major fracture will propagate around the larger grains in sandstone and through the grains in quartzite.

Residues on stone tools - residue analysis concerns the identification of tool use activities from preserved organic and inorganic residues of worked materials. These residues may be compacted into small flake scars on the edges of utilised artefacts or adhere strongly to their surfaces.

Retouch or *retouching* - an area of flake scars on an artefact resulting from intentional shaping or resharpening of a stone tool. In resharpening a cutting edge, the retouch is invariably found only on one side.

Retouched flake - an artefact or portion of an artefact from which flakes have been removed after the manufacture of the original flake.

Retouched piece - an artefact from which flakes have been removed after the manufacture of the original flake, but which lacks sufficient morphological attributes to identify it as a flake or other artefact type.

Retouched flake/piece - utilised - retouched flake or piece which displays macroscopic evidence of use.

Ridge crest - landform element that stands above most or all of the surrounding points in the adjacent terrain, typically smoothly convex upwards and with a length greater than the width of the landform element (after McDonald *et al* 1984).

Rock shelter - a shallow, cave-like opening in a sedimentary (typically sandstone) rock wall, generally large enough to have allowed human occupancy.

Sandstone - a cemented or compacted rock consisting of detrital grains, which range in size from 1/16 mm to 2 mm in diameter. Quartz typically comprises the majority of grains. The grains can be bound together by a cement of silica, carbonate or other minerals, or a matrix of clay minerals. The nature of the cement is denoted by terms such as argillaceous (clayey), calcareous, ferruginous and tuffaceous sandstone.

Scarp - a laterally extensive steep to precipitous maximal slope eroded by gravity, water-aided mass movement or sheet flow.

Shelter floor area - the gross area of the floor of a rock shelter or overhang.

Simple slope - slope landform element adjacent below a crest or flat and adjacent above a flat or depression (after McDonald *et al* 1984). For the purposes here, this unit also includes *upper slopes*, *mid-slopes* and *lower slopes* as these become problematic to differentiate on the surface or on base mapping.

Site - location of evidence of Aboriginal occupation.

Site integrity - the extent to which the distribution of site contents corresponds to their spatial relationships at the time of deposition. Subsequent to deposition, a range of post-depositional processes affect the spatial relationships of items, and therefore site integrity.

Size class - artefact size as the maximum measurement in any direction, in units of 10 mm. For example, class '1' equals items with a maximum dimension of up to 10 mm and size class '2' equals items with a maximum dimension of between 10 and 20 mm.

Slope (class of slope) - gradient delineated after McDonald *et al* (1984):

Class 1 (level/very gentle) - level to very gently inclined slopes $<1^{\circ}45'$;

Class 2 (gentle) - gently inclined slopes $>1^{\circ}45'$ and $<5^{\circ}45'$; and

Class 3 (moderate) - moderately inclined slopes $>5^{\circ}45'$ and $<18^{\circ}$.

Class 4 (steep) - steeply inclined slopes $>18^{\circ}$.

Spit - a level in which an excavation unit is excavated.

Spur crest - landform element comprising a *ridge crest* that descends from a dominant or main ridge crest to adjacent lower lying terrain.

Step termination - when the end of the flake turns sharply at ninety degrees to the surface of the core or outside surface of the flake.

Stone artefact - a piece of stone with evidence of intentional human modification.

Stone material - the geological type of stone from which an artefact is made. Synonymous with 'lithic material', 'stone type' and 'raw material', the latter of which is a less specific but commonly used term.

Stone procurement site (quarry) - a general term for the location of an exploited stone source. Sources can vary from alluvial gravels (where there may be little or no archaeological evidence of human activity) to extensively quarried outcrops of bedrock, where there is clear evidence of procurement activity such as pits, discarded hammerstones and large deposits of primary flaking debris (refer also to *quarry*, *lithic quarry*).

Stone tool - a piece of flaked or ground stone used in an activity or fashioned for use as a tool. A synonym of stone tool is *implement*, which is more often used to describe a flake tool fashioned by more delicate flaking (retouch).

Sub-surface deposit - identified or predicted deposits of artefacts buried under the surface, both in open contexts and within rock shelters.

Surface visibility - a mean estimate of the percentage of visible ground surface within a *total sample area* or a *site*. Where a single component's *sample area* is comprised of multiple exposures, the surface visibility was recorded separately and the range of the surface visibility percentages noted in the database.

Survey area - an area sampled during the present survey, consisting of a single archaeological terrain unit or *environmental context* that is bounded on all sides by different archaeological terrain units.

Tabular cortex (abbr. = tab) - weathered surface of a tabular shaped cobble.

Terrace - a former flood plain on which erosion and aggradation by channelled and over-bank stream flow is barely active or inactive because deepening or enlargement of the stream channel has lowered the level of flooding (after McDonald *et al* 1984).

Terrestrial cortex (rough and weathered cortex; abbr. = terr) - a cortical surface which has developed by weathering of a fractured surface. Includes surfaces which have been weathered after natural fracturing along faults and exfoliation. Indicative of a terrestrial, not an alluvial source. The topographically rough weathered surface of a stone differs from that of *waterworn (pebble)* or *tabular cortex*.

Total sample area - the quantity of ground surface within a survey area physically inspected in such a manner as to reliably enable the detection of heritage evidence.

Tuff - lithified volcanic ash with a chemical composition of rhyolite. This stone has been commonly misidentified as *indurated mudstone* and *chert*. Tuff is composed of fine ash which has been hurled from the vent of a volcano during a violent explosive eruption. The tuff is rhyolitic in chemical composition, being comprised of quartz and potassium-feldspar, sometimes with layer silicates. After settling to the land, or more likely ponded water, the tuff undergoes recrystallisation at low pressures. This ‘indurated’ rhyolitic tuff exhibits conchoidal fractures. Colour is predominantly grey but variation occurs when mineral bearing solutions pass through the rock and some minerals (eg. goethite) precipitate out. Some tuff deposits show graded bedding, not unlike that of some sedimentary rocks. Lateral sorting also tends to occur, with coarser material settling closer to the volcanic vent and finer material further away.

Use-wear - microscopic and macroscopic damage to the surfaces of a stone implement resulting from its use. Examination for use-wear is aided by low-magnification microscopy. Major use-wear forms are edge fractures, use-polish and smoothing, abrasion, and edge rounding and bevelling.

Utilised flake or piece - a flake or lithic fragment displaying utilisation wear along one or more edges from use as a hand-held tool or as part of a composite wood and stone implement or weapon. The wear may be edge-rounding, surface polish, abrasive smoothing or abrasion such pitting and scratching (‘striations’).

Valley flat - a compound landform element comprising a gently inclined to level flat, aggraded or occasionally eroded by channelled or over-bank stream flow, typically enclosed by hill slopes (after McDonald *et al* 1984). For the purposes of the survey, this unit also includes stream beds, stream banks and stream channels where they exist within a valley flat.

Ventral face - the inside surface of a flake created during the flake’s formation. The speed of the fracture ranges from about 200 metres to over 1000 metres per second (refer also to *dorsal face*).

Visible extent of artefacts - for each *site*, the approximate dimensions of the area in which artefacts are visible.

Visible extent of surface exposures - the approximate dimensions of a surface exposure in which a *site* has been identified.

Volcanic - rocks produced from the discharge of volcanic matter. Includes crystalline rock, such as granite, formed by the consolidation of magma, and fine-grained igneous rocks that result from more rapid cooling (eg. basalt).

Waterworn (pebble) cortex - the topographically smooth weathered surface of a stone, which occurs with a continuous curve.