

BENGALLA Mining Company



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# Aboriginal Archaeology and Cultural Heritage Impact Assessment



Bengalla Continuation of Mining Project  
Hansen Bailey Environmental Consultants  
15-Jul-2013

# Bengalla Continuation of Mining Project

Aboriginal Archaeology and Cultural Heritage Impact Assessment





## Bengalla Continuation of Mining Project

Aboriginal Archaeology and Cultural Heritage Impact Assessment

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## Glossary of Terms

|                                       |                                                                                                                                                                                                                                                                                                                                       |
|---------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Alluvium</b>                       | "An unconsolidated accumulation of stream-deposited sediments, including sands, silts, clays or gravels" ( <a href="http://www.geology.com">www.geology.com</a> , accessed 2011).                                                                                                                                                     |
| <b>Archaeological potential</b>       | The likelihood of undetected surface and/or subsurface archaeological materials existing at a location.                                                                                                                                                                                                                               |
| <b>Aboriginal archaeological site</b> | The present spatial extent of visible Aboriginal archaeological material(s) at a given location.                                                                                                                                                                                                                                      |
| <b>Artefact</b>                       | Any object which has been physically modified by humans.                                                                                                                                                                                                                                                                              |
| <b>Angular shatter</b>                | Small irregularly shaped fragments of knapped stone interpreted as an undiagnostic 'splinter' fragments.                                                                                                                                                                                                                              |
| <b>Assemblage</b>                     | A collection of artefacts.                                                                                                                                                                                                                                                                                                            |
| <b>Backing</b>                        | Steep unidirectional or bidirectional retouch that is typically found on one lateral edge of an artefact.                                                                                                                                                                                                                             |
| <b>Bedrock</b>                        | Outcrop of <i>in situ</i> rock material.                                                                                                                                                                                                                                                                                              |
| <b>Bipolar technique</b>              | Technique of resting a core on an anvil and striking it with a hammerstone.                                                                                                                                                                                                                                                           |
| <b>Blocky fragment</b>                | Large angular fragment of stone that has detached fortuitously during the knapping process.                                                                                                                                                                                                                                           |
| <b>Bondi Point</b>                    | A flake that has been 'backed' (i.e. retouched) along one lateral margin and comes to a point at its distal end. Bondi points are asymmetrical around their longitudinal axis.                                                                                                                                                        |
| <b>Bulb of percussion</b>             | A bulge below the striking platform on the ventral surface of a flake.                                                                                                                                                                                                                                                                |
| <b>Bulbar scar</b>                    | A small flake scar on the bulb of percussion that results from a small flake being detached when the main flake is detached.                                                                                                                                                                                                          |
| <b>Bulbar fissures</b>                | Very fine lines present on the bulb or percussion that radiate out from the point of impact.                                                                                                                                                                                                                                          |
| <b>Broken flake</b>                   | A flake that lacks a termination but retains one or more of the following: platform and/or intact point of impact, bulb of percussion, bulbar scar and lateral fissures.                                                                                                                                                              |
| <b>Chert/tuff</b>                     | In this report, the term 'chert/tuff' is used in place of 'chert' and 'tuff'. Despite differing geological origins, archaeologists working in northern and southeastern NSW have tended to use these terms interchangeably (see, for example, Corkill 1999). The use of the term 'chert/tuff' herein is intended to reduce confusion. |
| <b>Compression waves</b>              | Prominent concentric rings on the ventral surface of the flake radiating out from the point of impact.                                                                                                                                                                                                                                |
| <b>Conglomerate</b>                   | "A poorly-sorted detrital sedimentary rock composed of rounded gravels, stones or cobbles in a matrix of much finer material" (Milford 1999).                                                                                                                                                                                         |
| <b>Cortex</b>                         | An altered, weathered outer surface or 'rind' on a piece of rock.                                                                                                                                                                                                                                                                     |

|                                        |                                                                                                                                                                                                                                                                                                                                                                                                                          |
|----------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Complete flake</b>                  | A complete flake is a flake that has a ventral surface that preserves a complete fracture plane, a platform (or impact point), lateral margins and a termination (Holdaway and Stern 2004: 111).                                                                                                                                                                                                                         |
| <b>Core</b>                            | "A mass of homogenous lithic material that has had flakes removed from its surface" (Andrefsky 2005: 14).                                                                                                                                                                                                                                                                                                                |
| <b>Crest</b>                           | A landform element that "stands above all, or almost all, points in the adjacent terrain" (Speight 2009: 20).                                                                                                                                                                                                                                                                                                            |
| <b>Dorsal surface</b>                  | The surface of a flake that was originally part of the outer surface of the core.                                                                                                                                                                                                                                                                                                                                        |
| <b>Effective coverage</b>              | A quantifiable estimate of the area in which archaeological materials are " <i>detectable</i> ", i.e. exposed ground surface area.                                                                                                                                                                                                                                                                                       |
| <b>Elouera</b>                         | A backed, crescent-shaped implement that is symmetrical around its transverse axis but asymmetrical around its longitudinal axis.                                                                                                                                                                                                                                                                                        |
| <b>Exposure</b>                        | An area of land surface where the ground surface is visible, usually as the result of thinner vegetation cover, erosive forces or human-caused disturbance. In archaeological surveys, the percentage of ground surface that is visible is recorded. These percentages of exposure are then used to calculate effective coverage.                                                                                        |
| <b>Flake</b>                           | A sharp-edged sliver of stone that has been detached from a core. Flakes have a number of distinctive features or attributes that allow them to be distinguished from other lithic materials. These include a bulb of percussion, a striking platform, a dorsal surface, a ventral surface, a bulbar scar (also known as an <i>erraillure</i> scar), bulbar fissures, lateral fissures or hackles and compression waves. |
| <b>Flake shatter</b>                   | Any piece of flake debitage with no recognisable striking platform.                                                                                                                                                                                                                                                                                                                                                      |
| <b>Flat</b>                            | "Planar landform element that is neither a crest nor a depression and is level or very gently inclined" (Speight 2009: 22).                                                                                                                                                                                                                                                                                              |
| <b>Floodplain</b>                      | A large flat area, adjacent to a watercourse, characterised by frequent active erosion and aggradation by channelled and overbank stream flow.                                                                                                                                                                                                                                                                           |
| <b>Fluvial</b>                         | Pertaining to rivers and streams. Deposits by flowing water.                                                                                                                                                                                                                                                                                                                                                             |
| <b>Geometric microlith</b>             | A flake that has been 'backed' at one or other end, sometimes at both, and sometimes on one lateral margin as well. Geometric microliths are symmetrical around their transverse axis and have a maximum dimension of less than 80 mm.                                                                                                                                                                                   |
| <b>Greywacke</b>                       | A tough, well-indurated type of sandstone distinguished by detrital quartz crystals and rock fragments set in a finer-grained matrix (Milford 1999).                                                                                                                                                                                                                                                                     |
| <b>Grinding groove</b>                 | A depression formed in rock from the sharpening of a stone hatchet head or use of a muller (topstone).                                                                                                                                                                                                                                                                                                                   |
| <b>Ground Surface Visibility (GSV)</b> | A term used to describe the area of the ground's surface that is visible during archaeological field surveys.                                                                                                                                                                                                                                                                                                            |
| <b>Hammerstone</b>                     | A stone that has been used to strike a core to remove a flake, often causing pitting or other wear on the stone's surface.                                                                                                                                                                                                                                                                                               |

|                                         |                                                                                                                                                                                                                                                                                                                                  |
|-----------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Hearth</b>                           | Fireplace often recognised archaeologically through the presence of charcoal or burnt ground. Historical hearths are usually associated with a brick or stone structure.                                                                                                                                                         |
| <b>Holocene</b>                         | The geological period covering the last 10,000 years.                                                                                                                                                                                                                                                                            |
| <b><i>In Situ</i></b>                   | In the natural or original position. Applied to a rock, soil, or fossil when occurring in the situation in which it was originally formed or deposited.                                                                                                                                                                          |
| <b>Lateral fissures or hackles</b>      | Very fine lines present on the lateral margins of a flake.                                                                                                                                                                                                                                                                       |
| <b>Lithic</b>                           | Of, or pertaining to, stone.                                                                                                                                                                                                                                                                                                     |
| <b>Lower slope</b>                      | "Slope element not adjacent below a crest or flat but adjacent above a flat or depression" (Speight 2009: 21).                                                                                                                                                                                                                   |
| <b>Metamorphic</b>                      | "Rocks whose composition, texture and/or structure have been altered through tectonic pressure and/or heat" (Milford 1999).                                                                                                                                                                                                      |
| <b>Mudstone</b>                         | A very fine-grained, hard, cohesive rock which generally has a dull, slightly porous appearance. Mudstone is composed of extremely fine-grained sediments such as rock flour, clay minerals and silt. Mudstone is macroscopically similar to chert but distinguished by its lack of lustre.                                      |
| <b>Pleistocene</b>                      | The geological period equivalent to the last ice age and preceding the Holocene from about 2 million years to 10,000 years ago. The Late Pleistocene generally refers to the period of time from 40,000 – 10,000 years ago.                                                                                                      |
| <b>Potential Archaeological Deposit</b> | PAD is the hypothesised presence of archaeological deposit where there is uncertainty due to a lack of visibly eroding artefacts, lack of test excavation either locally or in analogous landforms in the region.                                                                                                                |
| <b>Quartz</b>                           | Quartz is one of the most common minerals on earth. A member of the silica family of minerals, quartz can occur in a variety of forms including free-standing crystals, as veins of milky quartz cutting through other rocks, and as tiny irregularly shaped grains that are components of many rocks.                           |
| <b>Silcrete</b>                         | "A very brittle, intensely indurated rock composed mainly of quartz clasts cemented by a matrix which may well be well-crystallised quartz, cryptocrystalline quartz or opaline silica. The texture of silcrete reflects the host rock and clasts may range in size from very fine grains to boulders" (Langford-Smith 1978: 3). |
| <b>Stone artefact</b>                   | Any piece of rock modified by human behaviour.                                                                                                                                                                                                                                                                                   |
| <b>Striking platform</b>                | More-or-less planar surface struck to cause flake removal.                                                                                                                                                                                                                                                                       |
| <b>Survey Coverage</b>                  | The area of a study area surveyed, usually expressed as a percentage. See also <b>Effective Coverage</b> .                                                                                                                                                                                                                       |
| <b>Tuff</b>                             | Rock-type consisting of consolidated volcanic ash ejected from a volcanic.                                                                                                                                                                                                                                                       |
| <b>Ventral surface</b>                  | The surface of a flake that has broken away from the core. Ventral surfaces are typically smooth and show no evidence of previous flake removals.                                                                                                                                                                                |

## Executive Summary

AECOM Australia Pty Ltd (AECOM) has been commissioned by Hansen Bailey Environmental Consultants (Hansen Bailey) on behalf of Bengalla Mining Company Pty Limited (BMC) to undertake an Aboriginal archaeological and cultural heritage impact assessment for the Bengalla Continuation of Mining Project (the Project). The assessment is to form part of an Environmental Impact Statement (EIS) being prepared by Hansen Bailey to support an application for Development Consent under Part 4 Division 4.1 of the *Environmental Planning and Assessment Act 1979* (EP&A Act) to enable mining to continue directly west at a rate of up to 15 Million tonnes per annum (Mtpa) for a 24 year period.

The archaeological survey was undertaken within the Study Area (which consisted of the land between the Approved Bengalla Mine and the Project Boundary) over a total of 15 days between 14 May and 6 June 2012 by a combined field team of two AECOM archaeologists (Geordie Oakes and Andrew McLaren) and 28 rostered Registered Aboriginal Party (RAP) representatives.

A total of 289 archaeological sites have been identified within the Study Area. These include 196 AHIMS sites, 54 newly identified sites, alongside 39 sites identified within previous assessments that are not on the AHIMS register.

High significance was attributed to the southern section of B10 quarry (37-2-0579), which will not be impacted by the Project, due to its research potential. Moderate scientific significance was attributed to six sites due to moderate rarity and research potential and low significance was attributed to the remaining 282 sites. Consultation with RAPs to date indicates that all Aboriginal archaeological sites within the Study Area are culturally significant.

To manage potential impacts to Aboriginal sites from the Project, the existing Aboriginal Cultural Heritage Management Plan (ACHMP) will need to be updated. The updated ACHMP should be prepared in consultation with RAPs and the Office of Environment and Heritage (OEH), and to the satisfaction of the Department of Planning and Infrastructure (DP&I). The commitment for the development of this ACHMP is outlined in this report.

A total of 263 Aboriginal archaeological sites have been identified as being directly impacted by the Project through open cut mining activities and/or the construction/maintenance of mine-related infrastructure. Of these 259 are artefact scatters and isolated finds. Three AHIMS registered scarred trees will also be impacted by the Project (37-2-3095, 37-2-3107, and 37-2-3064) as well as the northern portion of quarry site (37-2-0579) where no Aboriginal heritage objects have been previously identified.

To mitigate Project impacts to Aboriginal sites, it is recommended that surface artefact collection be undertaken for all artefact scatters and isolated finds impacted by the Project (n=259). This should occur prior to Project disturbances. Details of the surface artefact collection should be addressed within the ACHMP.

It is recommended the three scarred trees impacted by the Project be subject to an aborist inspection, with the participation of RAP representatives, prior to Project impacts, in order to assess their status as Aboriginal scarred trees. Should it be determined the scars on these trees are of Aboriginal origin they should be removed under the supervision of a qualified Aborist, archaeologist and RAP representatives prior to impacts. Details for the scarred tree assessment, and possible removal, transport and long term storage should be incorporated into the revised ACHMP. Should it be determined they are not Aboriginal scarred trees they will not be managed as Aboriginal archaeological sites.

The northern portion of the ridgeline originally mapped by Rich (1993) as B10 quarry (37-2-0579) will be impacted by the Project. This portion of B10 has been assessed as of low significance due to a lack of identified surface archaeology in the area, viewed in conjunction with past disturbances and results of previous archaeological excavations. Therefore, no mitigation is proposed for this area. In addition, no impacts are proposed to the larger southern portion of the B10 quarry site, where surface artefacts have previously been identified, and there have been fewer disturbances, making it of research value.

All Aboriginal sites not impacted by the Project but within the Project Boundary are to be protected from impacts. In addition, Aboriginal archaeological sites that will not be impacted by the Project but occur within 200 m of proposed impacts (n = 17) are to be protected via permanent stock-proof fencing and appropriate associated signage. Site fencing is to be constructed under the direction of a qualified archaeologist and RAP representatives. Details for the care of protected sites should be incorporated into the ACHMP.

## 1.0 Introduction

AECOM Australia Pty Ltd (AECOM) has been commissioned by Hansen Bailey Environmental Consultants (Hansen Bailey) on behalf of Bengalla Mining Company Pty Limited (BMC) to undertake an Aboriginal archaeological and cultural heritage impact assessment for the Bengalla Continuation of Mining Project (the Project). The assessment is to form part of an Environmental Impact Statement (EIS) being prepared by Hansen Bailey to support an application for Development Consent under Part 4 Division 4.1 of the *Environmental Planning and Assessment Act 1979* (EP&A Act) to enable mining to continue directly west at a rate of up to 15 Million tonnes per annum (Mtpa) for a 24 year period.

### 1.1 Project Description

BMC operates the Bengalla Mine (Bengalla) in the Upper Hunter Valley of NSW, approximately 130 km north-west of Newcastle and four km west of Muswellbrook (**Figure 1**), within the Muswellbrook Local Government Area (LGA). BMC is managed by Coal & Allied Bengalla Pty Limited. As part of BMC's ongoing commitment to future operations at Bengalla, and its commitment to long-term investment in the Upper Hunter Region, BMC has completed detailed scoping and feasibility studies to enable its continuation of mining west of its current operations.

The Project generally comprises:

- Open cut coal mining at up to 15 Mtpa ROM for 24 years continuing to utilise a dragline and truck and excavator fleet;
- Continue mining to the west of current operations;
- An additional Overburden Emplacement Area (OEA) to the west of Dry Creek which may be utilised for excess spoil material until it is intercepted by mining;
- Processing, handling and transportation of coal via the existing Coal Handling Preparation Plant (CHPP) (to be upgraded) and rail loop for export and domestic sale;
- An additional CHPP coal stockpile and Run of Mine (ROM) coal stockpile;
- Continued use, expansion and upgrades to existing site infrastructure;
- The construction of a radio tower;
- Relocation of the Explosives Magazine and Reload Facility;
- Relocation of a section of Bengalla Link Road near the existing mine access road to enable coal extraction;
- The re-diversion of Dry Creek via dams and pipe work with a later permanent realignment of Dry Creek through rehabilitation areas when emplacement areas are suitably advanced;
- Re-location of water storage infrastructure as mining progresses through existing dams (including the staged discharge dam);
- The construction of raw water dams and a clean water dam;
- A workforce of approximately 900 full time equivalent personnel (plus contractors) at peak production; and
- Supporting power reticulation infrastructure, other ancillary facilities and infrastructure including roads, temporary in pit coal, reject and earth handling facilities which enable construction activities.

### 1.2 Director General's Requirements

The Project has been granted State Significant Development (SSD) status under the EP&A Act (SSD-5170). DP&I issued the Director General's Requirements (DGRs) for the Project on 13 March 2012. In relation to Aboriginal heritage, they require:

*"An Aboriginal cultural heritage assessment (including both cultural and archaeological significance) which must:*

*Demonstrate effective consultation with Aboriginal communities in determining and assessing impacts, and selecting mitigation options and measures; and*

*Outline any proposed mitigation and management measures (including an evaluation of the effectiveness and reliability of the measures)."*

(Director General's Requirements for Continuation of Bengalla Mine Project, issued 13 March 2012)

This report fulfils the requirement for an Aboriginal cultural heritage assessment (including both cultural and archaeological significance). The proposed mitigation and management measures are contained in Section 14.0.

### 1.2.1 OEH Submission

In addition to the DGRs, OEH issued specific requirements for the Project in relation to Aboriginal heritage. These were:

- The EIS must address and document the information requirements set out in the draft *"Guidelines for Aboriginal Cultural Heritage Impact Assessment and Community Consultation (DEC 2005)"*.
- The EIS must include surveys by suitably qualified archaeological consultants in consultation with all of the local Aboriginal knowledge holders.
- The EIS should identify the nature and extent of impacts on Aboriginal cultural heritage values across the project area and clearly articulate strategies proposed to avoid/minimise these impacts. If impacts are proposed as part of the final development, clear justification for such impacts should be provided.
- The EIS must assess and document the archaeological and Aboriginal significance of the sites Aboriginal cultural heritage values.
- The EIS must describe the actions that will be taken to avoid or mitigate impacts of the project on Aboriginal cultural heritage values. This must include an assessment of the effectiveness and reliability of the measures and any residual impacts after these measures are implemented. Any proposed methodology for investigation should reflect best practice standards set by OEH (2010) in the *Code of Practice for Archaeological Investigations of Objects in New South Wales*.
- The EIS must provide documentary evidence to demonstrate that effective community consultation with Aboriginal communities has been undertaken in assessing impacts, developing protection and mitigations options and making final recommendations. OEH supports broad-based Aboriginal community consultation and as a guide OEH's 'Aboriginal cultural heritage consultation requirements for proponents 2010' provides a useful model to follow.
- If impacts on Aboriginal cultural heritage values are proposed as part of the final development, an assessment of the proposed impacts in the context of 'intergenerational equity' and cumulative impact must be undertaken. This assessment must examine both cultural and archaeological perspectives at both local and regional levels, with consideration given to site level and broader landscape level.

## 1.3 Study Area

The Project Boundary comprises a 2,338.7 ha parcel of land incorporating two key areas: one, the currently Approved Bengalla Mine (not assessed in this report); and two, the area containing the proposed mining continuation, which is the focus of this assessment. The Study Area comprises a 1,356 ha area, which includes the entire Disturbance Boundary of 964 ha, within the Project Boundary and is presented on **Figure 2**.

## 1.4 Assessment Methodology

This assessment has been undertaken in accordance with the *Guidelines for Aboriginal Cultural Heritage Impact Assessment and Community Consultation* (NSW Department of Environment & Conservation 2005) and with reference to the *Aboriginal Cultural Heritage Consultation Requirements for Proponents* (DECCW 2010a), *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* (NSW OEH 2011).

The scope of work completed by AECOM for this report included:

- Searching the OEH's AHIMS register;
- Describing the existing environment within and surrounding the Study Area;
- Reviewing relevant archaeological and ethno historic information for the Study Area and surrounding area;

- Identifying, notifying and registering Aboriginal people who hold cultural knowledge relevant to determining the cultural significance of Aboriginal objects and/or places in the Study Area;
- Preparing a predictive model for Aboriginal archaeological sites within the Study Area;
- Undertaking an archaeological and cultural heritage survey of the Study Area and report on the findings;
- Providing RAPs with information about the Project;
- Facilitating a process whereby RAPs can:
  - Contribute culturally appropriate information to the assessment methodology;
  - Provide information that will enable the cultural significance of Aboriginal objects and/or places within the Study Area to be determined; and
  - Provide input into the development of any cultural heritage management options.
- Preparing and finalising an Aboriginal archaeological and cultural heritage impact assessment with input from RAPs.

## 1.5 Project Team

The assessment was managed and report prepared by AECOM archaeologists Geordie Oakes and Andrew McLaren. Jason Martin (Hansen Bailey) and Andrew Wu (Hansen Bailey) undertook Aboriginal consultation and arranged participation of RAPs in the archaeological survey. Geordie Oakes and Andrew McLaren (AECOM) undertook fieldwork. Luke Kirkwood (Senior Archaeologist, AECOM) provided QA review of all assessment outputs. Unless otherwise specified, Tim Osborne (Designer, AECOM) created all figures within this report. Jodie Glennan (IAP Team Secretary, AECOM) provided administrative support throughout the assessment process.

## 1.6 Report Structure

The report is structured as follows:

- **Section 2.0** outlines the relevant statutory framework for the assessment;
- **Section 3.0** discusses the Aboriginal consultation processes adopted, the archaeological survey strategy and Aboriginal cultural values;
- **Section 4.0** describes the existing environment within and surrounding the Study Area (including land use) and outlines the key archaeological implications;
- **Section 5.0** summarises relevant ethnographic information for the Study Area and its surrounds;
- **Section 6.0** details the archaeological context of the Study Area and its surrounds on both a regional and local scale;
- **Section 7.0** presents a predictive model for Aboriginal archaeology within the Study Area, specifying probable site type occurrence, content, distribution and integrity;
- **Section 8.0** presents the archaeological survey methodology;
- **Section 9.0** describes the archaeological survey including objectives, field team members, survey strategy and methodology, Aboriginal archaeological sites recorded and an evaluation of the predictive model;
- **Section 10.0** discusses the finding of the assessment;
- **Section 11.0** outlines the scientific (i.e. archaeological) and cultural significance of identified Aboriginal archaeological sites within the Study Area;
- **Section 12.0** provides an assessment of the potential impacts of the Project on the sites identified;
- **Section 13.0** provides the cumulative impact assessment;
- **Section 14.0** details appropriate management options and/or recommendations for identified Aboriginal archaeological sites within the Study Area; and
- **Section 15.0** lists the references cited in-text.

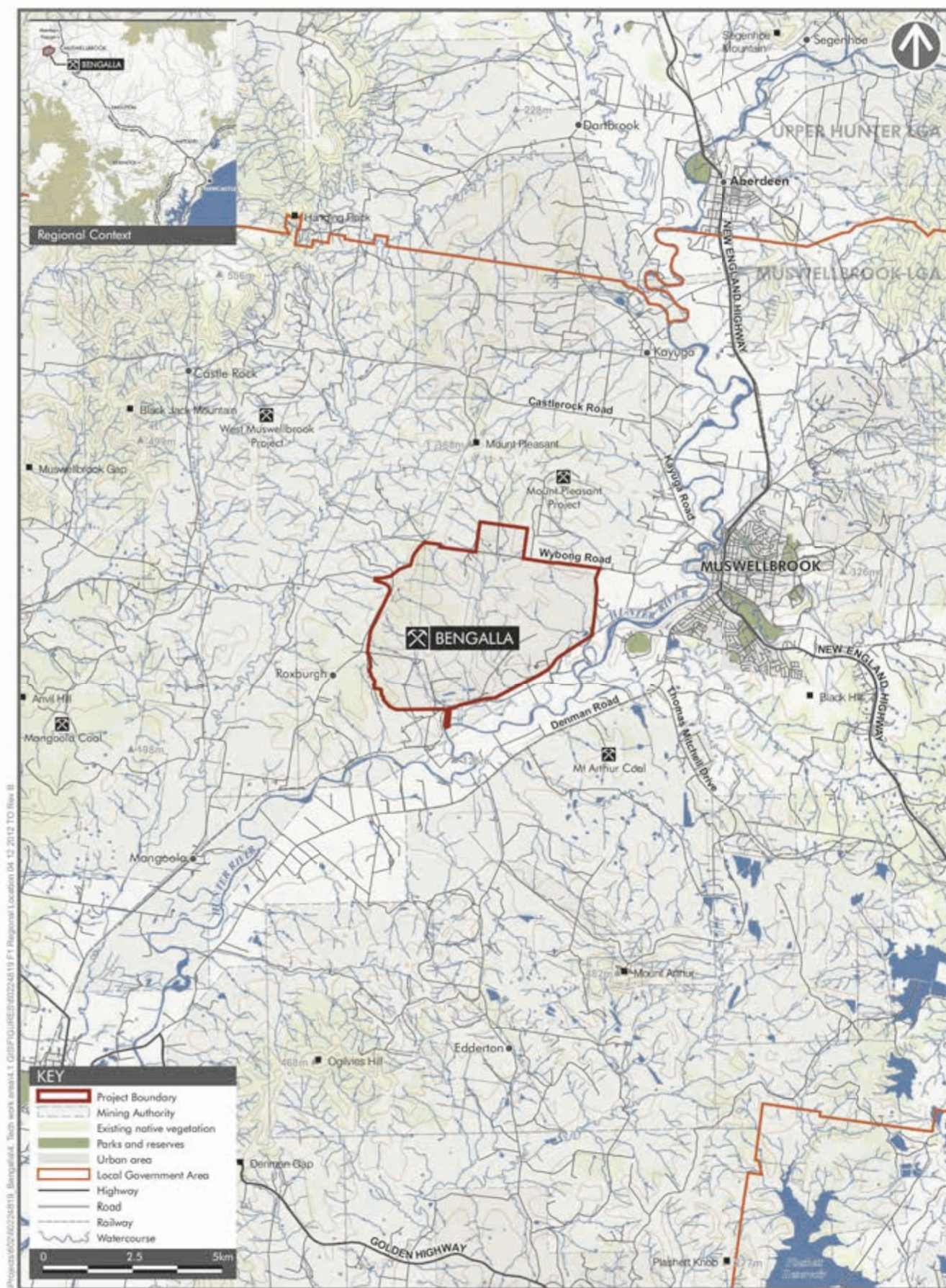


FIGURE 1

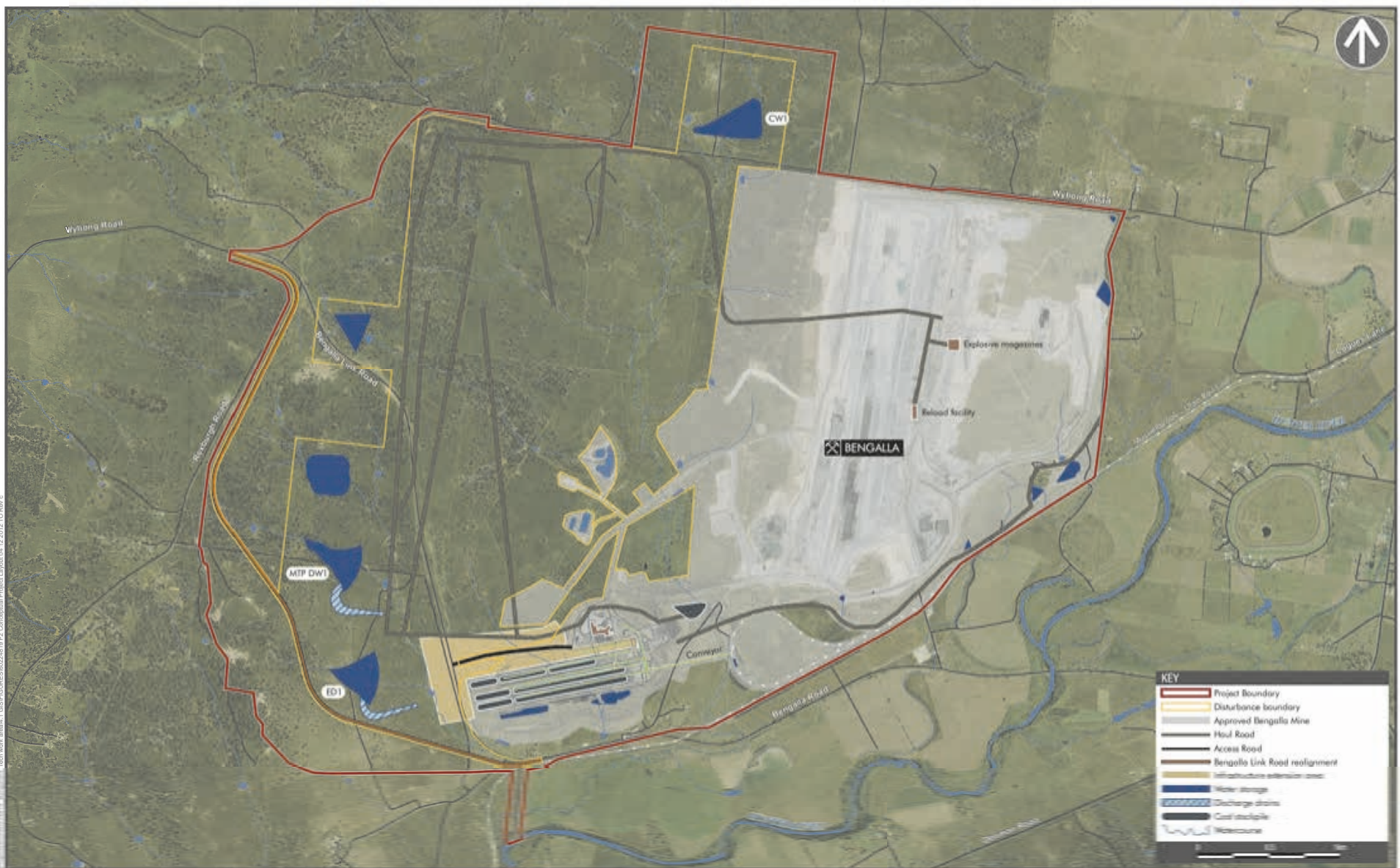


FIGURE 2

## 2.0 Applicable Policy and Legislation

### 2.1 Commonwealth Legislation

#### 2.1.1 Aboriginal and Torres Strait Islander Heritage Protection Act 1984

The *Aboriginal and Torres Strait Islander Heritage Protection Act 1984* (the ATSIHP Act) provides for the preservation and protection of places, areas and objects of particular significance to Indigenous Australians. The stated purpose of the ATSIHP Act is the 'preservation and protection from injury or desecration of areas and objects in Australia and in Australian waters, being areas and objects that are of particular significance to Aboriginals in accordance with Aboriginal tradition' (Part I, Section 4).

Under the Act, '*Aboriginal tradition*' is defined as "the body of traditions, observances, customs and beliefs of Aboriginals generally or of a particular community or group of Aboriginals, and includes any such traditions, observances, customs or beliefs relating to particular persons, areas, objects or relationships" (Part I, Section 3). A '*significant Aboriginal area*' is an area of land or water in Australia that is of 'particular significance to Aboriginals in accordance with Aboriginal tradition' (Part I, Section 3). A '*significant Aboriginal object*', on the other hand, refers to an object (including Aboriginal remains) of like significance.

For the purposes of the Act, an area or object is considered to be injured or desecrated if:

- In the case of an area:
  - it is used or treated in a manner inconsistent with Aboriginal tradition;
  - the use or significance of the area in accordance with Aboriginal tradition is adversely affected;
  - passage through, or over, or entry upon, the area by any person occurs in a manner inconsistent with Aboriginal tradition
- in the case of an object:
  - it is used or treated in a manner inconsistent with Aboriginal tradition.

The ATSIHP Act can override state and territory laws in situations where a state or territory has approved an activity, but the Commonwealth Minister prevents the activity from occurring by making a declaration to protect an area or object. However, the Minister can only make a decision after receiving a legally valid application under the ATSIHP Act and, in the case of long term protection, after considering a report on the matter. Before making a declaration to protect an area or object in a state or territory, the Commonwealth Minister must consult the appropriate minister of that state or territory (Part 2, Section 13). No areas or objects within the Study Area have been declared '*significant Aboriginal areas*' or '*significant Aboriginal objects*' under the ATSIHP Act.

#### 2.1.2 Environment Protection and Biodiversity Act 1999

The Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) took effect on 16 July 2000. Under Part 9 of the EPBC Act, any action that is likely to have a significant impact on a matter of National Environmental Significance may only progress with approval of the Commonwealth Minister for Sustainability, Environment, Water, Population and Communities (SEWPaC). An action is defined as a project, development, undertaking, activity, series of activities, or alteration. An action will also require approval if:

- It is undertaken on Commonwealth land and will have or is likely to have a significant impact;
- It is undertaken outside Commonwealth land and will have or is likely to have a significant impact on the environment on Commonwealth land; and
- It is undertaken by the Commonwealth and will have or is likely to have a significant impact.

The EPBC Act defines 'environment' as incorporating both natural and cultural environments and therefore includes Aboriginal and historic heritage items. Under the Act, protected heritage items are listed on the National Heritage List (items of significance to the nation) or the Commonwealth Heritage List (items belonging to the Commonwealth or its agencies). These two lists replaced the Register of the National Estate (RNE). Statutory references to the RNE in the EPBC Act were removed on 19 February 2012. However, the RNE remains an archive of over 13,000 heritage places throughout Australia.

The heritage registers mandated by the EPBC Act have been consulted and there are no Aboriginal heritage items located within the Project Boundary.

## 2.2 State Legislation

### 2.2.1 Environmental Planning and Assessment Act 1979

The EP&A Act requires that consideration be given to environmental impacts as part of the land use planning process. In NSW, environmental impacts are interpreted as including impacts to cultural heritage.

Upon repeal of Part 3A of the EP&A Act on 1 October 2011, the *Environmental Planning and Assessment Amendment (Part 3A Repeal) Act 2011* inserted a new Division 4.1 into Part 4 of the EP&A Act.

Part 4, Division 4.1, provides for a new planning assessment and determination regime for State Significant Development (SSD). Section 89C of the EP&A Act stipulates that a development will be considered SSD if it declared to be such by the new *State Environmental Planning Policy (State and Regional Development) 2011* (SEPP SRD).

Under Clause 8(1) of SEPP SRD, a development is declared to be State Significant Development if:

- a) the development on the land concerned is, by the operation of an environmental planning instrument, permissible with development consent under Part 4 of the EP&A Act, and
- b) the development is specified in Schedule 1 or 2 of SEPP SRD.

The Project was declared SSD by the Minister for Planning and Infrastructure on 13 March 2012.

Projects declared SSD under Part 4, Division 4.1 of the EP&A Act are exempt from the provisions of Section 90 of the *National Parks and Wildlife Act 1974* (NPW Act), and therefore an Aboriginal Heritage Impact Permit (AHIP) is not required if impacts to Aboriginal objects and/or places cannot be avoided.

### 2.2.2 National Parks and Wildlife Act 1974

The NPW Act is administered by OEH and is the primary legislation for the protection of Aboriginal cultural heritage in NSW. The NPW Act gives the Director General of OEH responsibility for the proper care, preservation and protection of 'Aboriginal objects' and 'Aboriginal places', defined under the Act as follows:

- an *Aboriginal object* is any deposit, object or material evidence (that is not a handicraft made for sale) relating to Aboriginal habitation of NSW, before or during the occupation of that area by persons of non-Aboriginal extraction (and includes Aboriginal remains).
- an *Aboriginal place* is a place declared so by the Minister administering the NPW Act because the place is or was of special significance to Aboriginal culture. It may or may not contain Aboriginal objects.

Part 6 of the NPW Act provides specific protection for Aboriginal objects and places by making it an offence to harm them. Following amendments introduced in October 2010, the NPW Act includes a 'strict liability offence' for harm to Aboriginal objects and places. A 'strict liability offence' does not require someone to know that it is an Aboriginal object or place they are causing harm to in order to be prosecuted.

Defences against the 'strict liability offence' in the NPW Act include the carrying out of certain 'Low Impact Activities', prescribed in Clause 80B of the *National Parks and Wildlife Amendment Regulation 2010* (NPW Regulation), and the demonstration of due diligence.

An AHIP is required if impacts to Aboriginal objects and/or places cannot be avoided. An AHIP is a defence to a prosecution for harming Aboriginal objects and places if the harm was authorised by the AHIP and the conditions of that AHIP were not contravened. Applications for an AHIP must be accompanied by an assessment report conducted in accordance with the *Code of Practice for Archaeological Investigation of Aboriginal Objects in NSW* (DECCW 2010a). Applications must also provide evidence of consultation with the Aboriginal communities. Consultation is required under Part 8A of the NPW Regulation and is to be conducted in accordance with the *Aboriginal Cultural Heritage Consultation Requirements for Proponents* (DECCW 2010b). 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.

Development Consents under Division 4.1 of the EP&A Act are exempt from the provisions of Section 90 of the NPW Act. Section 89A of the NPW Act, however, requires notification of the location of Aboriginal sites within a reasonable time, with penalties for non-notification. Section 89A is binding in all instances, including Part 4, Division 4.1 projects.

## 2.3 Local Government

### 2.3.1 Muswellbrook Local Environmental Plan 2009

The Muswellbrook Local Environmental Plan (LEP) is the comprehensive statutory planning document that applies to the Muswellbrook LGA. Clause 5.10 of the LEP provides specific provisions for the protection of heritage items and relics within Muswellbrook LGA. The objectives of the clause are:

- to conserve the environmental heritage of Muswellbrook;
- to conserve the heritage significance of items and heritage conservation areas including associated fabric, settings and views;
- to conserve archaeological sites; and
- to conserve places of Aboriginal heritage significance.

Clause 5.10 (2) requires development consent for the following:

- demolishing or moving a heritage item or a building, work, relic or tree within a heritage conservation area;
- altering a heritage item or a building, work, relic, tree or place within a heritage conservation area, including (in the case of a building) making changes to the detail, fabric, finish or appearance of its exterior;
- altering a heritage item that is a building by making structural changes to its interior;
- disturbing or excavating an archaeological site while knowing, or having reasonable cause to suspect, that the disturbance or excavation will or is likely to result in a relic being discovered, exposed, moved, damaged or destroyed,
- disturbing or excavating a heritage conservation area that is a place of Aboriginal heritage significance;
- erecting a building on land on which a heritage item is located or that is within a heritage conservation area; and
- subdividing land on which a heritage item is located or that is within a heritage conservation area.

Before granting consent, Council must consider the impact of the development on the heritage significance of the item. However, development consent is not required if Council considers the proposed development to not adversely affect the heritage significance of the item concerned.

Schedule 5 of the LEP provides a list of heritage items and relics within Muswellbrook LGA. There are no Aboriginal heritage items listed in the heritage schedule that occur within the boundaries of the Study Area.

## 3.0 Registered Aboriginal Party Consultation

Aboriginal community consultation for the Project was conducted by Hansen Bailey in accordance with the 'Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010' (DECCW 2010). Hansen Bailey has prepared the following section of the report.

### 3.1 Notification and Registration

#### 3.1.1 Consultation with Regulatory Agencies

Section 4.1.2 of the Aboriginal Consultation Guidelines requires the proponent to consult with the following agencies for the purpose of identifying Aboriginal people who may hold cultural knowledge relevant to determining the cultural significance of Aboriginal objects or places within the Study Area:

- Office of Environment and Heritage (OEH);
- NSW Department of Aboriginal Affairs – Office of the Registrar (DAA);
- Hunter-Central Rivers Catchment Management Authority (HCRCA);
- Muswellbrook Shire Council (MSC);
- Native Title Services (NTS);
- National Native Title Tribunal (NNTT); and
- Wanaruah Local Aboriginal Land Council (WLALC).

On 27 February 2012, these agencies were consulted via a letter seeking assistance in identifying potentially interested Aboriginal stakeholders.

On 28 February 2012, DAA indicated that there are no Registered Aboriginal Owners (under Division 3 of the *Aboriginal Land Rights Act 1983*) of the land within the Project Boundary. OEH responded on 29 February 2012 by providing a list of 47 stakeholder groups. On 29 February 2012, NNTT responded by providing the results of a native title search, however no additional Aboriginal stakeholders were identified. On 6 March 2012, WLALC provided a list of 32 stakeholder groups. WLALC also expressed an interest in being consulted as part of this assessment. On 29 March 2012, MSC responded by providing a list of 35 stakeholders. HCRCA advised in a letter dated 30 March 2012 that it would not be providing the details of any Aboriginal stakeholders. NTS responded by email on 10 April 2012, indicating that it could not release the details of any stakeholder groups due to privacy reasons.

#### 3.1.2 Public Notification

Section 4.1.3 of the Aboriginal Consultation Guidelines requires that a Project must be advertised in the local newspaper. The notification must outline the Project and identify its location. In accordance with this requirement, the Project was advertised in the Muswellbrook Chronicle on 17 February 2012 and the Hunter Valley News on 22 February 2012 (**Appendix a**). The notice invited Aboriginal stakeholders to express an interest in being consulted as part of the Aboriginal cultural heritage impact assessment. In accordance with section 4.1.4 of the Aboriginal consultation guidelines the registration period extended for 14 days to the 7 March 2012.

Eight Aboriginal stakeholder groups responded to the public notice and were duly accepted as participants in the consultation program for this assessment.

Following the correspondence from the agencies and the newspaper notifications a total of 53 Aboriginal stakeholder groups were identified to be consulted for the Project.

#### 3.1.3 Invitations for expressions of interest

In accordance with Section 4.1.3 of Aboriginal Consultation Guidelines on 19 March 2012, a letter inviting expressions of interest was sent to all Aboriginal stakeholders identified by the regulatory agencies. A total of 53 Aboriginal stakeholders were invited to register an interest in being consulted as part of the Aboriginal cultural heritage impact assessment. The closing date for expressions of interest was 2 April 2012, which provides the necessary 14 day period for expressions of interest.

The draft methodology for the archaeological survey component of this assessment was also attached to this letter and stakeholders were invited to comment on the methodology. Comment on the draft survey methodology was sought by the 16 April 2012. Additional details for the consultation conducted for the survey methodology is provided in **Section 3.3.1**.

This letter also advised all stakeholders that there would be a planning meeting held at Bengalla Mine on 4 April 2012 to discuss the Project, consultation process and the proposed survey methodology.

By the closing date for expressions of interest (2 April 2012), 12 stakeholder groups had expressed an interest in the Project. To enable sufficient time to respond to the personalised registration letter the period for expressions of interest was extended until after the onsite planning meeting held on 4 April 2012. An additional four groups registered an interest on 3 April 2012 and a further four groups registered an interest in person at the planning meeting.

From the public notice, personalised expression of interest letter and onsite planning meeting a total of 28 groups registered, and have since been consulted as part of the Aboriginal cultural heritage impact assessment. These stakeholders are listed in **Table 1**.

**Table 1: Registered Aboriginal Groups**

| Ref | Group Name                                          | Primary Contact           |
|-----|-----------------------------------------------------|---------------------------|
| 1   | Aliera French Trading                               | Aliera French             |
| 2   | Bawurra Consultants                                 | Kevin Sampson             |
| 3   | Breeza Plains Culture and Heritage Consultants      | Terry Matthews            |
| 4   | Bunda Consultants                                   | Tammy Knox                |
| 5   | Cacatua Cultural Consultants                        | Donna Sampson             |
| 6   | D F T V Enterprises                                 | Derrick Vale Sr           |
| 7   | Deslee Talbott Consultants                          | Deslee Matthews           |
| 8   | Gidawaa Walang Cultural Heritage Consultancy        | Annie Hickey              |
| 9   | Hunter Valley Aboriginal Corporation                | Rhonda Griffiths          |
| 10  | Hunter Valley Cultural Surveying                    | Luke Hickey               |
| 11  | Indigenous Outcomes                                 | Robert Smith              |
| 12  | Kauwul (trading as Wonn1 Contracting)               | Arthur Fletcher           |
| 13  | Kawul Cultural Services                             | Vicky Slater              |
| 14  | Myland Cultural & Heritage Group                    | Warren Schillings         |
| 15  | Ngarramang-Kuri Aboriginal Culture & Heritage Group | Abie Wright               |
| 16  | Roger Noel Matthews Consultancy                     | Roger Matthews            |
| 17  | Ungooroo Aboriginal Corporation                     | Annette Dunstan           |
| 18  | Upper Hunter Heritage Consultants                   | Melissa Matthews          |
| 19  | Upper Hunter Wonnarua Council                       | Rhoda Perry               |
| 20  | Waabi Gabinya Cultural Consultancy                  | Elizabeth Howard          |
| 21  | Wallangan Cultural Services                         | Maree Waugh               |
| 22  | Wanaruah Local Aboriginal Land Council              | Noel Downs                |
| 23  | Warragil Cultural Services                          | Aaron Slater              |
| 24  | Warul Consultants                                   | Scott Smith               |
| 25  | Wattaka Wonnarua Culture Consultants                | Des Hickey                |
| 26  | Widescope Indigenous Group Pty Ltd                  | Steven Hickey             |
| 27  | Wonnarua Culture Heritage                           | Gordon Griffiths          |
| 28  | Yinarr Cultural Services                            | Kathleen Steward-Kinchela |

Two further stakeholders expressed an interest in this assessment after the registration closure date on 11 April 2012 including Greg Griffiths and T&G Culture Consultants. Both Greg Griffiths and T&G Culture Consultants will continue to be consulted for the Project however would be ineligible for the archaeological survey component.

### 3.1.4 Notification of RAPs

In accordance with Section 4.1.5 of the Aboriginal Consultation Guidelines the expression of interest letter dated 19 March 2012, advised that contact details would be forwarded to OEH and WLALC unless they stipulated that they did not want their details distributed. In accordance with Section 4.1.6 of the Aboriginal Consultation Guidelines, the details of registered stakeholders were provided to OEH and WLALC on 30 April 2012 (see

#### Appendix a.

- A copy of the public notice placed in the Muswellbrook Chronicle and Hunter Valley News;
- A copy of the letter inviting expressions of interest, sent to all Aboriginal stakeholders on 19 March 2012; and
- A record of RAPs whom have registered for consultation as part of the Aboriginal cultural heritage impact assessment.

## 3.2 Consultation Stage 2

### 3.2.1 Planning Meeting

In order to satisfy sections 4.2.1 and 4.2.2 of the Aboriginal Consultation Guidelines, a planning meeting was held on site at Bengalla on 4 April 2012. The purpose of the planning meeting was to:

- Present a detailed briefing about the Project;
- Discuss the draft survey methodology and the nature and scope of the assessment;
- Outline the environmental impact statement process;;
- Specify critical timelines and milestones for the completion of assessment activities and delivery of reports;
- Clearly define agreed roles, functions, and responsibilities in relation to Aboriginal consultation;
- Identify, raise and discuss the Aboriginal groups' cultural concerns, perspectives and assessment requirements (if any) and provide contact details should any individual discussions be required; and
- Provide a forum in which cultural knowledge of the land within the Project Boundary can be discussed.

A total of 24 RAPs attended the planning meeting.

## 3.3 Survey methodology

### 3.3.1 Methodology

In accordance with section 4.3.1 of the Aboriginal consultation guidelines, the proposed methodology for the archaeological survey was provided to RAPs accompanying the letter dated 19 March 2012.

The methodology letter provided a description of the Project, previous Aboriginal assessments and context, results from a desktop assessment along with the proposed archaeological survey methodology for the Project. All Aboriginal stakeholders were encouraged to provide comments and raise any concerns in relation to the draft methodology or cultural heritage issues either in writing, during the planning meeting or during any stage of the consultation process. **Section 8.0** describes the methodology adopted for the archaeological survey.

Five stakeholder groups provided a response to the draft methodology including:

- Breeza Plains Culture and Heritage Consultants;
- DFTV Enterprises;
- Gidawaa Walang Cultural Heritage Consultants;
- Ungooroo Aboriginal Corporation; and
- Cacatua Culture Consultants.

All of these groups agreed with the content in the draft methodology. These responses are provided in **Appendix a**.

### 3.3.2 Archaeological Survey

All Aboriginal stakeholders that had registered an interest prior to the planning meeting were offered the opportunity to participate in an archaeological survey of the land within the Project Boundary. All 28 registered stakeholder groups accepted the offer of archaeological survey.

As explained in the methodology, it was estimated that three weeks would be needed to survey the entire Study Area. Due to the large number of groups involved in the assessment, the 28 groups involved in the archaeological survey were divided equally into three working groups. Each working group would be allocated to one week of the archaeological survey. All stakeholder groups were asked to nominate an archaeological survey representative and to indicate the weeks that their representative would be available to undertake archaeological survey. Each of the 28 stakeholder groups was provided the opportunity to select one of the three working groups according to the availability of their archaeological survey representative. The final allocations for the 28 groups are shown in **Table 2**.

Each Aboriginal group was personally contacted by phone and / or email to confirm dates representatives were required in the field, request insurances and to provide other logistics. The archaeological survey was then scheduled for the three weeks from 14 May 2012 to 1 June 2012 and consisted of the following:

- Working Group 1 (14/05/12 – 18/05/12);
- Working Group 2 (21/05/12 – 25/05/12); and
- Working Group 3 (28/05/12 – 01/06/12).

The third week of archaeological survey was scheduled for the working week from 28 May 2012 to 1 June 2012. Due to inclement weather, the final three days of archaeological survey were postponed until the following week. That is, the archaeological survey originally scheduled for the three days from 30 May to 1 June 2012 was undertaken on 4 – 6 June 2012.

Table 2: Participants in the Archaeological Survey

| Working Group | Survey Period                                | Stakeholder Group                                     |
|---------------|----------------------------------------------|-------------------------------------------------------|
| 1             | 15/05/12 – 18/05/12                          | Roger Noel Matthews                                   |
|               |                                              | Indigenous Outcomes                                   |
|               |                                              | Myland Cultural and Heritage Group                    |
|               |                                              | Upper Hunter Heritage Consultants                     |
|               |                                              | Wonnarua Culture Heritage                             |
|               |                                              | Bawurra Consultants                                   |
|               |                                              | Bunda Consultants                                     |
|               |                                              | Yinarr Cultural Services                              |
|               |                                              | Ngarramang-Kuri Aboriginal Culture and Heritage Group |
| 2             | 21/05/12 – 25/05/12                          | Kawul Cultural Services                               |
|               |                                              | Warragil Cultural Services                            |
|               |                                              | Breeza Plains Culture and Heritage Consultants        |
|               |                                              | Gidawaa Walang Cultural Heritage Consultancy          |
|               |                                              | Cacatua Culture Consultants                           |
|               |                                              | Wallangan Cultural Services                           |
|               |                                              | Upper Hunter Wonnarua Council                         |
|               |                                              | DFTV Enterprises                                      |
|               |                                              | Deslee Talbott Consultants                            |
|               |                                              | Hunter Valley Cultural Surveying                      |
| 3             | 30/05/12 – 01/06/12<br>& 04/06/12 – 06/06/12 | Hunter Valley Aboriginal Corporation                  |
|               |                                              | Widescope Indigenous Group                            |
|               |                                              | Kauwul                                                |
|               |                                              | Wanaruah Local Aboriginal Land Council                |
|               |                                              | Aliera French Trading                                 |
|               |                                              | Waabi Gabinya Culture Consultants                     |
|               |                                              | Cacatua Culture Consultants*                          |
|               |                                              | Upper Hunter Wonnarua Council*                        |
|               |                                              | Wallangan Cultural Services*                          |
|               |                                              | Gidawaa Walang Cultural Heritage Consultancy*         |

\* Stakeholder group was offered additional archaeological survey due to the absence of other stakeholders

### 3.4 RAP Review of Draft Aboriginal Cultural Heritage Impact Assessment Report

The draft Aboriginal cultural heritage impact assessment report was issued to all RAPs on the 09 October 2012. Responses to the report were provided by 14 RAPs. A summary of the responses is provided below and the complete responses in **Appendix b**.

#### 3.4.1 RAP Responses/Recommendations

A summary of the RAP responses/recommendations are outlined below:

Seven RAPs agreed with the content of the report and did not wish to make further comment.

When contacted, three RAPs stated they did not wish to make comment.

- The Wanaruah Local Aboriginal Land Council highlighted the importance of land within the Project Boundary to Aboriginal people. In addition, the Wanaruah Local Aboriginal Land Council made the following recommendations:
  - That the 'Management Recommendations' in the draft report be correctly titled "Consultant's Management Recommendations" to define the difference between those measures the consultant wished to see implemented and those of the Aboriginal Community.
  - That the recommendation here in are included in the report under Aboriginal community Recommendations and not as part of an annex to be ignored.
  - An Aboriginal cultural surface and subsurface investigation be conducted by the Aboriginal community and that the Aboriginal community be consulted over the scope of the cultural sub surface investigation.
  - The artefact analysis of salvaged objects include the participation from the Aboriginal community and it be expediated to be completed in such a way as to help inform the cultural investigation.
  - That any research and salvage works be rostered among the stakeholders so all get a fair go at being involved if they choose to be.
  - That the Aboriginal community be given employment opportunities in all areas of the mining process through Aboriginal specific traineeships and employment programs. The target numbers and time frames to be agreed mutually between the mining company and stakeholders before they start the destruction of cultural sites and areas.
  - That the proponent assist in building the capacity of Aboriginal companies to meet the compliance needs to become contractors to the proponent in areas other than culture and heritage.
  - That the proponent funds the building of a Keeping Place and learning centre for the Aboriginal Community.
  - That an area of land of not less than 50 Ha be set aside in perpetuity as a cultural offset for the Aboriginal community. The offset land is to be in an area freely accessible to the Aboriginal community and preferably with access directly to the Hunter River or other permanent water source. This will enable elders to conduct cultural activities in a culturally appropriate manner.
  - That the offset land is not part of any other offset (e.g. part of a biodiversity offset) without the unanimous support of Aboriginal stakeholders and the support of Wanaruah LALC.
  - That the proponent gives \$500,000.00 per year for the life of the mine to a trust for Aboriginal employment and education programs un the Upper Hunter, and Wanaruah LALC be on the board of said trust/s with the power to veto projects they do not deem worthy.
  - That the proponent gives \$200,000.00 per year for the life of the mine to a trust for delivery of Aboriginal Health Services in the Upper Hunter, and that Wanaruah LALC be on the said trust/s with the power to veto projects they deem not worthy.
- Kauwul requested Arthur Fletcher be consulted and to participate in the site salvage and the inspection and decision-making process with regard to the scarred trees.
- Hunter Valley Aboriginal Corporation stated that they did not wish to make specific comment however supported the views of the Wanaruah LALC.
- DFTU Enterprises commented that land surveyed during the second week of the survey was densely covered with pasture grass which lowered surface visibility and limited the potential to identify evidence of surface archaeological materials.

### 3.4.2 Responses to RAP Comments

#### Wanaruah Local Aboriginal Land Council

1. *That RAP recommendations are included in the report under Aboriginal community Recommendations and not as part of an annex to be ignored.*

**All RAP comments have been included in the main body of the AACHIA under Section 3.4.1 and have been considered in the development of management recommendations.**

2. *An Aboriginal cultural surface and subsurface investigation be conducted by the Aboriginal community and that the Aboriginal community be consulted over the scope of the cultural subsurface investigation.*

**Details of proposed mitigation and management strategies of all sites will be included as part of the revised Aboriginal Cultural Heritage Management Plan (ACHMP) to be prepared following approval of the Project. The ACHMP will be developed in consultation with all RAPs and RAPs will be involved in the proposed surface collection.**

3. *The artefact analysis of salvaged objects include the participation from the Aboriginal community and it be expedited to be completed in such a way as to help inform the cultural investigation.*

**Provisions will be made within the ACHMP for the participation of RAPs in the analysis of salvaged items. This may take the form of an artefact workshop held at BMC's offices during the analysis phase of the salvage works.**

4. *That any research and salvage works be rostered among the stakeholders so all get a fair go at being involved if they choose to be*

**A roster will be developed so that each RAP group will have equal opportunity to be involved in all research and salvage works proposed for the Project as part of the ACHMP.**

5. *That the Aboriginal community be given employment opportunities in all areas of the mining process through Aboriginal specific traineeships and employment programs. The target numbers and time frames to be agreed mutually between the mining company and stakeholders before they start the destruction of cultural sites and areas.*

**All members of the community are entitled to apply for vacant positions that arise at BMC and more broadly Coal & Allied. All applications will be assessed equally and fairly and employment will be provided to those applicants deemed most suitable for the role.**

6. *That the proponent assist in building the capacity of Aboriginal companies to meet the compliance needs to become contractors to the proponent in areas other than culture and heritage.*

**See above response.**

7. *That the proponent funds the building of a Keeping Place and learning centre for the Aboriginal Community.*

**It is proposed that the artefacts to be salvaged following the approval of the ACHMP for the Project will be stored in an appropriate storage facility (along with previously salvaged artefacts for DA 211/93) to preserve their long term integrity.**

8. *That an area of land of not less than 50 Ha be set aside in perpetuity as a cultural offset for the Aboriginal community. The offset land is to be in an area freely accessible to the Aboriginal community and preferably with access directly to the Hunter River or other permanent water source. This will enable elders to conduct cultural activities in a culturally appropriate manner.*
9. *That the offset land is not part of any other offset (e.g. part of a biodiversity offset) without the unanimous support of Aboriginal stakeholders and the support of Wanaruah LALC.*

**No cultural heritage offset strategy is proposed for the Project.**

10. *That the proponent gives \$500,000.00 per year for the life of the mine to a trust for Aboriginal employment and education programs in the Upper Hunter, and Wanaruah LALC be on the board of said trust/s with the power to veto projects they do not deem worthy.*

In partnership with the Upper Hunter Valley Aboriginal Community Coal & Allied launched the Aboriginal Development Consultative Community (now known as the Coal & Allied Aboriginal Community Development Fund (ACDF) in 2006, investing more than \$1.7 Million in education, training, community and business development projects benefiting the Hunter Valley Aboriginal community since its inception. In 2011 the ACDF invested \$644,958 in 28 projects, partnering with community groups and businesses, supporting projects which will help deliver long term sustainability in the Hunter Valley. The ACDF is a funding program accessible by any Aboriginal person or group in the Upper Hunter Valley region undertaking a project to benefit the wider Aboriginal community.

The ACDF operates under a set of guidelines established and agreed to by the Upper Hunter Valley Aboriginal community and Coal & Allied. The projects funded are those most likely to deliver long term, sustainable outcomes for the Upper Hunter Valley Aboriginal community and applications may be made by members of the Upper Hunter Valley Aboriginal community, including the areas of Muswellbrook and Upper Hunter. Based on the established objectives, the ACDF looks to fund proposals of the following nature:

- Aboriginal business development;
- Educational programs;
- Heritage and culture;
- Training and employment;
- Community development;
- Community health and wellbeing; and
- Projects that have compelling and significant benefit for the whole Upper Hunter Aboriginal community.

More detail in relation to recent projects supported by the ACDF program is available on the Coal & Allied website  
[www.riotintocoalaustralia.com.au/ouroperations/3453\\_bengalla\\_3599.asp](http://www.riotintocoalaustralia.com.au/ouroperations/3453_bengalla_3599.asp).

11. *That the proponent gives \$200,000.00 per year for the life of the mine to a trust for delivery of Aboriginal Health Services in the Upper Hunter, and that Wanaruah LALC be on the said trust/s with the power to veto projects they deem not worthy.*

See above response.

#### **Kauwul**

1. *Kauwul requested Arthur Fletcher be consulted and to participate in the site salvage and the inspection and decision-making process with regard to the scarred trees.*

**RAP representatives will be included in all inspections and decision making for potential scarred trees throughout the consultation program developed for the ACHMP.**

#### **DFTU Enterprises**

1. *DFTU Enterprises commented that land surveyed during the second week of the survey was densely covered with pasture grass which lowered surface visibility and limited the potential to identify evidence of surface archaeological materials.*

**The ACHMP developed for the Project will include a 'Unexpected Find' procedure for any Aboriginal artefacts not previously identified.**

## 4.0 Existing Environment

The type and distribution of Aboriginal archaeological sites that occur within an area is intrinsically connected to the local environment. Environmental factors such as topography, geology, hydrology, flora and fauna will have played a pivotal role in influencing how Aboriginal people interacted with the landscape. Consequently, attempts to predict or interpret the character and distribution of sites in the landscape must include an analysis of environmental factors. The following section presents an overview of each of these factors which, when viewed in conjunction with the archaeological context, provides a broad background to the archaeological predictive model.

### 4.1 Climate

The climate in the vicinity of the Project can be described as having warm to hot and humid summers and cool to mild winters. Temperatures range from a maximum mean high of 31.7 °C during January, to a minimum mean low of 3.8°C in July, although daily temperatures can reach considerably higher or lower than these averages. The average annual rainfall for the area is 645.7 mm (Bureau of Meteorology 2012).

### 4.2 Topography

Bengalla is located in the Hunter Valley Region, defined by Hughes (1984a) as the catchment of the Hunter River and its tributaries. More specifically, Bengalla falls within the Central Lowlands subregion of the Hunter Valley, an area described by Galloway (in Story et al. 1963) as a belt of lowlands, occurring through the centre of the Hunter Valley, developed on relatively weak sedimentary rocks, that is undulating or gently hilly, with an abrupt transition to the steep country either side. Conforming to this description, the Study Area occurs on land that is gently undulating with low hills and generally slopes southward towards the Hunter River.

The majority of the Study Area consists of elevations between 150 to 250 m AHD (Australian Height Datum), with several hilltops reaching 270 m AHD. Along the eastern and southern margin of the Project Boundary are the Hunter River alluvial flats or floodplain, rising from 134 m AHD, of which only a narrow strip falls within the southern extent of the Study Area. Land within the Study Area is dominated by slopes of less than five degrees, with the gullies in the lower reaches of ephemeral streams draining into the Hunter River along with the ridge tops generally sloping at no more than two and a half degrees. The Hunter River alluvial floodplain generally slopes at no more than one degree (HLA-Envirosciences Pty Ltd 1993).

### 4.3 Hydrology

Bengalla is located on the northern side of the Hunter River, which is the most significant water body in the Hunter Valley Region, and flows in a general south-westerly direction through a channel approximately 50-100 m wide and approximately 3-6 m deep. The Hunter River cuts across a well-developed floodplain, which is approximately 3 km wide at its widest point.

Within the Study Area, natural surface water flows south along several minor tributaries and unnamed drainage lines, the majority of which feed into Dry Creek. The remainder flow south directly into the Hunter River. Dry Creek is the largest watercourse within the Study Area commencing north of Wybong Road and flowing south across the eastern portion of the Study Area through paddocks and farmland which have been largely modified by previous agricultural activities. For the vast majority of the year, Dry Creek remains dry and only occasionally holds small pools of water for a few days following significant rainfall events (Hansen Bailey 2012).

As demonstrated by a large number of archaeological assessments, both in the Hunter Valley and more broadly in NSW, the nature and distribution of potable water will have played a significant role in Aboriginal use of the landscape. Consequently, archaeological assessments within NSW have consistently shown Aboriginal archaeological sites associated with rivers, creek lines and, to a lesser degree, ephemeral drainage lines. Moreover, it has been shown that higher order creek lines i.e., 3<sup>rd</sup> and 4<sup>th</sup>, using Strahler's (1952) stream order model, are commonly associated with larger and more complex Aboriginal sites, in both surface and subsurface contexts (see Kuskie 2000a; White & McDonald 2010).

Watercourses within the Study Area are a combination of 1<sup>st</sup>, 2<sup>nd</sup>, 3<sup>rd</sup> and 4<sup>th</sup> ordered creek lines with a clear emphasis on lower order (1<sup>st</sup> and 2<sup>nd</sup>) creek lines, which account for over 75% of the total. A section of Dry Creek, roughly four km in length, comprises the only 4<sup>th</sup> order creek within the Project Boundary. Based on this understanding, it is anticipated that, should sites be identified, the larger and more complex sites will be associated with Dry Creek rather than its lower order counterparts. While archaeological sites with subsurface

potential may also be associated with low order creek lines within the Study Area, it is anticipated these will comprise fewer overall artefact numbers and diversity of material. In undertaking this general modelling, consideration must also be given to the effects of European landscape use practices which may have substantially modified creek line alignment and flow rates, and consequently disturbed or destroyed areas of potential archaeological deposit.

#### 4.4 Geology

The Project is situated within the Hunter Coalfield, close to the north-eastern boundary of the Sydney Basin. The geology of the Hunter Valley is characterised by late Permian sediments, early Permian marine sediments, and Quaternary alluvium. Examination of available geological data indicates that Permian sediments including coal seams associated with the lower Jerry Plains and Vane Subgroups of the late Permian Wittingham Coal Measures occur within the Study Area. The Wittingham Coal measures, which outcrop in a number of places within the Project Boundary, form the lower part of the Singleton Supergroup, and are up to 800 m thick and consist of sandstone, siltstone, claystone, conglomerate and tuff within which intermittent coal seams lie (HLA-Envirosciences Pty Ltd 1993). One of the characteristics of the Wittingham Coal Measures is the occurrence of fine-grained siliceous raw materials such as silcrete and indurated mudstone/tuff (IMT), which are of particular importance, as these two raw materials dominate artefactual assemblages in the Hunter Valley.

Quaternary alluviums are also well represented within the Study Area and thinly overlay Permian sediments. Quaternary alluvial deposits consist of silts, sand clays and gravel along the creek valleys within the Project Boundary, and in the alluvial floodplain of the Hunter River to the south (Hansen Bailey 2012). In common with the Wittingham Coal Measures, both silcrete and IMT are known to occur in the alluvial gravels of the Hunter River and its associated terraces. In particular, a known source of silcrete outcrop has been previously identified at Bengalla - archaeological site B10 (37-2-0579), which was partially excavated in 1998 (see White 1998).

#### 4.5 Soils

The Project is located in the Central Lowlands topographic zone within the Sydney Basin geological province. According to Kovac et al (1991) two soil landscape units underlie the Study Area. These comprise the Roxburgh Soil Landscape, which underlies the majority of the Study Area and the Bayswater Soil Landscape, of which a small section is found along its eastern boundary of the Study Area (Kovac et al. 1991). **Table 3** summarises the key characteristics of soils associated with these landscape and their archaeological implications.

Data provided in this table is a combination soil data from *Singleton Soil Landscapes* (Kovac et al. 1991) and the *Soil and Land Capability* assessment undertaken for the Project (GSS Environmental 2012).

Table 3: Soil Types within the Study Area

| Landform Element                                                           | Dominant Soils                                                                                                                                                                                                                                                                                                                                                                             | Dominant Geology                                                                                                 | Erosion Potential                                                                                                                                         | Archaeological Implications                                                                                                                                                                                                                                                                                                                                                     |
|----------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Crest</b>                                                               | <b>Lithosols</b><br><i>A Horizon</i> – Dark reddish brown light sandy clay loam; single-grained; pH 7; becomes loam fine sandy at 10cm; pH 8.0; Bedrock at 35cm                                                                                                                                                                                                                            | Derived from sandstone shale, mudstone, conglomerate, and coal parent material from the Singleton Coal Measures. | High                                                                                                                                                      | 1. Exposure of subsurface archaeological materials due to erosion;<br>2. Low potential for substantial intact soil units containing archaeological deposits; and<br>3. Alkaline soils tend to poorly preserve some organic materials i.e., wood and shell, but may preserve bone.                                                                                               |
| <b>Upper Slope;</b> gently inclines (3-10%) & moderately inclined (10-18%) | <b>Red Chromosol</b><br><i>A Horizon</i> – Dark Brown moderate consistence silty clay loam. Moderate pedality rough faced peds (sub angular blocky 10-20 mm). Boundary clear and wavy. pH 6.8 (neutral). Depth 15 cm.<br><i>B Horizon</i> – Yellow Red and Dark brown clays. Moderate to strong pedality. pH 7.4 – 8.5 (alkaline). Depth 60 cm.                                            | Derived from sandstone shale, mudstone, conglomerate, and coal parent material from the Singleton Coal Measures. | Moderate. Less susceptible to sheet and gully erosion when managed to their correct capacity, as compared to the less steep waning slope soils.           | 1. Exposure of subsurface archaeological materials due to erosion;<br>2. Low potential for substantial intact soil units containing archaeological deposits;<br>3. Alkaline soils tend to poorly preserve some organic materials i.e., wood and shell, but may preserve bone.                                                                                                   |
| <b>Mid-slope;</b> very gently to gently inclined (3-10%)                   | <b>Brown Chromosol</b><br><i>A Horizon</i> – Dark Brown silty clay loam. Sub angular blocky 5-25mm. Roots fine/medium and common. Boundary is clear and wavy. pH 6.6 (neutral). Depth 10 cm.<br><i>B Horizon</i> – Dark Brown and Orange strong and moderate clays. pH 5.9 – 8.0 (acidic to alkaline). Depth 90 cm.<br><i>C Horizon</i> – Conglomerate, sandstone and shale. Depth 140 cm. | Derived from sandstone shale, mudstone, conglomerate, and coal parent material from the Singleton Coal Measures. | Moderate. Less susceptible to sheet and gully erosion when managed to their correct capacity, as compared to the soil covering the steeper waxing slopes. | 1. Potential exposure of subsurface archaeological materials due to sheet erosion;<br>2. Low potential for substantial intact soil units containing archaeological deposits; and<br>3. Acidic soils tend to preserve biological material i.e., wood and shell.<br>4. Alkaline soils tend to poorly preserve some organic materials i.e., wood and shell, but may preserve bone. |

| Landform Element                                                                  | Dominant Soils                                                                                                                                                                                                                                                                                                                                                                    | Dominant Geology                                                                                                 | Erosion Potential                                                                                                                                                                                                                                              | Archaeological Implications                                                                                                                                                                                                                                                                                                |
|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Mid-slope;</b> very gently to gently inclined (3-10%)                          | <b>Red Sodosol</b><br><i>A Horizon</i> – Very Dark Brown weak consistence clay loam. Moderate pedality (sub-angular blocky 10-50 mm), earthy faced peds. Many coarse roots. Boundary clear and even. pH 6.6 (neutral). Depth 20 cm.<br><i>B Horizon</i> – Dark Red, Yellow Red, and Yellow Brown heavy clays. Moderate to strong pedality. pH 8.2 – 8.9 (alkaline). Depth 120 cm. | Derived from sandstone shale, mudstone, conglomerate, and coal parent material from the Singleton Coal Measures. | High. These soils are susceptible to sheet and gully erosion due to the dispersive nature of their subsoils. Incorrect management practices can lead to the topsoil being detached and cause enhanced erosion rates when the subsoil is exposed.               | 1. Exposure of subsurface archaeological materials due to erosion;<br>2. Low potential for substantial intact soil units containing archaeological deposits;<br>3. Low preservation of organic remains (e.g. shell, wood) in alkaline soils.                                                                               |
| <b>Mid-slopes/lower slopes</b>                                                    | <b>Brown Vertosol</b><br><i>A Horizon</i> – Dark Brown strong consistence clays. Moderate pedality (angular blocky 20-50mm) earthy face peds. pH 7.2-8.2 (neutral to alkaline). Depth 30 cm<br><i>B Horizon</i> – Dark Reddish Brown and Yellowish Brown clays. Moderate to strong pedality. pH 9.2 (alkaline). Depth 110 cm.                                                     | Derived from sandstone shale, mudstone, conglomerate, and coal parent material from the Singleton Coal Measures. | Moderate. Soils are generally not susceptible to sheet or gully erosion when managed to their correct capacity, as compared to duplex soils with sodic characteristics.                                                                                        | 1. Exposure of subsurface archaeological materials due to erosion;<br>2. Moderate potential for substantial intact soil units containing archaeological deposits;<br>3. Alkaline soils tend to poorly preserve some organic materials i.e., wood and shell, but may preserve bone.                                         |
| <b>Lower slope (within drainage line);</b> level to very gently inclined (0 – 3%) | <b>Brown Kurosol</b><br><i>A Horizon</i> – Brown and bleached weak consistence sandy and clay loam. pH 5.5-5.9 (acidic). Depth 60 cm.<br><i>B Horizon</i> – Strong Brown moderate consistence sandy clay. Sandy fabric (sub angular blocky 100-200mm. pH 4.9 (strongly acidic). Depth 100 cm.                                                                                     | Derived from sandstone shale, mudstone, conglomerate, and coal parent material from the Singleton Coal Measures. | High. Soils are susceptible to sheet and gully erosion due to the high erodibility and dispersive nature of their subsoils. Incorrect management practices can lead to the topsoil being detached and cause enhanced erosion rates when the subsoil is exposed | 1. Exposure of subsurface archaeological materials due to erosion;<br>2. Low potential for substantial intact soil units containing archaeological deposits;<br>3. Low preservation of organic remains (e.g. shell, wood) in alkaline soils.<br>4. Acidic soils tend to preserve biological material i.e., wood and shell. |

| Landform Element                                                      | Dominant Soils                                                                                                                                                                                                                                                                                                                                                     | Dominant Geology                                                                                                 | Erosion Potential                                                                              | Archaeological Implications                                                                                                                                                                                                                       |
|-----------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Flat/Gullies (creekline);</b> level to very gently inclined (0-3%) | <b>Brown Sodosol</b><br><i>A Horizon</i> – Dark Brown strong consistence clay loam. Moderate pedality. Earthy peds. Boundary is diffuse, even. pH 7.2-8.1 (neutral to alkaline). Depth 60 cm.<br><i>B Horizon</i> – Brown moderate consistence light clay. Moderate pedality (sub angular blocky 100-200mm) earthy peds. pH 9.1 (strongly alkaline). Depth 100 cm. | Derived from sandstone shale, mudstone, conglomerate, and coal parent material from the Singleton Coal Measures. | Moderate. Sheet erosion and gully erosion is likely if protective vegetative cover is removed. | 1. Exposure of subsurface archaeological materials due to erosion;<br>2. Moderate potential for substantial intact soil units containing archaeological deposits;<br>3. Low preservation of organic remains (e.g. shell, wood) in alkaline soils. |

## 4.6 Geomorphology

Examination of historic aerials and observations made during the field survey, indicate the vast majority of land within the Study Area has been continuously grazed since the late 19<sup>th</sup> century, an activity initiated by large-scale land clearing. Vegetation clearance is a process that often results in the soil degradation, erosion and structural damage to existing soils. Turvey, in his original geomorphological assessment for Bengalla (in White 1998 pp 144-165), notes that this was such a significant problem in the Study Area in the 1950s that a remediation program was implemented incorporating large-scale contour banking and damming across the Study Area. In addition, according to historical investigations (see Rich 1993; White 1998) rabbit infestations at Bengalla during the 1940s and 1950s completely stripped paddocks bare of vegetation leading to further soil erosion as exposed soils were washed away, typically into watercourses.

As shown in **Table 3**, and also noted by Turvey (in White 1998 pp 144-165), soils within the Study Area are susceptible to moderate and high degrees of erosion due to their dispersive nature. This susceptibility to erosion is accelerated by poor land management and vegetation clearance. Observations made during the field assessment noted the majority of the Study Area, with the exception of Dry Creek and its tributaries, retained relatively little topsoil, and often exhibited exposed underlying clay units. Sheet, rill and gully erosion, largely a result of vegetation clearance, being the likely cause. This was most evident adjacent to lower order creeklines and drainage lines in the western portion of the Study Area.

Archaeologically, areas of erosion and exposure are of particular importance as they provide the greatest visibility, and subsequently the greatest chance of identifying surface artefacts. However, in these environments the potential for stratified subsurface archaeological deposit is reduced dramatically as erosional forces, particularly in high-energy flood environments, may expose and subsequently transport artefactual material downstream. Artefact scatters identified on deflated surfaces i.e. where topsoils have been carried away, are best conceived as time-averaged palimpsests (see Shiner 2008), or more simply as artefact assemblages where single knapping events or activities that have occurred at different times, even thousands of years apart, are merged.

Areas of sediment deposition within the Study Area afford the greatest likelihood for the preservation of subsurface archaeological materials. A review of geomorphological data, including soil assessments, in conjunction with observation made during the field survey, indicates Dry Creek and its tributaries likely offer the only depositional environment in the Study Area. GSS Environmental (2012) noted the upper profile material along Dry Creek is likely derived from erosional processes upslope. As a result, soils associated with Dry Creek and its tributaries have the greatest potential for subsurface materials, albeit in varying condition as a result of the geomorphic processes described above. Observations made during the field survey are consistent with this assessment, identifying artefactual material actively eroding from an A horizon soil profile, between 30-40 cm in depth.

## 4.7 Flora and Fauna

Historically, land within the Project Boundary has been impacted by processes related to agriculture, in particular land clearing for grazing. Nonetheless, small patches of remnant woodland vegetation occur in the western portion of the Project Boundary that provides habitat for the majority of local flora and fauna. Archaeologically, areas of remnant vegetation are of particular importance as they have the potential to contain mature native trees with Aboriginal scars or carvings.

Broadly, two main structural types of vegetation occur within the Study Area: Woodland and Grassland. Woodland is a broad category of vegetation that is dominated by a canopy of relatively widely spaced trees, where the crowns of the trees do not usually touch. Grasslands, as the name suggests, are dominated by grasses, and canopy trees and shrubs are either absent or very rare. Boxgum woodlands are well represented in Study Area, with White Boxgum Grassy Woodland the most extensive wooded vegetation community (Cumberland Ecology 2012).

Fauna surveys undertaken for the Project by Cumberland Ecology (2012) found the Study Area did not support a great diversity of fauna species due to the simplified and highly modified habitat present. The survey identified 50 species of bird, 19 mammals, three amphibians and two reptiles.

While the flora and fauna present within the Study Area today is unlikely to directly correlate with that available in the past, it offers a general guide that, combined with ethnographic records, provides some, albeit limited, information on the resources available to Aboriginal people in the past.

Ethnographic records for the Wonnarua indicate that a number of plant species were exploited for food. Most commonly mentioned in ethnographic records are various types of bush fruits, roots and a particular species of water lily (see Fawcett 1898; Miller 1887). Archer *et al* (2004) provide a detailed and exhaustive list of plant species eaten by the Wonnarua which include fruits such as bush cherries (*Syzygium australe*), apple berry (*Billardiera scandens*), and black plum (*Diospyrus australis*) that would have been picked and eaten directly from the bush. Flower species exploited include bluebells (*Wahlenbergia spp.*) its flowers being edible, bottlebrush (*Caesalpinchia saligna*) and other types of sweet nectars which could be used to sweeten water or sucked directly from the flower, and the native violet (*Viola hederacea*) its flowers also being edible. In addition to these, a variety of nuts, roots, and seeds were likely consumed including the pepperberry tree (*Cryptocarya obovata*), the native parsnip (*Trachymene incise*) and pigweed (*Portulaca oleracea*) to name a few. The consumption of particular plant species within the Study Area would have been dependent upon their local availability.

Fauna species identified in ethnographic records include those often mentioned by early observers i.e. kangaroo, emu, reptiles and various species of birds and amphibians (Fawcett 1898; Miller 1887). However, as Brayshaw (1984) notes, ethnographic literature generally does not identify which species of macropod, aside from kangaroos and wallabies, were hunted by the Wonnarua. Brayshaw provides a summary of animal species exploited by the Wonnarua as described in ethnographic records that includes echidna, possums, flying foxes, bird species such as ducks, geese, swans and pigeons, goannas and snakes.

## 4.8 Land Use and Disturbance

The Upper Hunter region has a long history of rural land use for a variety of agricultural and industrial activities, predominantly grazing and coal mining. The current dominant land uses within and adjacent to the Study Area include open cut coal mining and agriculture, with a focus on cattle grazing. As a result of these land uses, land within the Study Area has sustained disturbances from a range of activities, including:

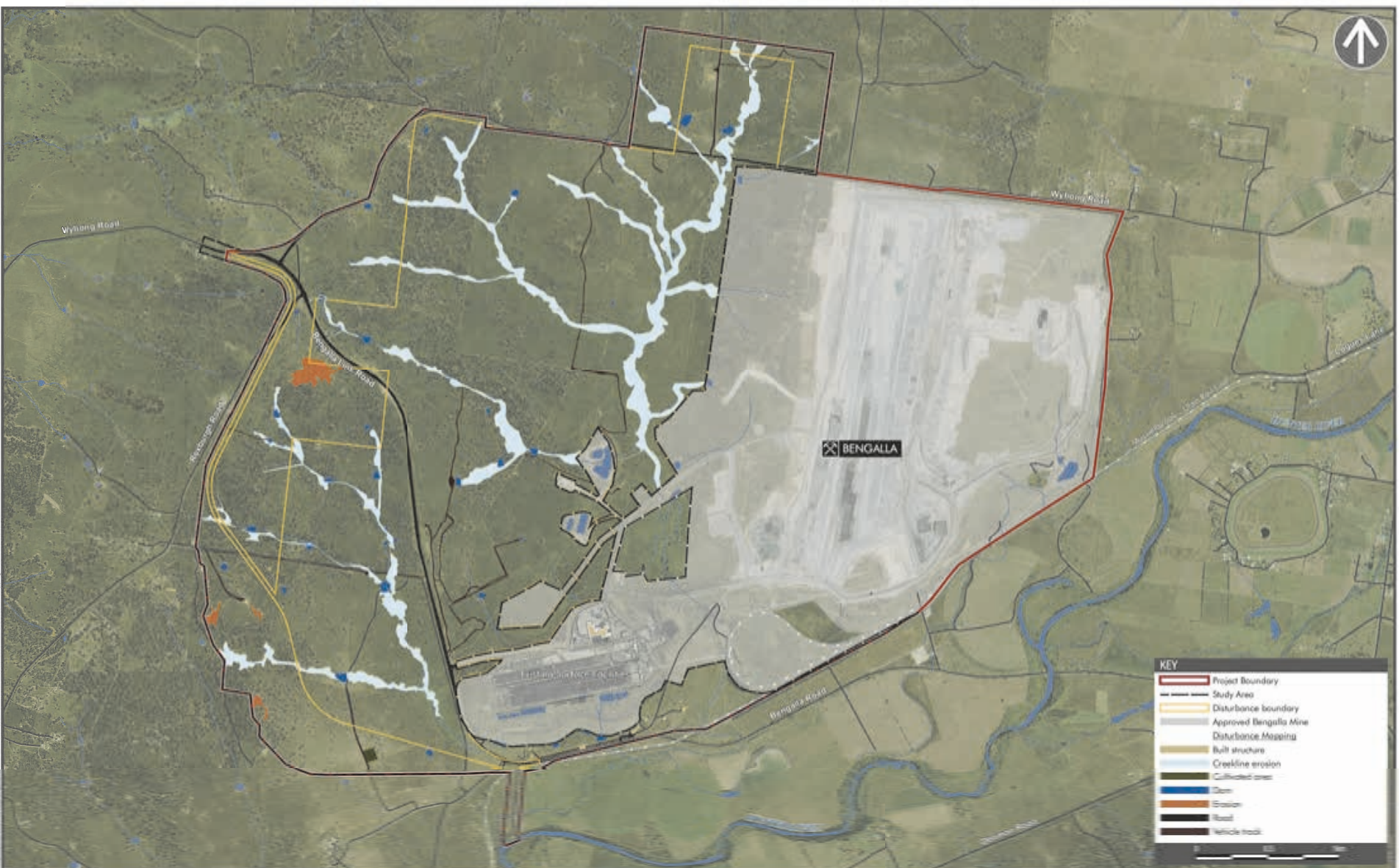
- Native vegetation clearance;
- Trampling from cattle grazing;
- Fencing works;
- Earthworks and excavation for damming;
- Topsoil disturbances from ploughing;
- Contour banking;
- Sheet, gully and rill erosion, particularly along creeklines;
- Landscape disturbances from construction of vehicle tracks;
- Landscape disturbances from the construction of farmhouses and associated buildings; and
- Landscape disturbances from coal mining activities including minor excavation for exploratory drilling activities.

**Figure 3** provides disturbance mapping for the Study Area.

## 4.9 Implications for Aboriginal Archaeology and Cultural Heritage

Key observations drawn from a review of the existing environment of the Study Area are as follows:

- Environmental conditions discussed above, such as climate, access to fresh water, flora and fauna provide a basis to argue that land within the Study Area was sufficient to support repeated occupation by Aboriginal people;
- Evidence of occupation is likely to be found concentrated along/adjacent to creek lines where there is easy access to potable water and marine food resources. More intense evidence of Aboriginal occupation, in the form of higher artefact densities, is anticipated adjacent to Dry Creek, being the most significant creek line within the Study area, with lower densities along ephemeral feeder creeks and drainage lines.
- In topographic terms, the majority of the Study Area can be characterised as being suitable for occupation by Aboriginal people. This said, landforms most suited to repeated or intensive occupation activity include level to gently undulating/inclined flood/drainage plains, gently inclined foot slopes and flats (i.e. low gradient land surfaces).
- Stone suitable for the production of chipped and ground implements is available from both within the Study Area (quarry site B10 (37-2-0579)) and locally from the Hunter River gravels in the form of widely distributed surface deposits of pebble/cobble conglomerate.
- Native vegetation within the Study Area has been extensively modified as a result of European land use practices. Nonetheless, areas of remnant woodland have the potential to contain trees with cultural scarring. Scattered mature paddock trees may likewise exhibit scars.
- Prior to European occupation, the floral and faunal resources of the Study Area would have been sufficient to facilitate intensive and/or repeated occupation by Aboriginal people; and
- Erosion is common and widespread throughout the Study Area, likely being caused by extensive vegetation clearance from previous farming activities and rabbit infestations in the 1940s and 1950s. As a result, those areas where erosion is evident will generally offer poor potential for stratified archaeological deposit. Dry Creek and its tributaries likely offer the only depositional environment in the Study Area and therefore have the greatest potential for subsurface deposit.



**DISTURBANCE MAPPING**  
Bengalla Continuation of Mining Project  
Aboriginal Archaeological and Cultural Heritage Impact Assessment

FIGURE 3

AECOM

## 5.0 Ethnographic Context

Information regarding the ways in which Aboriginal people used the pre-contact landscape is available to archaeologists through two primary sources: archaeological data and ethnohistoric records. **Section 6.0** has summarised the archaeological context of the Study Area on both a regional and local scale. This section builds on this foundation by summarising relevant ethnohistoric information for the Study Area and its environs. As in other parts of Australia, Europeans living in the Hunter regions began to document Aboriginal culture from first contact, with explorers, missionaries, settlers and the like recording their encounters with, and observations of Aboriginal people and their material culture in letters, journals and official reports. Most of these accounts are overtly Eurocentric in tone and content and the veracity of some is, at best, questionable. Nonetheless, taken together, they form an important source of information on Aboriginal lifeways at the time of British colonisation and can, in conjunction with available archaeological data, be used to generate working predictive models of Aboriginal land use practices.

### 5.1 The Wonnarua

Prior to European settlement, the Muswellbrook district is thought to have been inhabited by people of the Wonnarua language group (many spelling variations include Wanaruwa, Wanarua, Wanaruah, Wannarawa, Wannerawa, Wonarua, Wonnah Kuah, Wonnuaruah). Key published sources for the Wonnarua language and peoples include primary ethnographic resources such as Threlkeld (in Gunson 1974), Howitt (cited in Brayshaw 1966), Mathews (1898; 1903), Enright (1901), Curr (1886), Fawcett (1898), and Miller (1887). A summary of some key features of the Wonnarua's way of life and material culture is provided below.

The Wonnarua language group covered a relatively small area of some 5,200 km<sup>2</sup> which, according to Tindale (1974), straddled the Upper Hunter Valley and extended from just west of Maitland and Kurri Kurri to the Dividing Range (just west of Widden Brook). The Wonnarua's lands border Darkinjung territory to the south near Wollombi, the Worimi and Awabakal of the Lower Hunter to the east near Maitland, and the Geawegal to the north near Muswellbrook.

While there is general acceptance of the boundaries of the Wonnarua, there is some evidence to suggest the Geawegal and Wonnarua were part of the Kamilaroi. Ethnographic accounts by Threlkeld (cited in Gunson 1974) and Mathews (1903) suggest Kamilaroi territory extended as far south as Jerrys Plains, into what is now referred to as Wonnarua territory. However, other early sources make a clear distinction between the two groups such as Howitt (cited in Brayshaw 1966) who states 'the Wonnarua, who were closely affiliated with the Kamilaroi, occupied the Valley from here to Merriwa in the Goulburn Valley'. Despite the conflicting evidence, it is almost certain that Aboriginal people living in the Muswellbrook or Jerrys Plains area were linked culturally, if not directly, to their Kamilaroi neighbours.

Population density for the Wonnarua is difficult to estimate, and certainly pre-European numbers have not been estimated with any accuracy. Various historical accounts of early European interactions with the Wonnarua, cited by Brayshaw (1987), suggest relatively low numbers for that language group. For example, five individuals were observed by John Howe near Jerrys Plains in 1819. In 1824, fifteen Aborigines visited Dangar's camp at Dart Brook, and soon after a group of 150 attacked his party just beyond the Liverpool Range. These figures tend to correlate with the low population numbers provided by early European accounts. However, Brayshaw (1987) suggests that actual numbers were likely higher citing an observation by a settler of 300 Aboriginal men at Patricks Plains in 1824, west of Cessnock and an official report indicating 200 participated in an attack on Merton at the junction of the Goulburn and Hunter Rivers in 1826 (Brayshaw 1987: 47). Curr (1886), on the other hand, stated that the Wonnarua numbered 500 individuals in 1841, a number supported by Fawcett (1898).

The social organisation of the Wonnarua prior to European settlement is also difficult to establish. As Brayshaw (1987) suggests it was not until the second half of the 19<sup>th</sup> century, after a significant breakdown of traditional Aboriginal life, that people such as A.W.Howitt, R.H.Mathews and W.J.Enright began to show interest and note details regarding Aboriginal social organisation. Despite this, utilising available information on the Wonnarua and drawing on broader knowledge of Aboriginal society it is possible to make general statements about the Wonnarua's social organisation.

The Wonnarua's social structure likely comprised of many self-governing units, with the smallest residential units known as hearth groups. These typically would have consisted of a man, his wife or wives and their dependent children. Several hearth groups camped together temporarily forming slightly larger residential units of perhaps 40 to 60 people (Lourandos 1977; O'Rourke 1997), who cooperated in hunting and gathering. The largest residential groupings consisted of either seasonal (summer) band aggregations or irregular ceremonial band aggregations forming local communities of at least 150 people. Residential units formed clans which were closely linked to the land they ranged. The tribe consisted of an agglomeration of clans, and the members of each tribe shared the same language, social customs and territory situated within specific but elastic geographical units (Vinnicombe 1980).

Wonnarua habitation patterns are equally difficult to interpret due to a paucity of evidence. However, Fawcett (1898), in a key statement discussing the Wonnarua, states that in choosing their campsites the Wonnarua considered 'proximity to fresh water was one essential, some food supply a second, while a vantage ground in case of attack from an enemy was a third'. Archaeological evidence available for the Hunter Valley, which indicates proximity to creeklines i.e. potable water sources, was the key determinant in the Aboriginal people's choice of campsite, is suggestive that Fawcett was correct in his assessment. Mathews (cited in Brayshaw 1966) also makes the observation of the Aboriginal people camping near Broke that they camped 'in a romantic spot on the bank of Wollombi Brook'.

As discussed in **Section 4.7**, the Wonnarua consumed a variety of animal and plant resources, in what was likely a seasonal dietary cycle. Fawcett (1898) notes a number of animals exploited by the Wonnarua including kangaroos, emus, wallabies, bandicoots, kangaroo rats, opossums, rats, emus, snakes, lizards, fish, caterpillars, grubs, lava of wasps and other insects, birds and reptiles. These they either roasted, or baked in heaps of cinders or stone, as a form of oven (Miller 1886). Various plant foods were also exploited for food and medicine including bush fruits, roots, and yams (see Archer et al. 2004; Brayshaw 1987; 1966; Fawcett 1898).

Available ethno-historic records attest to the manufacture and use of a diverse range of material culture utilised by the Wonnarua people. Brayshaw quotes a number of ethnographic sources including Threlkeld (in Gunson 1974), Caswell (1841) and Dawson (1830) (cited in Brayshaw 1966) who all describe the use of huts or 'gunyers', constructed from bark, as the most widely used habitation structure. These accounts describe how large sheets of bark were cut or stripped from tea, box or stringy bark trees, heated on a fire, and supported by three forked sticks to form a shelter. A similar process is said to have been used to obtain bark for canoes (Threlkeld in Gunson 1974). Enright (cited in Brayshaw 1966) notes that generally canoes were cut from large river gum trees (*Eucalyptus spp*) and also the kurrajong (*Brachychiton spp*).

Brayshaw (1966) cites a large list of items, largely from Enright's collection of implements, as utilised by the Wonnarua. These include a variety of spears for fishing, hunting and war, probably from the grass tree *Xanthorrhoea arborea*; wommeras or spear throwers, usually about three feet in length; boomerangs, both returning and non-returning; yam-sticks; shields, of both wood and bark; waddys or clubs made of hard wood, probably mangrove (*Avicennia officinalis*) or white ironbark (*Eucalyptus paniculata*); axe heads (of basalt), both hafted non-hafted axes (see Fitzpatrick cited in Brayshaw 1966) used for cutting toe-holds to aid tree climbing, removing bark for huts and canoes, cutting possums out of trees, and removing bandicoots or kangaroo rats from hollow logs; stone implements, including gouges, knives and scrapers constructed from a variety of raw material; koola-man or wooden bowls for holding water, seeds, grubs etc; nets (turrila) and fishing line from the bark of various trees including the cabbage-tree (*Livistona australis*) and the kurrajong (*Brachychiton populneus*) for catching fish; fish hooks from oyster shells; a variety of bone implements including needles for sowing; and clothing made from opossum skins, including cloaks.

Spiritual authority was vested in a large number of supernatural beings. Throughout southeastern Australia, one of the most important was a belief in a sky deity *Baiami* ('The Great Shaper,' 'Thunder-God' or 'Great One'). Baiami formed the world by shaping the cosmos from a pre-existing primeval void (O'Rourke 1997). According to Berndt (1947), he had two wives, Biragnulu and Gunambali, and a son called Daramalan. Both Baiame and Daramalan were thought to return to earth during certain initiation rituals (Berndt 1947), and are often depicted in rock engravings or paintings (see Attenbrow 2010).

The Wonnarua are known to have utilised several methods to dispose of their dead, each involving varying degrees of ritual (Brayshaw 1966). The most common method recorded, as supported by archaeological evidence (see Dyll and Bentley 1973, 1975 cited in Brayshaw 1987; Donlon et al. 2003), was burial in the earth. Brayshaw (1966) notes the position of the body was varied and could be extended or flexed, face down, on its side or face up and the use of bark as a burial shroud was widespread. In some instances, articles belonging to the deceased have been buried with them (see Donlon et al. 2003).

## 6.0 Archaeological Context

### 6.1 Regional Archaeology

Formal archaeological interest in the Aboriginal archaeological record of the Hunter River Valley can be traced to the early 1940s (McCarthy & Davidson 1943). However, concentrated investigation of this record did not begin until the mid-to-late 1970s, a period marked by a rapid growth in the Valley's coal mining industry as well as affiliated development (see Moore 1967, 1969, 1970 for important early survey and excavation work). Intensive development activities since this time have secured the Hunter Valley's place as one of the most intensively investigated archaeological regions in Australia, with hundreds of Aboriginal archaeological investigations involving survey and/or excavation having been undertaken. The vast majority of these being undertaken as part of larger Environmental Impact Assessments associated with coal mining projects in the Central Lowlands subregion (Story et al. 1963). Not surprisingly, these investigations have varied significantly in scale and scope, ranging from targeted small-scale surveys to complex, multi-phase survey and excavation projects over large areas. Nonetheless, together, they have revealed a rich and diverse record of past Aboriginal occupation, with thousands of Aboriginal archaeological sites now registered on OEH's Aboriginal Heritage Information Management System (AHIMS) database. Fortunately, several useful syntheses of previous Aboriginal archaeological work within the Hunter Valley are now available (e.g., ERM 2004; Hughes 1984; Koettig 1990; MacDonald & Davidson 1998). Together with Dean-Jones and Mitchell's (1993) pioneering environmental study, these syntheses provide a suitable interpretive framework for the current assessment. Key findings are detailed in brief below under three thematic sub-headings.

#### 6.1.1 Open Artefact Sites: Distribution, Contents and Definition

Surface distributions of stone artefacts, variously referred to as artefact scatters, open sites, open camp sites, are by far and away the most common and widely distributed form of Aboriginal archaeological site in the Hunter Valley (ERM 2004; Hughes, 1984; Koettig, 1990; MacDonald & Davidson, 1998). Other site types, such as scarred trees, shell middens, quarries, grinding grooves, burials and rock shelters with deposit and/or art or PAD, have also been identified but are comparatively rare. Accordingly, open artefact sites remain the most intensively investigated component of the Aboriginal archaeological record of the Hunter Valley, with site distribution, contents and definition forming key research/discussion topics. Internal site structure has also generated some interest (e.g., Brayshaw & Haglund, 1984; Koettig, 1994; Rich, 1992) but remains to be investigated in detail.

As highlighted by Hughes (1984), and reiterated by numerous other researchers (e.g., ERM 2004; Koettig & Hughes, 1983, 1985; Koettig 1992, 1994; Kuskie, 2000; Rich, 1992) consideration of the distribution of open artefact sites within the Hunter Valley indicates a strong trend for their presence along watercourses, specifically, on river/creek banks, terraces and adjacent 'flats' (i.e., flood/drainage plains). Although this patterning is, to a significant degree, a product of both geomorphic dynamics and archaeological sampling bias i.e. extensive fluvial erosion activity along watercourses resulting in generally higher levels of surface visibility and subsequently the focus of archaeological survey. Nevertheless, despite these factors, this pattern of site distribution is supported by the results of several large scale Aboriginal archaeological salvage projects incorporating surface collection and excavation (e.g. Haglund 1992; Koettig 1992, 1994; Kuskie 2000; MacDonald & Davidson, 1998; Rich 1992).

Moreover, these projects have indicated that assemblage size and complexity tend to vary significantly in relation to both the proximity and permanency of potable water sources as well as landform, with larger, more complex assemblages (i.e., those containing a wider variety of raw materials and technological types and/or higher mean artefact densities and features such as hearths and knapping floors) concentrated on landform elements adjacent to major watercourses. Artefact distributions associated with ephemeral watercourses and other non-adjacent landform elements (e.g., mid- and upper slopes, ridgelines), meanwhile, have typically taken the form of a low-density artefact scatters often referred to as 'background scatter'.

Flaked stone artefacts dominate archaeological assemblages from recorded open artefact sites within the Hunter Valley (Hiscock 1986). However, items such as complete and fragmentary grindstones, charcoal, animal bone, shell and ochre have also been recorded at some sites. With the notable exception of 'knapping floors', a relatively common component of the open artefact site record of the Hunter Valley, associated archaeological features (i.e. hearths and pits) are rare (e.g., Koettig, 1992). Defined in slightly different ways by different researchers, following White (1999: 152), knapping floors can be broadly defined as "activity areas in which primacy was given to the reduction of one or more blocks of stone".

Recorded knapping floors vary considerably in size and complexity, with some examples (e.g., Koettig, 1994; Rich, 1992) containing thousands of artefacts and attesting to the reduction of multiple blocks of differing raw materials. Backed artefacts (i.e. Bondi points and geometric microliths) are a common feature of knapping floors. At Narama, near Ravensworth, a detailed analysis of the contents of knapping floor and non-knapping floor assemblages revealed significant differences between the two, including variation in the frequency of backed artefacts, other retouched and/or utilised tools, cores and the application of different reduction strategies (Rich 1992). Together with differences in the spatial distribution of the two forms of assemblage, this evidence was used to suggest that backed artefact production within the Narama landscape was a highly structured activity, and that knapping floors assemblages were the product of a more restricted range of behaviours than more generalised scatters. Although limited to a single landscape, evidence from other parts of the Valley (e.g., Hiscock 1986; Koettig 1992, 1994) supports the suggestion that backed artefact manufacture was a highly structured activity.

Although relevant to a variety of site types, geomorphic processes such as soil erosion and deposition are of particular relevance to the identification and definition of open artefact sites. As in other archaeological contexts (e.g., Fanning & Holdaway 2004; Fanning *et al.* 2009; Holdaway *et al.* 2000), it is now widely accepted by archaeologists working in the Hunter Valley that the visibility and preservation of open artefact sites in this region are, to a significant extent, products of contemporary, historic and prehistoric geomorphic processes which have, and continue to act variously to expose, obscure and destroy them (Dean-Jones & Mitchell 1993). As demonstrated by numerous large scale salvage projects in the Valley (e.g., Haglund 1992; Koettig 1992, 1994; Kuskie 2000; MacDonald & Davidson, 1998; Rich 1992) surface artefacts invariably represent only a fraction of the total number of artefacts present within recorded open artefact 'sites', with the majority occurring in subsurface contexts. Artefact exposure, unsurprisingly, is highest on erosional surfaces and lowest on depositional ones (cf. Fanning & Holdaway 2004; Fanning *et al.* 2009). Furthermore, in many areas, surface artefacts have been shown to form part of more-or-less continuous subsurface distributions of artefacts, albeit with highly variable artefact densities linked to environmental variables such as distance to water, stream order and landform (e.g., Kuskie & Clarke 2004; Rich 1992).

#### 6.1.2 Bondaian Stone Tool Technology

Chipped stone artefacts are a ubiquitous element of the Aboriginal archaeological record of the Hunter Valley. As in other parts of the state (e.g., Attenbrow 2010; Shiner 2008), this ubiquity has not only resulted in a long history of research but also guaranteed stone artefacts a prominent position in archaeological reconstructions of past Aboriginal land use in the region. To date, hundreds, if not thousands of surface-collected and excavated chipped stone assemblages from the Valley have been analysed, with individual assemblage sizes, research questions, aims, analytical methodologies and terminological schemes varying significantly between researchers and projects. Studies to date have ranged from basic descriptive accounts of assemblage composition in typological terms to detailed reconstructions of specialised knapping strategies through technological and metric attribute analyses, conjoining and, in some instances, experimental research. Particularly informative and/or influential analyses in the context of the Hunter Valley include those by Hiscock (1986a, 1986b, 1993), Koettig (1992, 1994) and Moore (1997, 2000).

As highlighted by Koettig (1994) and others (e.g., Hiscock 1986a; Hughes 1984), available technological and typological data for surface collected and excavated chipped stone artefact assemblages from the Hunter Valley suggest that the vast majority of these assemblages belong to what is known as the 'Australian Small Tool Tradition'. This term was coined by Gould (1969) to signal the appearance, in mid-Holocene, of a new suite of chipped stone tool forms in the Aboriginal archaeological record of Australia, including Bondi points, geometric microliths, adzes and points, both unifacially and bifacially flaked. Complex hierarchically-organised reduction sequences associated with the production of these tools contrast markedly with the simple chaining of earlier periods (Moore 2011). Tools of the 'Australian small tool tradition', it has been suggested, formed part of a portable, standardised and multifunctional tool kit aimed specifically at risk reduction (Hiscock 1994; 2006). Stone artefact assemblages from late Pleistocene and early Holocene contexts, in contrast, are described by archaeologists as belonging to the 'Large Core and Scraper Tool Tradition', a term first used by Bowler *et al.* (1970) to describe the Pleistocene assemblages recovered from Lake Mungo in western New South Wales. Bowler *et al.* (1970) saw the main components of these assemblages - core tools, steep-edged scrapers and flat scrapers - as characteristic of early Australian Aboriginal assemblages and as being of a distinctly different character to those appearing in the mid-Holocene around 6,000 BP and persisting into the contact period (i.e., the last 200 years). In eastern Australia, including the Hunter Valley, these later assemblages (i.e., those belonging to Gould's (1969) 'Small Tool Tradition') are referred to as 'Bondaian' assemblages (after McCarthy 1967).

Mid-to-late Holocene Aboriginal knappers in the Hunter Valley utilised a diverse range of lithic raw materials for chipped stone artefact production (Hughes 1984). However, two rock types - silcrete and indurated mudstone - were clearly favoured for this task (Hiscock 1986a). Alongside other, less commonly exploited raw materials, including quartz, quartzite, petrified wood, chalcedony, chert, porcellanite and local volcanics, both are available in the gravels of the Hunter River and its tributaries, occurring in pebble, cobble and, in the case of silcrete, boulder form (Raggatt 1938; see also Hiscock 1986a:14-16). Notably, studies by Esteves (1998) and MacDonald and Davidson (1998) have indicated spatial variability in the availability of silcrete and mudstone gravels along the Hunter River, with neither rock type continuously distributed, but rather, available at localised points. This evidence notwithstanding, on the basis of available data, it would appear that gravels associated with the Hunter River and its major tributaries functioned as *the* primary source of lithic raw materials for Aboriginal chipped stone artefact manufacture during mid-to-late Holocene. Other exploited sources are known (e.g., AECOM 2011; Dean Jones 1990, 1992; Mills 2000). However, reduction evidence at these locations has tended to take the form of a low density background scatter of flaked cobbles and flakes, suggesting relatively non-intensive on-source reduction (e.g., AECOM 2011; Mills 2000).

In the Hunter Valley, asymmetrical and symmetrical backed artefacts dominate the retouched components of surface collected and excavated chipped stone assemblages. Accordingly, the technology of backed artefact manufacture has been a particular focus of research (e.g., Baker 1992; Hiscock 1993; Koettig 1992; 1994a). Studies by Hiscock (1986a, 1993), Moore (1997; 2000) and others (e.g., (Baker 1992; Koettig 1992; Witter 1995; 1999) have demonstrated that backed artefact manufacture in the Hunter Valley was a highly structured activity involving a complex system of raw material procurement, transportation, preparation and reduction. Differences in the technological character of recovered cores and conjoin sets across the Valley indicate a significant degree of variability in the strategies used by Aboriginal knappers to produce blanks for backed artefact manufacture (**Figure 4**). Heat treatment, significantly, appears to have been integral component of the backed artefact manufacturing process in the Hunter Valley, with evidence for the thermal alteration of stone packages prior to reduction both abundant and widespread. As Hiscock (1993:66) has observed, "the thermal alteration of Hunter Valley silcrete drastically improves flaking qualities and increases the lustre and smoothness of the fracture surface". Compared with silcrete, evidence for the thermal alteration of indurated mudstone blanks is rare (e.g., Koettig 1992) and likely reflects the naturally higher flaking quality of this material.

Alongside the reconstruction of backed artefact manufacturing processes, the identification of diachronic change in Bondaian lithic technology in the Hunter Valley has received considerable analytical and interpretive attention (e.g., Baker 1992; Dean Jones 1992; Haglund 1989; Hiscock 1986a, 1986b; Koettig 1992; Rich 1991). Hiscock's (1986b) pioneering attribute analysis of a sample of unretouched mudstone flakes recovered from Sandy Hollow 1 rockshelter (Moore 1970) is of particular significance in this regard and can be considered the foundation upon which all other studies have been undertaken. This analysis sought to test a tripartite division of the Sandy Hollow 1 (SH1) assemblage made on the basis on chronological changes in backed artefact frequency (Hiscock 1986b:42). Three phases were recognised: Pre-Bondaian, Phase I Bondaian and Phase II Bondaian. Attribute analysis of a sample of 742 complete mudstone flakes from Square AA revealed technological changes consistent with this division, including, but not limited to, changes in the relative frequency of platform preparation and overhang removal as well as flake shape and platform size. Having established the validity of the three phase Bondaian sequence at SH1, Hiscock (1986b) applied the same attribute analysis to a series (n = 15) of chipped stone assemblages recovered from open artefact sites on the Mount Arthur North and Mount Arthur South coal leases and found that individual assemblages could be assigned to one of the three Bondaian phases recognised at SH1. On the basis of this evidence, Hiscock (1986b) proposed that the attribute analysis employed at SH1 could serve as a relative dating system for open sites in the Hunter Valley. Given the number of such sites within the region, this argument was particularly groundbreaking and has prompted several archaeologists to apply Hiscock's analysis to assemblages from other areas, albeit with mixed success (e.g., Baker 1992; Dean Jones 1992; Haglund 1989; Koettig 1992; Rich 1991). Difficulties in replicating Hiscock's results, Holdaway (Holdaway 1993:29) notes, can be linked, at least in part, to spatial variability in the methods used by Aboriginal knappers to reduce stone, variability itself prompted variables such as raw material type and accessibility, site function and stylistic differences between Aboriginal groups. As Hiscock (1984) himself has observed, different stone artefact technologies are likely to have both temporal *and* spatial components.

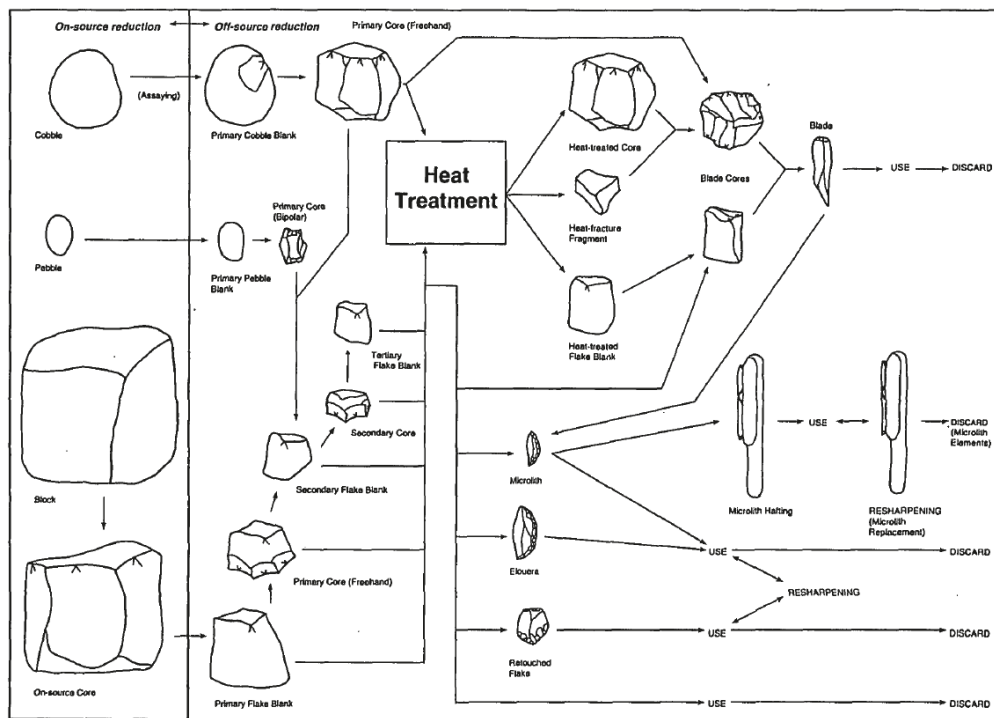


Figure 4: Moore's (2000) reduction model for the technology of Hunter Valley microlith assemblage (after Moore 2000: 29, Figure 5)

### 6.1.3 Chronology and Texture-contrast Soils

With some modification, McCarthy's (1967) *Eastern Regional Sequence* (ERS) of stone artefact assemblages remains the dominant chronological framework for Aboriginal prehistory in the Hunter Valley. The ERS hypothesises a three phase sequence of 'Capertian' (earliest), 'Bondaian' and 'Eloueran' assemblages and was developed on the basis of McCarthy's (1948; 1964) pioneering analyses of stratified chipped stone assemblages from Lapstone Creek rockshelter (McCarthy 1948), on the lower slopes of the Blue Mountains eastern escarpment, and Capertee 3 rockshelter (McCarthy 1964), in the Capertee Valley north of Lithgow. Hiscock's (1986b) three phase sequence notwithstanding, McCarthy's ESR is routinely characterised by archaeologists working within the Hunter Valley as a four-phase sequence, with the term Capertian retained and 'Bondaian' subdivided into three phases: Early Bondaian, Middle Bondaian and Late Bondaian<sup>1</sup> (Figure 5). The tripartite division of the Bondaian is based principally on the introduction and subsequent decline of backed artefact manufacture. However, other factors, such as changes in the abundance of bipolar and quartz artefacts, and the presence/absence of edge-ground axes are also relevant.

As in other parts of the state (e.g. Attenbrow 2010) evidence for Pleistocene and/or early Holocene Aboriginal occupation of the Hunter Valley is rare, with confirmed or potential terminal Pleistocene and/or early Holocene assemblages obtained from just five sites (Baker 1994; Hughes et al. 2000; Hiscock et al. 2000; Koettig 1986b; Kuskie 1999), one of which (i.e., Moffats Swamp Dune: Baker 1994) is located within the Valley's Coastal Plain. Significantly, studies by Koettig (1990), Baker (1994) and Kuskie (in prep), suggest that the chipped stone technology employed by Aboriginal knappers occupying the Hunter Valley during the terminal Pleistocene/early Holocene was part of the 'Large Core and Scraper tool Tradition'. This technology appears to have been focused on the opportunistic or non-specific reduction of early reduction cores (*sensu* Moore 2000) - some of which were very large. Core reduction appears simply to have geared towards the production of robust flakes for immediate use or retouch into simple scrapers, with no evidence for the complex hierarchically reduction sequences typical of the mid-to-late Holocene. Tool edges, Moore (2000:36) notes, were refurbished by unifacial retouching. A preference for volcanic materials over silcrete and mudstone has also been noted (Baker 1994; Koettig 1990, 1992:5). Heat treatment, meanwhile, is not reported for the early Hunter Valley assemblages.

<sup>1</sup> The Late Bondaian is equivalent to McCarthy's Eloueran phase.

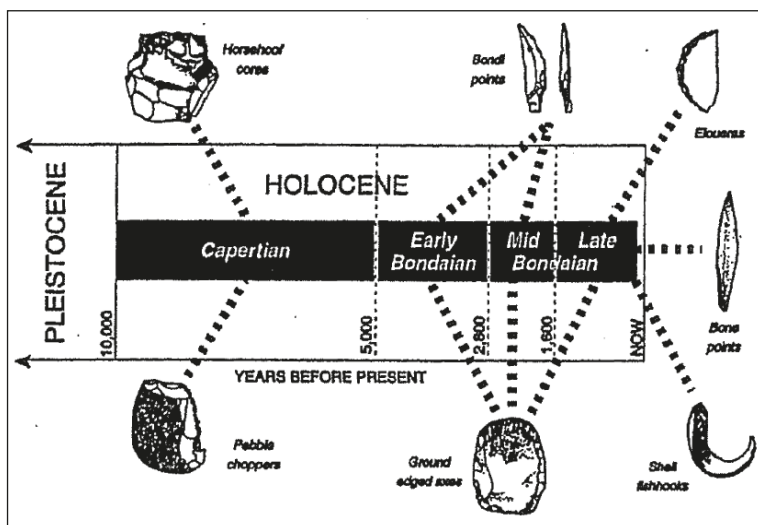


Figure 5: McCarthy's Eastern Regional Sequence (ERS) (from MacDonald and Davidson 1998: 105, Figure 5.1)

Critical to discussions concerning the chronology of Aboriginal occupation within the Hunter Valley is the genesis of the texture contrast or duplex soils that are associated with the vast majority of identified open artefact sites within the region (Dean Jones and Mitchell 1993). As Kuskie and Clarke (2004: 228) have pointed out, an understanding of the genesis of these soils, defined by Hughes (1984: 26) as those consisting of "an A horizon of massive, sandy to silty material which gives way abruptly down the profile to clayey material with a blocky structure", is critical for determining both the potential antiquity and integrity of any Aboriginal archaeological materials contained within them. Of particular relevance to archaeologists is the observation that whilst the 'A' and 'B' horizons of some texture contrast soils do, in fact, form a pedogenetical entity, having formed from *in-situ* weathering of parent materials, this is not always the case, with some 'A' horizons representing later colluvial deposits (Dean Jones and Mitchell 1993). In the Hunter Valley, available radiocarbon determinations and typological data for chipped stone assemblages recovered from excavated 'A' soil horizons provide overwhelming support for Hughes' (1984:28) widely cited suggestion that these soil horizons are sedimentary in origin and accumulated over the last 5,000 years. In contrast, Pleistocene dates for archaeological material in the Hunter Valley, confirmed through carbon dating of charcoal, have been associated with B unit soils (see Koettig 1986).

This said, as highlighted by Kuskie and Clarke (2004: 232), the paucity of information currently available on 'A' soil horizons between the last glacial maximum and late Holocene, precludes definitive comment on the maximum potential age of archaeological material within these horizons. As they quite rightly suggest, it is important that each locality be assessed independently given the complex interplay of pedogenetic and sedimentological processes that may have operated on the 'A' horizon within it. In contrast, Pleistocene dates for archaeological material in the Hunter Valley, confirmed through carbon dating of charcoal, have been associated with B unit soils (see Koettig 1986).

Drawing, in particular, on Mitchell's (1988) model for the genesis of duplex soils on hillslopes in the Sydney Basin, Dean Jones and Mitchell (1993) have suggested that rainwash (i.e., raindrop agitated surface flow) and bioturbation are crucial to the formation of texture contrast soils in these contexts. Following Mitchell (1988), they identify rainwash as the primary sediment transport mechanism operating on slopes but argue that, in isolation, slope transport will not result in a texture contrast profile. Duplex profiles, they suggest, will only form in situations where slope transport "combines with rapid rates of shallow bioturbation, especially soil mixing and mounding by organisms such as ants, termites and earthworms" (Dean Jones and Mitchell 1993: 43). Interestingly, Dean Jones and Mitchell (1993:43) attribute the development of stone layers between A and B horizons, a widespread geomorphological phenomenon in the Hunter Valley, to the down profile movement or 'sinking', over time, of stones through bioturbation. Stone layers, they suggest, will form at the level where bioturbation agents cease operating.

Bringing this and other observations to bear on the Aboriginal archaeological record the Hunter Valley, Dean Jones and Mitchell (1993:44) have suggested that the key archaeological implications of Mitchell's (1988) genesis model are as follows:

1. Duplex soils do not necessarily indicate great age;
2. Open sites located on texture contrast soils can never be truly stratified in a chronologically useful sense;
3. Stone artefacts on open sites will behave in the same way as natural stones on a hill slope and will be subject to surface dispersion, downslope movement, and differential burial or exposure, by bioturbation agents and will commonly form a stone layer; and
4. The only possible means of dating open sites in any meaningful way will be from artefact cultural sequences developed on the basis of stratified assemblages and/or intact hearths. All other dates, especially those based on detrital charcoal, will be spurious.

More broadly, Dean Jones and Mitchell (1993) and Hughes (2000) have highlighted a series of geomorphic contexts within the Hunter Valley that they believe represent favourable locations for the preservation of Pleistocene and/or early Holocene archaeological evidence. These include:

- Rock shelters and large middens;
- Source bordering dunes;
- The distal portions of low angle alluvial fans;
- Stream junctions where each tributary has a different rate of sediment supply; and
- Colluvial deposits at the base of steeply inclined surfaces.

#### **6.1.4 Occupation Models**

Existing models for Aboriginal site occupation in the Hunter Valley region are summarised in Table 4.

Table 4: Existing Models for Aboriginal Site Occupation in the Hunter Valley Region

| Researcher(s)                   | Location         | Summary of Model                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|---------------------------------|------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Dyall 1980                      | Mt Arthur        | Dyall proposed that creek confluences or junctions were most commonly used landforms for Aboriginal campsites.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| Hughes 1984                     | Hunter Valley    | Hughes proposed the often-quoted model of Aboriginal campsite location as commonly being found within 50 m of watercourses. Hughes argues that site sizes will diminish as the size of the watercourse decreases.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| Koettig 1994                    | Central Lowlands | Utilising the results of salvage excavations at Camberwell and Bulga and ethnographic accounts from central Australia, Koettig proposes camps were ordered according to strict rules based on: the location of water sources, the size and composition of the group or groups camping, and the length of the stay. Koettig further proposes: <ul style="list-style-type: none"> <li>Where occupation is infrequent, archaeological features at a site may be widely distributed and relatively infrequent.</li> <li>If, over time, occupation episodes are overprinted at the same site, then the evidence from different activity areas would be closer together and even superimposed.</li> <li>The longer the stay of groups at a campsite the more types of activities should be reflected and the greater should be the disturbance of occupation debris on the ground.</li> </ul> |
| Witter 1995                     | Hunter Valley    | Witter proposed that most open artefact scatters as being, for the most part, peripheral to one or more base camps near the Hunter River or its major tributaries.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| Dean-Jones, Pam & Mitchell 1993 | Hunter Valley    | Dean-Jones and Mitchell found that while the large majority of sites in the Hunter Valley have been distributed along drainage lines, there is potential for occupation to be associated with ridgelines as they provide linkage routes across the landscape. Elevated positions, particularly adjacent to fresh water supply are also noted as favourable occupation sites. Other landscapes such as terraces and mid slopes are also given preference, particularly during colder months when lower terrain may have been subject to frost hollow effects, and insects. Larger sites were noted to occur in valleys, as a result of greater resources.                                                                                                                                                                                                                                |
| Rich 1995                       | Mt Pleasant      | Rich argued that Aboriginal people making use of the Mt Pleasant area used technological solutions in conjunction with other strategies for survival. Groups were mobile occupying residential bases for one or several days. At such locations, they may have carried out a range of activities including stone tool production and maintenance, use of stone tools to make and maintain items, food processing and cooking, and other social/domestic tasks. From these residential bases, they might have made trips to the surrounding areas to produce food and various materials.                                                                                                                                                                                                                                                                                                 |
| Kuskie 2000a                    | Mt Arthur North  | Kuskie's work indicated that the entire landscape was utilised by Aboriginal people to varying extents. Kuskie refines Hughes' (1984) model that relates Aboriginal occupation sites adjacent to watercourses, by proposing that level to gently inclined landforms were preferred. Kuskie also finds that occupation sites are more commonly associated with 3 <sup>rd</sup> and 4 <sup>th</sup> order creeks. Vantage points are noted as important features for Aboriginal occupation sites. Kuskie found that Aboriginal people used and occupied the entire Mt Arthur North area but at varying intensities and at different times.                                                                                                                                                                                                                                                |

## 6.2 Local Archaeology

This section summarises a selection of Aboriginal archaeological assessments that have been carried out in the environs of the Study Area.

### 6.2.1 Kuskie

**Kuskie (2000a)** *An Aboriginal Archaeological Assessment of the Proposed Mount Arthur North Coal Mine, Near Muswellbrook, Hunter Valley, New South Wales.*

Kuskie (2000a) conducted an assessment of the Mt Arthur North lease area prior to proposed mining activities. The assessment examined 244 ha (6.6%) of the total Mt Arthur North lease area (3,700 ha). Unlike previous surveys, Kuskie (2000a) based his survey on a system of Archaeological Terrain Units (ATUs) i.e. landscape divisions based on a combination of landform elements and slope class. Archaeological survey areas were segments of an ATU that were surrounded on all sides by a different ATU. Kuskie (2000a) recorded artefactual materials in terms of *sites* (defined as the presence of one or more artefacts in a survey area – when an artefact is found in a survey area the whole survey area is regarded as a site) and *site loci* (spatially separate locations of evidence within a site).

The assessment identified a total of 305 sites within the survey area, 112 of which were previously recorded. Of these sites, 304 were stone artefact scatters and one was a grinding groove site – the same site (#37-2-0111 – Fairford 1) recorded by Dyllal (1980a). The sites were recorded in 1,188 separate site loci, which ranged in size from 0.3 m<sup>2</sup> to 60,000 m<sup>2</sup> and averaged 334 m<sup>2</sup>. Sites comprised of 1 to 21 site loci, but averaged two separate site loci. Total site size ranged from 540 m<sup>2</sup> to 1,444,487 m<sup>2</sup>. Kuskie (2000a) calculated that the sites occupied 81% of the whole Mt Arthur North EIS area. This figure is derived from the practice of defining a whole survey area (Kuskie's definition of survey area) as a site if physical evidence is found anywhere within it.

A total of 17,330 stone artefacts were identified during this assessment, with 15,982 recorded in detail. Sites were found at an average density of one site per hectare, and the number of artefacts recorded within each site ranged from 1 to 2,602. Within individual loci, recorded artefacts ranged from 1 to 670. Site loci had artefact densities between 0.0004 and 850 artefacts/m<sup>2</sup> and a mean of 0.183 artefacts/m<sup>2</sup>. This is 2.6 times higher than the average artefact density for all exposures, including those that did not contain artefacts. The majority of artefacts (86%) were recorded on surfaces exposed by sheet erosion. Artefacts were also noted in areas of stream bank erosion, gully erosion, rill erosion, dense vegetation, aggrading surface deposits and modified surfaces. Kuskie (2000a) recorded the following artefact distribution across the terrain units of Mt Arthur North. Overall, artefact densities were relatively low throughout the Study Area, despite artefacts being identified within a virtual continuum. All the landforms or variables sampled (geology, soils) contained archaeological materials.

Although sites were widely distributed throughout the Mt Arthur North landscape, Kuskie (2000a) noted several patterns in artefact distribution. Artefacts occurred at substantially higher densities within the valley flat landform element, on level to very gently inclined slopes, within 50 m of a watercourse (particularly if it was a higher order stream) and on level to very gentle valley flat ATU. Artefacts were widely distributed on ridge crests and spurs but in lower densities than expected. Artefact densities were higher than expected on simple slopes within all classes of slope (upper, mid, lower) and aggrading surfaces.

This distribution pattern led Kuskie (2000a) to argue that the most important landform units within the survey area were:

- The ridge crests/gentle sloping spurs;
- Moderate to steep simple slopes;
- Level/very gently sloping benches; and
- Level/very gently sloping valley flats.

Although Kuskie (2000a) identified the importance of valley flats and watercourses in this analysis, it is equally clear that occupation and use of higher terrain landform units is an important element in the assessment of this landscape.

The recorded assemblage contained 37 different types of artefacts, dominated by flakes (53.4%), microblades (16%) and flaked portions (15.1%). Evidence of utilised and/or retouched artefacts was not common (1.65%). The primary raw materials utilised were silcrete (51%) and IMT (34.6%), although 13 other stone materials were also identified.

Kuskie (2000a) concluded that the survey results indicated that a substantial body of Aboriginal heritage evidence existed at this site, of which only a small fraction was identified during the archaeological survey (due to the visibility constraints). The survey results also indicated that the major watercourses of the area were the focus of Aboriginal occupation, with level to gently inclined land typically preferred. Campsites tended to be positioned within 50 m of a watercourse, particularly on the third and fourth order streams. However, Kuskie (2000a) also noted the importance of vantage points within the landscape. The results indicated that the entire landscape was utilised to varying extents.

### 6.2.2 Kuskie & Clarke

**Kuskie & Clarke (2004)** *Salvage of Aboriginal Heritage Sites in the Mount Arthur North Coal Mine Lease, Hunter Valley, New South Wales.*

As a result of the Mt Arthur North Aboriginal heritage assessment undertaken by Kuskie (2000a) and in view of the limited scope for avoiding impacts to sites identified, Kuskie and Clarke (2004) conducted a program of salvage excavation in 2004. The salvage excavations were conducted in four phases comprising of mechanical test scrapes, broad-area hand excavations, mechanical surface scrapes and localised hand excavations within the surface scrapes. Mechanical excavations covered a total of 15.5 ha, although additional mechanical surface scrapes (totalling 23 ha) were conducted along an extensive portion of the Whites Creek valley flats following the identification of a burial site. Therefore, a combined total of 38 ha of surface scrapes were completed, resulting in a total of 138.7m<sup>3</sup> of soil being excavated and sieved. In addition, a total of 779.75 m<sup>2</sup> was excavated by hand.

In all, the excavations retrieved a total of 32,866 stone artefacts with a total of 43 stone artefact types. Kuskie and Clarke (2004) identified a total of six activity categories including non-specific stone flaking, bipolar flaking, microblade production, backing retouch of microliths, loss or intentional discard of microliths and loss or intentional discard of non-microlith tools. The production of backed artefacts was the most common specific activity and the generally small size classes that characterised much of the assemblage was attributed to backed-blade production. However, these specific-activity attributes accounted for a small proportion of the overall assemblage with the remainder (97%) the result of non-specific knapping.

A total of 16 discrete stone materials were identified with silcrete being the most common (59.4%) followed by tuff or IMT (19.4%) and then, porcellanite (10%), quartz (4.3%) and petrified wood (3.5%). Other raw materials recorded (at much lower frequencies) included quartzite, chert, chalcedony, basalt, sandstone, volcanic glass, glass, ochre and two unidentified types of volcanic stone.

Stone artefacts occurred at varying densities throughout the landscape and within the soil profile. Artefact densities resulting from the main hand excavations ranged from 11 artefacts/m<sup>3</sup> at the ridge and Hunter River upper section to 271.7 artefacts/m<sup>3</sup> in the Whites Creek upper section, with a mean of 106.8 artefacts/m<sup>3</sup>.

Kuskie and Clarke (2004) conclude from these results, that proximity to Whites Creek was more important to Aboriginal people than proximity to the Hunter River. The surface scrapes and excavations at Whites Creek contained much higher frequencies of 'background discard', higher frequencies of focussed activity areas, and a greater range and quantity of activities. Moreover, activity areas along Whites Creek represent substantially more intense activity and involve a greater range of stone materials than those along the ridge from Mt Arthur to the Hunter River.

In addition, Kuskie and Clarke (2004) suggested that the Whites Creek activity areas reflect a lifestyle involving several short-term temporary encampments used by small groups of people during the course of daily/seasonal hunting, in comparison to evidence along the ridge from Mt Arthur to the Hunter River, which indicates transitory movement. Radiocarbon dating, geomorphological and lithic evidence indicates that there is a high probability that occupation of the area was limited to the mid to late Holocene.

### 6.2.3 Umwelt Pty Ltd

#### Umwelt (2008) Mt Arthur Underground Project.

Umwelt (2008) conducted an assessment of Mt Arthur Underground to support an EA for the project. This assessment examined approximately 1,233 ha (32.7%) of the Mt Arthur Underground Project Boundary (3,800 ha). Like Umwelt's (2007) South Pit Extension survey, Umwelt (2008) used a modified version of the methodology used by Kuskie (2000a, 2000b), basing the survey on comparative ATUs and landform elements in an effort to obtain comparative data. However, the definition used to describe 'sites' differed slightly from Kuskie's (2000a, 2000b) and Umwelt's (2007) methodologies in that isolated artefacts were differentiated from artefact scatters and, more significantly, sites were defined on the basis of PADs connecting two or more loci or only loci if PADs were not defined. The assessment identified a total of 77 sites comprising of 509 site loci within the survey area. Of these sites, 76 were occupation sites (46 stone artefact scatters and 30 isolated artefacts) and one was a scarred tree site. The sizes of separate site loci were not recorded. Sites comprised 1 to 45 site loci, but averaged six separate site loci. A total of 9,603 stone tool artefacts were identified during this assessment. Sites were found at an average density of 0.02 sites per ha and loci were found at an average density of 0.1 loci per ha. The number of artefacts recorded within each site ranged from 1 to 2,768. Within individual loci, recorded artefacts ranged from 1 to 2000, though less than 10 artefacts was the norm.

The recorded assemblage contained 11 different types of artefacts, dominated by flakes and broken flakes (percentages not calculated). Evidence of utilised and/or retouched artefacts and microblade manufacturing was not common within the assemblage. The primary raw materials utilised were IMT, followed by silcrete, with lower utilisation of porcellanite, quartz, chert, quartzite, hornfels, basalt, silicified sandstone, petrified wood, chalcedony, tuff and river pebbles (manuports) in site loci with larger assemblages.

The majority of recorded artefacts were identified on surfaces exposed by sheet erosion. Artefacts were also identified in areas of stream bank erosion, gully erosion, rill erosion, dense vegetation, aggrading surface deposits and modified surfaces.

**Table 8** shows Umwelt's (2008) recordings of artefact distribution across the terrain units of Mt Arthur Underground.

**Table 5: Artefact Distribution Recorded at Mt Arthur Underground by Umwelt (2008)**

| Landform                                | No. Artefacts | Effective Site Loci Area (m <sup>2</sup> ) | Artefact Density (No./m <sup>2</sup> ) |
|-----------------------------------------|---------------|--------------------------------------------|----------------------------------------|
| Simple slope (level – v. gentle)        | 199           | 1,734                                      | 0.1148                                 |
| Simple slope (gentle)                   | 391           | 15,691                                     | 0.0249                                 |
| Simple slope (moderate – steep)         | 817           | 45,493                                     | 0.0699                                 |
| Drainage depression (level – v. gentle) | 1,912         | 224,808                                    | 0.0085                                 |
| Drainage depression (gentle)            | 4,592         | 50,593                                     | 0.0908                                 |
| Drainage depression (moderate – steep)  | 973           | 23,297                                     | 0.0418                                 |
| Ridge crest Ridge Line                  | 82            | 11,682                                     | 0.0070                                 |
| Spur crest                              | 447           | 2,472                                      | 0.1808                                 |
| Modified terrain                        | 190           | 3,199                                      | 0.0594                                 |
| <b>Totals</b>                           | <b>9,603</b>  | <b>378,969</b>                             | <b>0.0253</b>                          |

*Note: For the purposes of calculating total number of artefacts for an ATU, where a range of artefacts is given for a site (loci) the higher number is used for the calculation. Therefore, the number of artefacts shown is the upper limit and consequently the actual artefact densities may be lower.*

Overall, artefact densities were relatively low throughout the Study Area, although densities were markedly higher on the spur crests and, to a lesser extent, on level to very gentle slopes.

Although sites were widely distributed throughout the Mt Arthur Underground landscape, Umwelt noted several patterns in artefact distribution. The majority of site loci occurred within gentle drainage depressions, on gently inclined slopes, and on creek banks or within 50 m of a watercourse (particularly if it was a higher order stream in proximity to confluences). Artefacts occurred in low frequencies on ridge crests and spurs, with Umwelt attributing the use of these landforms by Aboriginal people as a result of their views. Artefact densities were lower than expected on simple slopes within all classes of slope (upper, mid, lower), compared with Kuskie's (1999) findings. Artefact densities were much higher than expected in moderate to steep drainage depressions, which Umwelt postulates is due to these gullies being used as travel routes to the tops of ridges. This distribution pattern led Umwelt to argue that the most important landform units within the survey area were drainage depressions regardless of slope class.

Although Kuskie (2000a) identified the importance of valley flats and watercourses in his analysis, he also believed that occupation and use of higher terrain landform units including higher slopes, spurs and ridges, was also important. This view is not supported by Umwelt's (2008) findings; however, the survey results also indicated that the major watercourses of the area were the focus of Aboriginal occupation, with gently inclined land preferred for occupation. Campsites tended to be positioned within 50 m of a watercourse, particularly on the third and fourth order streams.

#### 6.2.3.1 Rich

**Rich, E. R. (1995b).** *Mt Pleasant Coal Lease, Near Muswellbrook, NSW Archaeological Survey for Aboriginal Sites*

Rich undertook an archaeological survey of the Mt Pleasant coal lease, extending from Wybong road in the south to Dorset Road in the north. A total of 327 Aboriginal sites were recorded comprising 180 isolated artefacts and 93 artefact scatters (the remaining site types are not provided). In total 1,408 artefacts were recorded including backed blades and associated knapping debris, cores, a variety of retouched and/or used flakes and pieces, and larger pebble tools and axes of igneous materials. Silcrete was the predominant raw material utilised across the study area (58%) followed by mudstone 28%, igneous 5%, quartz 3%, and other 7%. Rich (1995) noted the composition of the assemblage was found to be similar to that identified at Bengalla.

Rich (1995) found artefact densities along gullies tended to be higher than on hill slopes and ridges. No artefacts were found on the slopes of Mt Pleasant above 300m and none was found on the Hunter Flats. Variation in artefact density across the lease was attributed to a variety of factors including the effects of land disturbance. It is noted, that artefact distribution does not appear to have been controlled by the availability of, or proximity to, the silcrete raw material source B10 (37-2-0579) identified at Bengalla given the almost identical percentage of silcrete artefacts. It is also noted that backed blades were found only near drainage lines and associated with larger-sized assemblages, a finding that is not uncommon in the Hunter Valley.

Rich (1995) provides a tentative occupation model for the landscape based on the site location, artefact counts and artefact typology. Groups were presumed to be mobile occupying residential bases for one or several days. At such locations, they may have carried out a range of activities including stone tool production and maintenance, use of stone tools to make and maintain items, food processing and cooking, and other social/domestic tasks. From these residential bases, they might have made trips to the surrounding areas to produce food and various materials.

#### 6.2.4 MCAS

**Myall Coast Archaeological Services (MCAS) (2007).** *Aboriginal Cultural Survey Stage 3 Mount Pleasant.*

MCAS undertook archaeological survey for the Mt Pleasant Coal Project Stage 3. A total of 346 Aboriginal archaeological sites were recorded. The total number of individual artefacts recorded was 1802, consisting primarily of silcrete (n= 1202), IMT (n=479), chert (n=52), quartz (20) petrified (18), porcellanite (14) and basalt (17).

### 6.2.5 Scarp

**Scarp (2009).** *Cultural Heritage Investigations Stage 5, Mt Pleasant Mine, Hunter Valley.*

Scarp undertook archaeological survey for the Mt Pleasant Coal Project Stage 5. A total of 136 Aboriginal archaeological sites were recorded including 20 artefact scatters, 113 isolated artefacts and 3 possible scarred trees. The total number of artefacts recorded was 256, of which, 154 were flakes with 52 being retouched, and 48 were cores. Silcrete was the dominant raw material accounting for over 50% of the assemblage, with IMT accounting for 20%. Basalt, other volcanic material, quartz, quartzite, chalcedony, petrified wood and sandstone comprising the remainder of the assemblage. Scarp suggests lack of evidence for large or complex sites within the study area, combined with small assemblage numbers with high frequencies of retouched and worn artefacts, supports the proposition that use of the area was restricted to temporary or short term occupation.

## 6.3 Archaeological Work within the Project Boundary

The following Aboriginal heritage assessments have been carried out within the Project Boundary.

### 6.3.1 Rich

**Rich, E. R. (1993).** *Archaeological Survey for Aboriginal Sites, Proposed Bengalla Coal Mine.*

Rich undertook an archaeological survey within the disturbance area of the Project, extending from Wybong Road in the north, to the Muswellbrook-Merriwa Railway line in the south, and from Bengalla Road in the east in 1993 for the Bengalla EIS (Existing Project Boundary). A total of 56 Aboriginal sites were recorded, comprising 39 artefact scatters and 17 isolated artefacts. Artefacts were found to occur on all landforms, including Dry Creek, gullies, flats, rises, slopes and ridge tops. The most significant site recorded was a silcrete quarry B10 associated with tertiary ridge gravels.

Rich hypothesises that three stone industries were present in the area: a microblade (i.e. backed blade) industry, a small flake tool industry, and a large tool industry that included large retouched flakes, unifacial and bifacial pebble tools, axes, hammerstones and a grindstone. Interestingly, Rich found that the various stone industries tended to be found on different landform units. Microblade industries were concentrated along the main creek and around the confluence of minor gullies. Small flake tool assemblages tended to occur along minor gullies and on hill slopes and ridges while artefacts of the large tool industry were found on most land units, but most frequently on land units close the Hunter flats and on slopes and ridges away from the flats. Silcrete was the predominant raw material recorded, accounting for 60% of all artefacts. Much of this material was found naturally occurring at the quarry site B10 (37-2-0579) and likely procured there. IMT was the next most commonly recorded raw material (26%).

The majority of recorded artefacts comprised flake and non-flake debitage (82%) with cores and tools reasonably well represented at 8.5% and 8.2% respectively. Cores and tools were also reasonably well represented at 8.5% and 8.2% respectively.

Rich concluded that most of the Bengalla coal lease had been substantially disturbed by previous land uses such as clearing, ploughing, grazing, construction of dams, contour drains, fences, transmission lines, track and general erosion. Most recorded sites were extensively damaged.

Consent to Destroy Permit (CtD) SZ133 dated 12 March 1997 was granted under Section 90 of the National Parks and Wildlife Act 1974 (NPW Act) to salvage those sites which were to be directly impacted upon by the development of Bengalla

### 6.3.2 White

**White, E. (1998).** *Archaeological Salvage of Sites B10 & B33, Bengalla Mine, Hunter Valley, NSW.*

White undertook salvage excavation of the previously identified quarry site B10 (37-2-0579) and artefact scatter B33 (37-2-0602) at Bengalla in 1998. The works constituted the first large scale excavation of a quarry in the Hunter Valley. The quarry site was located on an elevated ridge roughly 600 m from the Hunter River and comprised of cobbles of silcrete, petrified wood, quartz, and other fine-grained siliceous and igneous materials. Two large pits, B10-1 and B10-2, measuring 5 x 10 m were excavated. B10-1 was excavated within the outcrop of silcrete cobbles and recovered 4,454 artefacts. Results found that the most commonly utilised material were the sub-angular silcrete boulders embedded in the stony deposit and showing above the ground. White observed that the tops of these boulders were battered to remove large flakes that were subsequently used as cores for flaking.

Heat treatment of some of these larger flakes/cores prior to flaking was noted. Artefact densities at the site were up to 1,200 artefacts per metre squared. Excavations at B10-2, located approximately 2 km upstream from B10 (37-2-0579), recovered 222 artefacts. White concludes from the low artefact density at excavations site B10-2 that use of the site was episodic and related to foraging and hunting activities.

Excavations at B33 (37-2-0602), located 2.8 km north of B10 (37-2-0579), included another 5 x 10 m trench. A total of 142 artefacts was recorded during excavation. In addition to the 5 x 10 m pit, the remains of a partly eroded knapping floor, referred to as B33-2 was also excavated employing a 3 x 5 m pit. A total of 523 heat shattered and flaked artefacts were recovered. No backed artefacts were identified, leading White to argue that the sites were used for stone processing, rather than tool production.

All excavated artefactual material was analysed and is currently housed within the Australian Museum.

### 6.3.3 ERM

**ERM. (2007).** *Bengalla Mine Section 90 #2621.*

ERM undertook a surface collection and excavation for Section 90 application #2621 for Aboriginal quarry site B10 (37-2-0579) at Bengalla in 2007. A total of 166 stone artefacts was collected during the surface collection and 39 during the excavation. Excavations consisted of grader scrapes across the site. Analysis of artefactual material recovered found the dominant raw material utilised was silcrete, accounting for 90% of all artefacts. Far fewer artefacts were recovered from the excavations than the surface collection. Artefacts recovered from subsurface contexts were found to be larger on average and comprising of a greater number of cores. From this result, it is concluded that core reduction, in the context of the subsurface deposit was being undertaken elsewhere.

All excavated artefactual material has been subject to analysis and attempts are currently being made to house the material within the Australian Museum.

### 6.3.4 ENSR AECOM

**ENSR AECOM. (2008).** *Bengalla Link Road Stage Two Archaeological Salvage Bengalla Mine.*

ENSR AECOM undertook a program of surface collection grader scrapes of Aboriginal sites identified along the route of the Bengalla Link Road Stage 2. Nine Aboriginal sites were salvaged, resulting in the recovery of 56 artefacts. All sites were considered low density artefact scatters, with the low numbers of artefacts attributed to the great distance of the sites from permanent water sources. Silcrete was the most commonly identified raw material, accounting for 66% of all artefacts. The remaining raw materials comprised IMT (20%), quartz (7%) porcellanite (2%) and other igneous (2%).

All excavated artefactual material has been subject to analysis and attempts are currently being made to house the material within the Australian Museum

### 6.3.5 CQCHM

**Central Queensland Cultural Heritage Management (CQCHM). (2010).** *Mount Pleasant Project Modification Aboriginal Cultural Heritage Assessment Report.*

CQCHM undertook archaeological survey associated with the transport corridor for the Mount Pleasant Project across both BMC and Coal & Allied owned land. Within the Project Boundary approximately 130 isolated artefacts, four artefact scatters, four scarred trees, and three potential scarred trees were identified. All sites were attributed low or moderate archaeological significance.

All artefacts recorded were left *in-situ* and were not subject to collection or salvage.

## 6.4 Known Archaeological Sites

### 6.4.1 AHIMS Sites Within the Study Area

A search of the AHIMS database was conducted on 29 September 2011. A total of 215 registered Aboriginal sites were identified within the Study Area. Of these, 19 were listed as destroyed, deleted, or were duplicates. The remaining 196 sites comprise 112 artefact scatters, 79 isolated artefacts, four scarred trees and one quarry. Further detail on these sites is provided in **Section 9.0** and **Appendix c**.

**Table 6** provides a summary of Aboriginal site types located within the Study Area.

Table 6: Previously Recorded AHIMS Sites within the Study Area

| Site Type          | Number of Features | Percentage (%) |
|--------------------|--------------------|----------------|
| Artefact Scatters  | 112                | 57             |
| Isolated Artefacts | 79                 | 40             |
| Scarred Trees      | 4                  | 2              |
| Quarry             | 1                  | 1              |
| <b>Total</b>       | <b>196</b>         | <b>100</b>     |

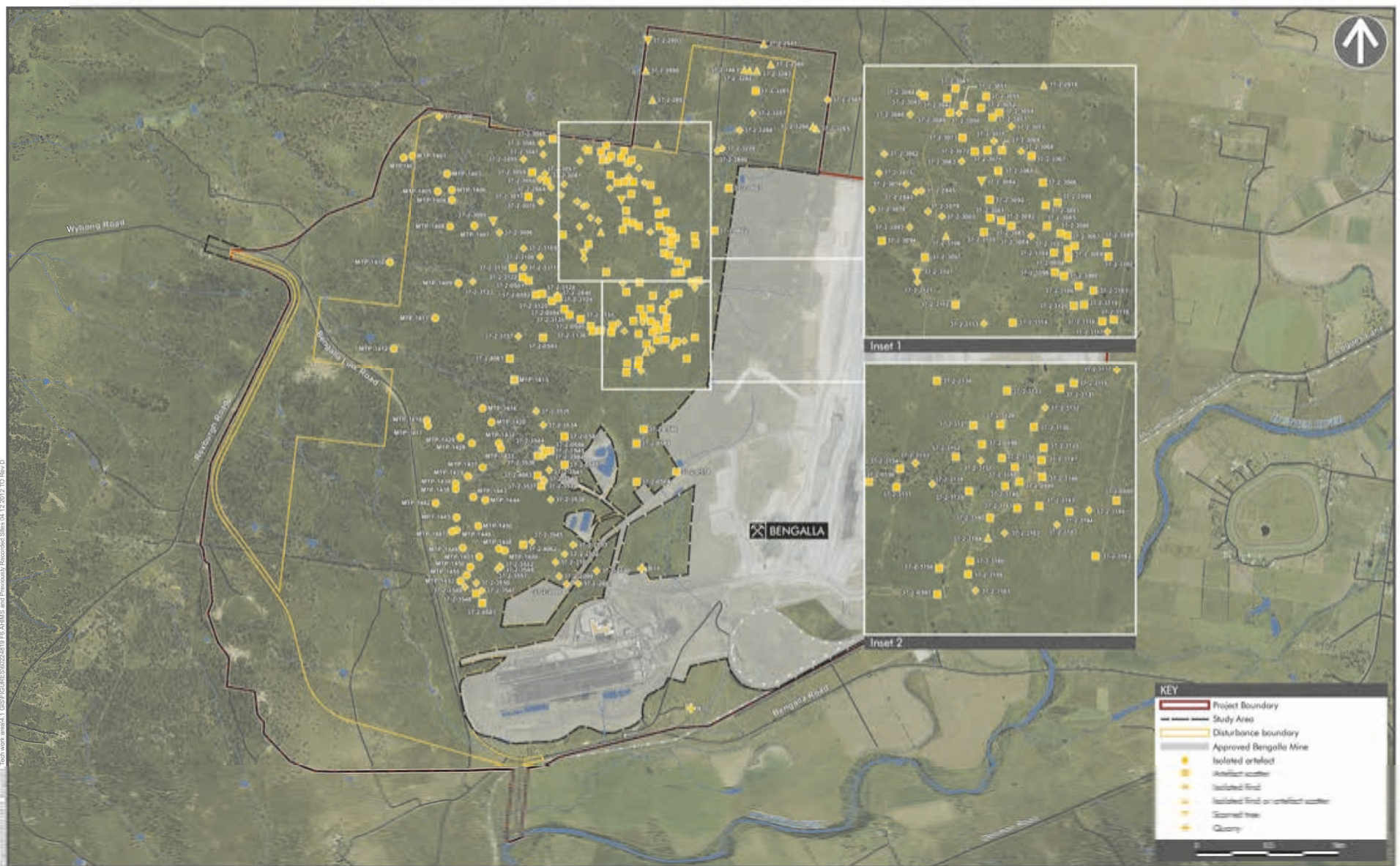
#### 6.4.2 Sites in Previous Reports

A review of the Mount Pleasant Project Modification Aboriginal Cultural Heritage Assessment Report (CQCH 2010) has identified four artefact scatters and 35 isolated artefact sites as occurring within the Study Area that were not identified on the AHIMS register. Details for the sites are provided in **Table 7** including an approximation of their coordinates based on geo-referencing Figure 5 within the assessment.

Table 7: Sites Identified in Previous Reports

| Site Name | Site Type         | GDA94 Zone 56 E | GDA94 Zone 56 N |
|-----------|-------------------|-----------------|-----------------|
| MTP-1401  | Isolated Artefact | 292739          | 6428967         |
| MTP-1402  | Isolated Artefact | 292677          | 6428953         |
| MTP-1403  | Artefact Scatter  | 293358          | 6426904         |
| MTP-1404  | Isolated Artefact | 293018          | 6428655         |
| MTP-1405  | Isolated Artefact | 292918          | 6428717         |
| MTP-1406  | Isolated Artefact | 293018          | 6428726         |
| MTP-1407  | Isolated Artefact | 293174          | 6428475         |
| MTP-1408  | Isolated Artefact | 293004          | 6428470         |
| MTP-1409  | Isolated Artefact | 293063          | 6428072         |
| MTP-1410  | Isolated Artefact | 292578          | 6428220         |
| MTP-1411  | Isolated Artefact | 292899          | 6427827         |
| MTP-1412  | Artefact Scatter  | 292593          | 6427618         |
| MTP-1415  | Isolated Artefact | 293453          | 6427387         |
| MTP-1416  | Isolated Artefact | 293231          | 6427188         |
| MTP-1417  | Isolated Artefact | 292847          | 6427065         |
| MTP-1418  | Isolated Artefact | 292838          | 6427103         |
| MTP-1420  | Isolated Artefact | 293292          | 6427089         |
| MTP-1428  | Isolated Artefact | 293155          | 6426942         |
| MTP-1429  | Isolated Artefact | 293075          | 6426985         |
| MTP-1432  | Isolated Artefact | 293344          | 6426942         |
| MTP-1433  | Isolated Artefact | 293358          | 6426904         |
| MTP-1437  | Isolated Artefact | 293231          | 6426772         |
| MTP-1438  | Isolated Artefact | 293041          | 6426620         |
| MTP-1439  | Isolated Artefact | 293127          | 6426710         |
| MTP-1440  | Isolated Artefact | 293125          | 6426706         |
| MTP-1442  | Isolated Artefact | 292899          | 6426521         |
| MTP-1443  | Isolated Artefact | 292985          | 6428840         |
| MTP-1444  | Isolated Artefact | 293248          | 6426542         |
| MTP-1445  | Isolated Artefact | 293046          | 6426422         |
| MTP-1447  | Isolated Artefact | 293013          | 6426322         |
| MTP-1448  | Isolated Artefact | 293046          | 6426332         |

| Site Name | Site Type         | GDA94 Zone 56 E | GDA94 Zone 56 N |
|-----------|-------------------|-----------------|-----------------|
| MTP-1449  | Isolated Artefact | 293089          | 6426209         |
| MTP-1450  | Isolated Artefact | 293198          | 6426360         |
| MTP-1451  | Isolated Artefact | 293205          | 6426145         |
| MTP-1452  | Isolated Artefact | 293070          | 6425972         |
| MTP-1455  | Artefact Scatter  | 293046          | 6426422         |
| MTP-1456  | Artefact Scatter  | 293143          | 6426073         |
| MTP-1458  | Isolated Artefact | 293344          | 6426201         |
| MTP-1459  | Isolated Artefact | 293384          | 6426187         |
| MTP-1401  | Isolated Artefact | 292739          | 6428967         |



AHMS AND PREVIOUSLY RECORDED SITES WITHIN THE STUDY AREA  
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FIGURE 6

## 7.0 Predictive Model

Consideration of the environmental, archaeological and ethnohistoric context of the Study Area and its surrounds allows a series of predictions to be made concerning the nature and distribution of Aboriginal archaeological sites within it. This section provides a working predictive model for the Aboriginal archaeology within the Study Area based on the data summarised in **Sections 4.0, 5.0 & 6.0**. Predictions are made concerning the type of sites likely to occur within the Project Boundary, as well as their likely content, distribution and integrity.

**Table 8: Key Predictions for Aboriginal Site Distribution, Content and Integrity**

| Site type              | Distribution                                                                                                                                                                                                                                                   | Content                                                                                                                                                                                                                                                                                                                                               | Integrity                                                                                                                                                                                                         |
|------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Open artefact scatters | <ul style="list-style-type: none"> <li>- The majority of scatters will occur in association with creek lines</li> <li>- Scatters are also likely to occur on hill slopes and ridge crests, often at a vantage point over the surrounding landscape.</li> </ul> | <ul style="list-style-type: none"> <li>- Stone artefacts will be the most common form of artefact present within identified scatters.</li> <li>- Silcrete followed by IMT will be the dominant raw material across the majority of sites.</li> <li>- Flake debitage will dominate recorded site assemblages whilst retouched will be rare.</li> </ul> | <ul style="list-style-type: none"> <li>- Open surface scatters along creek lines, slopes and ridge tops will exhibit varying degrees of archaeological integrity, depending on the effects of erosion.</li> </ul> |
| Isolated artefacts     | <ul style="list-style-type: none"> <li>- The majority of isolated artefacts will occur within and in association with creek lines.</li> </ul>                                                                                                                  | <ul style="list-style-type: none"> <li>- The majority of isolated artefacts will comprise chipped stone artefacts.</li> </ul>                                                                                                                                                                                                                         | <ul style="list-style-type: none"> <li>- Isolated artefacts will exhibit varying degrees of integrity.</li> </ul>                                                                                                 |
| Archaeological deposit | <ul style="list-style-type: none"> <li>- Archaeological deposits are likely to occur in alluvial soils along higher order creek lines.</li> </ul>                                                                                                              | <ul style="list-style-type: none"> <li>- Archaeological deposit will likely comprise of stone artefacts. Hearths may also be present.</li> </ul>                                                                                                                                                                                                      | <ul style="list-style-type: none"> <li>- Archaeological deposits will have varying degrees of integrity, particularly along creek lines, which experience significant erosion.</li> </ul>                         |
| Scarred trees          | <ul style="list-style-type: none"> <li>- Scarred trees may occur where original remnant vegetation remains.</li> </ul>                                                                                                                                         | <ul style="list-style-type: none"> <li>- Scarred trees will likely be eucalypts i.e. box.</li> </ul>                                                                                                                                                                                                                                                  | <ul style="list-style-type: none"> <li>- Scarred trees are likely to be extremely old, dying or dead.</li> </ul>                                                                                                  |
| Quarry sites           | <ul style="list-style-type: none"> <li>- Quarry sites may occur where exposed silcrete and mudstone outcrops occur.</li> </ul>                                                                                                                                 | <ul style="list-style-type: none"> <li>- Stone artefacts will likely consist of large shattered cobbles.</li> </ul>                                                                                                                                                                                                                                   | <ul style="list-style-type: none"> <li>- Quarry sites will exhibit varying degrees of integrity.</li> </ul>                                                                                                       |

## 8.0 Archaeological Survey Methodology

### 8.1 Aim and Objectives

The aim of the archaeological survey was to identify, record and map Aboriginal heritage values within the Study Area. These values include both the tangible remains of past Aboriginal activity (i.e. archaeological evidence) as well as intangible cultural values. To achieve these aims, the following specific survey objectives were developed:

- To relocate and re-record all previously recorded Aboriginal archaeological sites within the Study Area.
- To comprehensively survey, by pedestrian transects, land within the Study Area.
- To inspect, where appropriate, areas of known or potential Aboriginal cultural value, including AHIMS sites, and areas identified by RAP representatives.
- To obtain sufficient data to facilitate the development of appropriate management and mitigation measures for identified Aboriginal sites and areas of archaeological sensitivity.

### 8.2 Archaeological Survey Team

A field team of two AECOM archaeologists (Geordie Oakes and Andrew McLaren) and 28 rostered RAP representatives. A list of representatives who participated in the archaeological survey is provided in **Section 3.3.2**.

### 8.3 Survey Methodology

The archaeological survey was undertaken over a total of 15 days between 14 May and 6 June 2012. Survey was confined to the Study Area, which encompasses all areas within the Project Boundary (and outside the Approved Bengalla Mine) with particular focus on areas contained within the Disturbance Boundary.

A comprehensive survey methodology was adopted whereby equally spaced pedestrian transects were undertaken over the entire Study Area south of Wybong Road and survey of the areas of proposed disturbance north of Wybong Road. All survey was undertaken on foot, with the archaeological survey team walking in line abreast at roughly 10 m intervals. Individual linear transect widths were dependent on the number of RAP representatives and archaeologists participating each day (range 70 to 130 m). Each transect was recorded using a handheld differential GPS (DGPS) (see **Figure 7** for transect data). During each transect notes were taken on landform, soils and surface exposure characteristics and photographs were taken.

All Aboriginal archaeological sites identified during survey were recorded to a standard comparable to that required by the *Code of Practice for Archaeological Investigation of Aboriginal Objects in NSW* (NSW Department of Environment Climate Change & Water 2010b). For each site located or re-visited, individual artefact locations were captured by DGPS. Associated site data (e.g. location, type and content) was also documented. The following attributes were recorded for all stone artefacts: raw material, artefact type, length, width, thickness, cortex, flake type, platform type, core type, core blank, number of scars, length of longest scar, tool type, tool condition, tool blank, retouch direction, backing type, retouch location, and angle of retouch.

## 8.4 Landform Elements

While a sampling strategy was not adopted for the assessment, the Study Area was divided into discrete landform based areas for the purpose of site description and analysis. **Table 9** provides the landform elements identified within the Study Area and **Figure 7** provides a map of those elements.

**Table 9: Landform Elements Identified in the Study Area**

| Landform Element     | Description                                                                                                                           |
|----------------------|---------------------------------------------------------------------------------------------------------------------------------------|
| Hilltop/Ridge/Crests | Landform that stands above all, or almost all, points in the adjacent terrain.                                                        |
| Upper slope          | Slope element adjacent below a crest.                                                                                                 |
| Mid slope            | Slope element lying between the upper slope and lower slope.                                                                          |
| Lower slope          | A waning slope, below a mid slope and above a flat.                                                                                   |
| Flat                 | A planar landform that is neither a crest nor a depression and is level or very gently inclined (less than 3% tangent approximately). |

## 8.5 Site Definition – Surface Features and Deposit

A discussion is provided below of the difficulties of defining a 'site' and a supporting argument for the methodology employed for this assessment.

The definition, in spatial terms, of Aboriginal archaeological sites is a topic of considerable importance to modern cultural heritage management and one that has generated significant discussion in Australian archaeology (e.g., Holdaway 1993; 2000; MacDonald & I. Davidson 1998b; Shiner 2008). Aboriginal archaeological sites can be broadly defined as places in the landscape that retain physical evidence of past Aboriginal activity. Such evidence can assume a range of forms, depending on the nature of the activity (or activities) that produced it, and can vary dramatically in quantity and extent. Some Aboriginal archaeological sites are, by their very nature, easy to define in spatial terms. Scarred trees and rock shelters, for example, can be readily delineated from their surrounding landscapes. Difficulties arise, however, for sites whose present-day physical extent is, more often than not, a product of natural geomorphological processes (e.g., soil accretion and erosion), as opposed to the actions of Aboriginal people in the past.

Although relevant to a variety of site types, the taphonomic bias introduced by natural geomorphological processes is of particular relevance to identification and definition of surface scatters of stone artefacts, commonly referred to as 'artefact scatters' or 'campsites'. As demonstrated by countless large-scale excavations projects in southeastern Australia, surface artefacts almost invariably represent only a fraction of the total number of artefacts present within these sites, with the majority occurring in subsurface contexts. At the same time, in many areas, surface artefacts have been shown to form part of more-or-less continuous subsurface distributions of artefacts, albeit with highly variable artefact densities linked to environmental variables such as stream order, landform, slope and distance to water.

Such evidence poses a significant analytical and interpretive dilemma with respect to how to define a 'site'. To do so, on the basis of surface artefacts alone is clearly problematic, with modern site boundaries invariably reflecting the size and distribution of surface exposures as opposed to the actions of Aboriginal people in the past. Nonetheless, for pragmatic reasons, this is the most commonly used approach, with 'distance' and 'density-based' definitions dominating. In NSW, two of the most commonly employed distance-definitions are '*two artefacts within 50m of each other*' and '*two artefacts within 100 m of each other*'. Neither definition is derived from a particular theoretical approach or body of empirical research - they are simply pragmatic devices for site definition. Definitions based on artefact density also vary in their particulars. However, one of most commonly used definitions is that which isolates, within an arbitrarily defined 'background scatter' of one artefact per 100 m<sup>2</sup>, higher density clusters that are subsequently defined as 'sites'.

Non-site archaeology offers an alternative approach to distance and density-based site definitions (Ebert 1992; Foley 1981), with individual artefacts, not sites, treated as the basic units of analysis (for published Australian examples see Holdaway et al. 2000; McNiven 1992; Shiner 2008). Whilst recognising the major interpretive potential of non-site approaches for data analysis and discussion, their implementation in the context of cultural heritage management studies is difficult (but see MacDonald & I. Davidson 1998; Kuskie 2000 for examples).

Here, the identification of 'sites' is required for reasons of recording (i.e., their entry into site databases such as AHIMS) as well as ease of relocation, protection, and management. The identification of spatially-discrete 'sites', therefore, offers the most pragmatic approach to Aboriginal heritage management in impact assessment contexts.

Surface site definition in the current investigation has been based on the 100 m convention cited above.

Subsurface archaeological potential, meanwhile, is addressed by the concept of 'archaeological sensitivity', with three levels of sensitivity recognised: nil, low and high (**Table 11**). Akin to the concept of Potential Archaeological Deposit (PAD), archaeologically sensitive areas can be broadly defined as areas that retain potential for subsurface archaeological deposit(s).



LANDFORM ELEMENTS AND SURVEY TRANSECTS  
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FIGURE 7

## 9.0 Archaeological Survey Results

### 9.1 Survey Coverage

The total Study Area comprised 1,356 ha and incorporated the entire Project Disturbance Boundary of 964 ha. A total of 42 transects were completed over a 15 day period, with transect lengths ranging from 300 m to 4,710 m. Combined, these result in a total survey coverage of approximately 1,113 ha, representing 82% of the Study Area. The remaining 18% largely comprises an area north of Wybong Road where no Project impacts are proposed.

**Table 10** provides a breakdown of survey coverage by landform type and provides an assessment of effective survey coverage. An assessment of effective coverage, required by OEH, is not an estimate of the area that was surveyed rather an estimate of the area in which archaeological materials are 'detectable'. Some Aboriginal archaeological site types, such as rock shelters and scarred trees, are more readily observed as they are not typically obscured by vegetation cover. By comparison, detection of sites such as stone artefact scatters and isolates are often entirely dependent on prevailing ground surface conditions.

**Table 10: Survey Coverage**

| Landform Type       | Total Landform in Study Area (ha) | Total Landform Area Surveyed (ha) | % of Area Surveyed | Area Effectively Surveyed (ha) | % of Landform Effectively Surveyed |
|---------------------|-----------------------------------|-----------------------------------|--------------------|--------------------------------|------------------------------------|
| Hilltop/Ridge/Crest | 34                                | 33                                | 96                 | 2.31                           | 6.79                               |
| Upper-slope         | 232                               | 199                               | 86                 | 13.93                          | 6.00                               |
| Mid-slope           | 654                               | 508                               | 84                 | 35.56                          | 5.44                               |
| Lower-slope         | 399                               | 367                               | 92                 | 25.69                          | 6.44                               |
| Flat                | 37                                | 6                                 | 15                 | 0.42                           | 1.14                               |
| <b>Total</b>        | <b>1356</b>                       | <b>1113</b>                       | <b>82</b>          | <b>77.91</b>                   | <b>5.7</b>                         |

**Table 10** and **Appendix d** provide tabulated estimates of the effective survey coverage achieved for each transect completed during the archaeological survey. As shown, this was typically low, as it is with almost all 'greenfield' assessments, with an overall effective coverage of 5.7% of the Study Area. This suggests that limited surface visibility was a constraint, as it regularly is, in assessing the surface Aboriginal archaeological record of the Study Area.

**Table 10** also indicates flats were the least surveyed landform within the Study Area. As shown on **Figure 7**, a relatively small area of flat was located at the southern portion of the Study Area adjacent to the Hunter River. Limited survey was conducted in this area due to significant grass cover, waterlogging and no planned Project impacts for that area.

### 9.2 Previously Recorded Sites

As discussed in **Section 6.4**, 235 previously recorded sites have been identified within the Study Area. These comprised 196 AHIMS sites and 39 sites identified within previous reports. Of these, approximately 121 sites, largely comprising of isolated artefacts, were not located during the survey due to significant grass cover and/or geomorphic processes which may have moved or transported artefact material from its recorded location.

### 9.3 Newly Recorded Sites

Approximately 1098 individual artefacts were recorded during the archaeological survey from a combination of existing AHIMS sites, sites identified in previous reports and newly recorded sites. Artefacts were identified across all landforms with varying densities (see **Figure 8**). As described in **Section 8.5**, the site definition employed in the current assessment was the 'visible extent of artefacts within 100 m of each other'. In instances where additional artefacts were found within 100 m of previously recorded AHIMS sites, that site has been expanded to include those artefacts, and were subsequently not recorded as new sites.

A total of 54 newly recorded archaeological sites were identified within the Study Area (**Figure 8**). These comprise, 29 artefact scatters and 25 isolated artefacts. **Table 11** lists details of the newly recorded sites, with coordinates reflecting centre points or centroids of each site.

**Table 11: Newly Recorded Aboriginal Sites**

| Site name  | Type     | Artefacts | Landform            | Dist. to water (m) | GDA94 Zone 56 E | GDA94 Zone 56 N |
|------------|----------|-----------|---------------------|--------------------|-----------------|-----------------|
| BM-AS01-12 | Artefact | 7         | Lower slope         | 5                  | 294901          | 6428871         |
| BM-AS02-12 | Artefact | 3         | Lower slope         | 39                 | 294815          | 6428544         |
| BM-AS03-12 | Artefact | 2         | Lower slope         | 117                | 294202          | 6427023         |
| BM-AS04-12 | Artefact | 2         | Lower slope         | 1                  | 294450          | 6426865         |
| BM-AS05-12 | Artefact | 3         | Mid slope           | 167                | 292029          | 6426475         |
| BM-AS06-12 | Artefact | 2         | Lower slope         | 170                | 292394          | 6425477         |
| BM-AS07-12 | Artefact | 8         | Upper slope         | 6                  | 292197          | 6427848         |
| BM-AS08-12 | Artefact | 5         | Hilltop/Ridge/Slope | 98                 | 292208          | 6427466         |
| BM-AS09-12 | Artefact | 2         | Hilltop/Ridge/Slope | 39                 | 292022          | 6427494         |
| BM-AS10-12 | Artefact | 2         | Mid slope           | 7                  | 291850          | 6426969         |
| BM-AS11-12 | Artefact | 11        | Mid slope           | 41                 | 292276          | 6426741         |
| BM-AS12-12 | Artefact | 21        | Mid slope           | 13                 | 292510          | 6426541         |
| BM-AS13-12 | Artefact | 5         | Mid slope           | 21                 | 292471          | 6426325         |
| BM-AS14-12 | Artefact | 2         | Mid slope           | 141                | 291888          | 6426064         |
| BM-AS15-12 | Artefact | 7         | Hilltop/Ridge/Slope | 325                | 291443          | 6425842         |
| BM-AS16-12 | Artefact | 234       | Lower slope         | 3                  | 292579          | 6425918         |
| BM-AS17-12 | Artefact | 6         | Lower slope         | 59                 | 292833          | 6425701         |
| BM-AS18-12 | Artefact | 18        | Lower slope         | 10                 | 292839          | 6425432         |
| BM-AS19-12 | Artefact | 20        | Lower slope         | 10                 | 292930          | 6425073         |
| BM-AS20-12 | Artefact | 3         | Upper slope         | 158                | 291779          | 6425680         |
| BM-AS21-12 | Artefact | 6         | Upper slope         | 1                  | 291753          | 6425502         |
| BM-AS22-12 | Artefact | 11        | Upper slope         | 37                 | 291623          | 6425398         |
| BM-AS23-12 | Artefact | 23        | Hilltop/Ridge/Slope | 188                | 291704          | 6425127         |
| BM-AS24-12 | Artefact | 12        | Lower slope         | 15                 | 292165          | 6425346         |
| BM-AS25-12 | Artefact | 13        | Lower slope         | 8                  | 292349          | 6425330         |
| BM-AS26-12 | Artefact | 2         | Upper slope         | 13                 | 291483          | 6425502         |
| BM-IA01-12 | Isolated | 1         | Lower slope         | 222                | 293979          | 6427459         |
| BM-IA02-12 | Isolated | 1         | Mid slope           | 62                 | 293105          | 6427486         |
| BM-IA03-12 | Isolated | 1         | Mid slope           | 183                | 292741          | 6427051         |
| BM-IA04-12 | Isolated | 1         | Hilltop/Ridge/Slope | 259                | 293086          | 6426348         |
| BM-IA05-12 | Isolated | 1         | Upper slope         | 204                | 292830          | 6427900         |
| BM-IA06-12 | Isolated | 1         | Upper slope         | 81                 | 292414          | 6428066         |
| BM-IA07-12 | Isolated | 1         | Mid slope           | 21                 | 292449          | 6427622         |

| Site name   | Type     | Artefacts | Landform    | Dist. to water (m) | GDA94 Zone 56 E | GDA94 Zone 56 N |
|-------------|----------|-----------|-------------|--------------------|-----------------|-----------------|
| BM-IA08-12  | Isolated | 1         | Upper slope | 23                 | 292235          | 6427681         |
| BM-IA09-12  | Isolated | 1         | Upper slope | 88                 | 292874          | 6429137         |
| BM-IA10-12  | Isolated | 1         | Mid slope   | 103                | 292119          | 6426980         |
| BM-IA11-12  | Isolated | 1         | Mid slope   | 58                 | 291959          | 6426694         |
| BM-IA12-12  | Isolated | 1         | Mid slope   | 83                 | 292340          | 6426455         |
| BM-IA13-12  | Isolated | 1         | Mid slope   | 65                 | 292140          | 6426567         |
| BM-IA14-12  | Isolated | 1         | Mid slope   | 7                  | 291467          | 6426433         |
| BM-IA15-12  | Isolated | 1         | Mid slope   | 85                 | 291770          | 6426148         |
| BM-IA16-12  | Isolated | 1         | Upper slope | 328                | 291840          | 6425815         |
| BM-IA17-12  | Isolated | 1         | Mid slope   | 211                | 292380          | 6425752         |
| BM-IA18-12  | Isolated | 1         | Upper slope | 202                | 291954          | 6425628         |
| BM-IA19-12  | Isolated | 1         | Mid slope   | 74                 | 291700          | 6425294         |
| BM-IA20-12  | Isolated | 1         | Lower slope | 28                 | 292306          | 6425197         |
| BM-IA21-12  | Isolated | 1         | Mid slope   | 154                | 292185          | 6425108         |
| BM-IA22-12  | Isolated | 1         | Mid slope   | 215                | 292347          | 6424992         |
| BM-IA23-12  | Isolated | 1         | Mid slope   | 406                | 292406          | 6424802         |
| MTP-AS01-12 | Artefact | 2         | Mid slope   | 156                | 293414          | 6427885         |
| MTP-AS02-12 | Artefact | 2         | Lower slope | 58                 | 294513          | 6427391         |
| MTP-AS03-12 | Artefact | 2         | Lower slope | 183                | 294152          | 6427949         |
| MTP-IA01-12 | Isolated | 1         | Lower slope | 160                | 294099          | 6427451         |
| MTP-IA02-12 | Isolated | 1         | Mid slope   | 240                | 293974          | 6428112         |



RECORDED ABORIGINAL SITES  
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FIGURE 8

## 10.0 Discussion of Findings

### 10.1 Total Number of Sites

A total of 289 archaeological sites have been identified within the Study Area. These comprise:

- 196 valid AHIMS sites;
- 39 sites identified within previous reports (not currently registered on AHIMS); and
- 54 newly recorded sites.

Site descriptions are provided in **Table 7** and **Table 11** with further site details in **Appendix e**.

### 10.2 Summary of Site Types

**Table 12** provides a summary of the types of Aboriginal archaeological sites identified within the Study Area.

Table 12: Summary of Site Types within Study Area

| Site Type         | Count      | % of Total |
|-------------------|------------|------------|
| Artefact scatter  | 145        | 50         |
| Isolated artefact | 139        | 48         |
| Scarred tree      | 4          | 1          |
| Stone quarry      | 1          | 1          |
| <b>Total</b>      | <b>289</b> | <b>100</b> |

#### 10.2.1 Artefact Scatters & Isolated artefacts

A total of 145 artefact scatters and 139 isolated artefacts, totalling 1,098 surface artefacts, were recorded within the Study Area. Of these, the highest artefact count at a newly recorded site consisted of 234 individual artefacts recorded at site BM-AS16-12 located on a feeder creek of the Hunter River adjacent to Bengalla Road. The largest previously recorded site consisted of 239 artefacts recorded at AHIMS site 37-2-0599 (B30). Artefact counts at scatter sites range from two to 239, with a mean count of 12.9.

All surface artefact sites within the Study Area, with the exception of those located along Dry Creek and its tributaries, are considered to have low subsurface potential due to the effects of erosion. On the basis of Rich's (1998) excavations at B33-2 and a review of Dry Creek's geomorphology, sites located on Dry Creek, including AHIMS site 37-2-0599 (B30), are considered to have potential for subsurface deposit.

#### 10.2.2 B10 Quarry Site (37-2-0579)

Aboriginal stone quarry site B10 (37-2-0579) was originally recorded by Rich (1993: 94) who described it as 'a silcrete source and extraction site occurring on a ridge within the coal lease'. Rich (1993: 94) identified cobbles of silcrete, petrified wood and other igneous materials eroding from the side of the cigar shaped ridge extending northward approximately 1.3 km from the Hunter River flats. Artefactual material, in varying densities, and consisting primarily of large (<5 cm) silcrete artefacts, was identified over the ridgeline. While the entire ridgeline was mapped as the B10 quarry site, Rich (1993: 94) noted the northern extent of the site/ridgeline showed declining artefact densities and 'patchy' occurrences of artefactual material.

Since its identification, two archaeological excavations have been undertaken at B10. Initially, White excavated the central section of the site in 1998 as part of a NPWS Consent to Destroy (CtD) permit SZ133. Two excavation areas, B10-1 and B10-2, were selected and approximately 4,676 artefacts were recovered. Subsequently, B10 was partially destroyed under CtD permit SZ133, leaving two smaller sections at the southern and northern extent, both remain extant today.

A second excavation, which included a program of surface collection, was undertaken at the site by ERM in 2007 as part of a second NPWS CtD Permit #2621. The focus of the archaeological works was on the middle/northern portion of the site, although it excluded a small section at the very northern extent. These excavation works consisted of grader scrapes and surface collection. A total of 170 artefacts were collected, the majority coming from the central section of the site, with a smaller portion (n=2) collected from around a dam in the north.

At the completion of both excavations and fulfilment of the CtD permits, two sections of the ridgeline originally mapped by Rich (1993) as B10 remained intact and are present today. These are at its very southern and very northern extents. The southern section comprises an approximate 18 ha area and the northern section a smaller approximate 5 ha area. During the current archaeological survey, two quartzite cores and one flake were identified on the remaining southern section of the ridgeline. However, during the current archaeological survey, and during past surveys, no artefacts, cobbles of silcrete or other raw materials were identified on the remaining northern portion of the ridgeline. This finding supports Rich's (1993) observation that artefact numbers will decline towards the northern extent of the ridgeline. Moreover archaeological excavations undertaken at B10 by White (1998) in the central/southern section of B10 recovered 4,454 artefacts, while ERM's (2007) excavation in the central/northern section only recovered 170 showing a marked decline towards the north.

Observations made during the current archaeological survey also noted that only a remnant of the original ridgeline identified by Rich (1993) remained undisturbed, having been cut into during construction of the Bengalla Mine haul road (see **Figure 9**). The section of ridgeline that remains is its eastern edge approximately 30 m in width and 300 m in length parallel to the haul road (shown in yellow below). Consequently, while the southern section of B10 is considered largely undisturbed and likely to have associated archaeological deposit, the northern portion is considered disturbed and unlikely to have associated archaeological deposit.



Figure 9: B10 Northern Section

### 10.2.3 Scarred Trees

Four previously recorded AHIMS scarred trees and four possible Aboriginal scarred trees noted by the Aboriginal community have been identified within the Study Area. An arborist and Aboriginal community members inspected the four potential scarred trees on 15 August 2012. The inspection by both the arborist and the Aboriginal community members present found the scarring on all four trees was the result of natural causes (see **Appendix f**). Accordingly, the trees will not be registered on AHIMS or managed as Aboriginal archaeological sites.

Table 13: Trees with Scarring

| Tree ID | Easting (MGA) | Northing (MGA) | Arborist Finding                   |
|---------|---------------|----------------|------------------------------------|
| Tree 1  | 292756        | 6427129        | Natural (branch tear/termites)     |
| Tree 2  | 292698        | 6428743        | Natural – branch tear              |
| Tree 3  | 293161        | 6426412        | Natural/branch or lower shoot tear |
| Tree 4  | 293257        | 6426726        | Natural/branch or lower shoot tear |

## 10.3 Spatial Distribution

Due to the arbitrary nature of site boundary definitions, as discussed in **Section 8.5**, the following discussion of the spatial distribution of artefacts within the Study Area is from a non-site approach, and as such uses individual artefact locations as the unit of analysis.

### 10.3.1 Distance to Water and Stream Order

Artefact distribution varies significantly with stream order within the Study Area. Spatial analysis of stone artefacts identified within the Study Area finds that the majority of artefacts ( $n = 720$ , 65%) were recorded within 50 m of a watercourse. **Table 14** is suggestive of a pattern of decreasing artefact numbers with distance from watercourse, with a marked decline in numbers from a distance of 100 m. The greatest proportion of artefacts (42%) were associated with 2<sup>nd</sup> order creek lines within the Study Area, though this percentage is likely exaggerated by the identification of 234 artefacts at site BM-AS16-12.

Artefact associations with Strahler ordered creek lines and adjusted according to the total creek line length within the Study Area, indicate that 4<sup>th</sup> order creek lines have the highest associated surface artefact numbers at 0.070 artefacts per metre of creek line. Calculations show the next highest artefact occurrences are associated with 3<sup>rd</sup> order creek lines at 0.066 artefacts per metre, followed by 2<sup>nd</sup> order at 0.051 and 1<sup>st</sup> order at 0.024 artefacts per metre. This trend corresponds to artefact spatial patterning according to creekline order identified during previous archaeological investigations throughout the Hunter Valley and NSW more broadly.

Limitations to this analysis, which would require subsurface testing to clarify, relate to surface visibility, which is generally greater along creek banks, making surface artefacts more easily detectable.

Table 14: Distribution of Aboriginal Artefacts Associated with Watercourses

| Distance to Water Source (m)       | Creekline Order |     |     |     | Total | % of Total |
|------------------------------------|-----------------|-----|-----|-----|-------|------------|
|                                    | 1               | 2   | 3   | 4   |       |            |
| 0 – 50                             | 130             | 291 | 59  | 240 | 720   | 65         |
| 51 – 100                           | 60              | 111 | 36  | 35  | 242   | 22         |
| 101 – 150                          | 11              | 12  | 6   | 1   | 30    | 3          |
| 151 – 200                          | 4               | 4   | 0   | 1   | 9     | 1          |
| > 200                              | 47              | 42  | 4   | 4   | 97    | 9          |
| <b>Total</b>                       | 253             | 462 | 108 | 285 | 1098  | 100        |
| <b>% of Total vs. Stream Order</b> | 23              | 42  | 10  | 25  | 100   | N/A        |

Table 15: Creekline Totals

| Creek Order           | Total Length in Study Area (m) | % of Total Creekline | Artefacts/m |
|-----------------------|--------------------------------|----------------------|-------------|
| 1 <sup>st</sup> Order | 10,585                         | 42                   | 0.024       |
| 2 <sup>nd</sup> Order | 9,067                          | 36                   | 0.051       |
| 3 <sup>rd</sup> Order | 1,628                          | 6                    | 0.066       |
| 4 <sup>th</sup> Order | 4,048                          | 16                   | 0.070       |
| <b>Total</b>          | <b>25,328</b>                  | <b>100</b>           | <b>N/A</b>  |

### 10.3.2 Landform Analysis

**Table 16** presents the number of individual artefacts identified within each landform type over the Study Area. Artefact distribution clearly varies across landforms. Results show that the majority of artefacts were found on lower slopes (n = 885, 81%), a landform generally associated with creeklines. Relatively few artefacts were located on upper slopes or hilltops, crests or ridges. The highest artefact density per hectare is within the lower slope class where 2.22 artefacts were identified per hectare. Conversely, the lowest artefact density per hectare was within the midslope class where 0.22 artefacts were identified per hectare.

Table 16: Correlation between Artefact Distribution and Landform Type

| Landform Type       | No. of Artefacts | %          | Landform total (ha) in Study Area | Artefact density per ha |
|---------------------|------------------|------------|-----------------------------------|-------------------------|
| Hilltop/Crest/Ridge | 11               | 1          | 34                                | 0.32                    |
| Upper slope         | 59               | 5          | 232                               | 0.25                    |
| Mid slope           | 143              | 13         | 654                               | 0.22                    |
| Low slope           | 885              | 81         | 399                               | 2.22                    |
| Flat                | 0                | 0          | 37                                | 0                       |
| <b>Total</b>        | <b>1098</b>      | <b>100</b> | <b>1356</b>                       | <b>N/A</b>              |

## 10.4 Artefact Analysis

### 10.4.1 Assemblage Size and Composition

A total of 1,098 stone artefacts were identified and recorded during the current survey. **Table 17** provides a simplified typological breakdown of the survey assemblage, with first order type definitions based on those of Hiscock (1984) and Andrefsky (2005). As is typical of Hunter Valley assemblages, flake debitage (i.e., flakes and flake shatter fragments) dominates, accounting for 80.1% of the total. Non-flake debitage (i.e., angular shatter), in contrast, is comparatively poorly represented at 8.8%. Cores and retouched flakes, meanwhile, make up 10.7% of the assemblage, with 89 cores and 29 retouched flakes accounting for 8.1% and 2.6% of the total respectively. Two hatchet heads (0.2%) and a single hammerstone (0.1%) complete the assemblage.

Terminological differences notwithstanding, a comparison of the relative frequencies of stone artefact types represented in the current survey assemblage with those recorded by Rich (1993; 1995b) for the Bengalla Coal Mine (Rich 1993: 26, Table 3) and Mount Pleasant Project (Rich 1995: 31, Table 9) reveals a broadly similar typological profile for these assemblages (**Table 18**). Differences in the relative frequency of tools between assemblages, with both earlier assemblages exhibiting higher values, likely relate to Rich's in-field identification of non-retouched but potentially utilised flakes/pieces. No attempt was made to identify such items during the current survey. However, it is recognised that a proportion of the unretouched flakes and other items of debitage identified during survey may, in fact, have been used prior to discard.

Table 17: Simplified Typological Breakdown of Recorded Survey Assemblage

| Type            | Number      | %          |
|-----------------|-------------|------------|
| Flake           | 642         | 58.5       |
| Flake shatter   | 238         | 21.7       |
| Angular shatter | 97          | 8.8        |
| Core            | 89          | 8.1        |
| Retouched flake | 29          | 2.6        |
| Hatchet head    | 2           | 0.2        |
| Hammerstone     | 1           | 0.1        |
| <b>Total</b>    | <b>1098</b> | <b>100</b> |

Table 18: Typological Breakdowns of Bengalla Coal Mine and Mt Pleasant Coal Lease Assemblages (after Rich 1993: 26, Table 3 and Rich 1995: 31, Table 9)

|                                  | Bengalla Coal Mine |            | Mount Pleasant Project |            |
|----------------------------------|--------------------|------------|------------------------|------------|
| Type                             | Number             | %          | Number                 | %          |
| Waste                            | 1443               | 82         | 1162                   | 83.9       |
| Cores                            | 150                | 8.5        | 103                    | 7.4        |
| Axes and pebble tools            | 19                 | 1.1        | 17                     | 1.2        |
| Other tools (RU flakes & pieces) | 125                | 7.1        | 80                     | 5.8        |
| Backed artefacts                 | 23                 | 1.3        | 17                     | 1.2        |
| Bipolar                          | na                 | na         | 6                      | 0.4        |
| <b>Total</b>                     | <b>1760</b>        | <b>100</b> | <b>1385</b>            | <b>100</b> |

#### 10.4.2 Raw Materials

**Table 19** presents a breakdown of the relative frequency of raw material types represented in the survey assemblage. As indicated, silcrete was the dominant raw material overall, accounting for the 67.1% (n = 737) of the total assemblage and 68.9% of identifiable materials (n = 1070). At 21.1%, IMT is the second most common raw material, followed by quartz (3.5%, n = 38), 'other' materials (2.6%, n = 28), chert (2.2%, n = 24), quartzite (1.5%, n = 17), porcellanite (0.7%, n = 8), volcanic rock (0.6%, n = 7), petrified wood (0.5%, n = 6) and chalcedony (0.1%, n = 1).

In keeping with the typological data described above, a comparison of relative frequencies of raw material types in the current survey assemblage with those reported by Rich (1993, 1995) for the adjoining Bengalla Coal Mine (Rich 1993: 25, Table 2) and Mt Pleasant Coal Lease (Rich 1995: 31, Table 9) indicates a common emphasis on the exploitation of silcrete for chipped stone tool manufacture (67.1%, 60% and 57.9% respectively), with IMT the second most commonly exploited raw material at 21.1%, 26% and 28% respectively (**Table 20**). Other raw materials (e.g., quartz, quartzite, chert and porcellanite) are comparatively poorly represented in all three assemblages, with available data suggestive of opportunistic, as opposed to targeted, procurement. Notably, the preference for silcrete evident in these 'local' assemblages is consistent with broader, intra-regional patterning in raw material use. As highlighted by White (1999:145), chipped stone assemblages recovered from the northwestern portion of the Hunter Valley tend to be silcrete-dominant, whilst those in southeast tend to be IMT-dominant. Taken at face value, this patterning is suggestive of intra-regional differences in the relative availability of these two raw materials. However, as White (1999:145) has highlighted, available data suggest that this is unlikely to be the case, with observed patterning more likely a product of real preferences that may, at least in part, relate to cultural boundaries and/or affiliations.

Table 19: Breakdown of Raw Material Types in the Survey Assemblage

| Type           | Number      | %          |
|----------------|-------------|------------|
| Silcrete       | 737         | 67.1       |
| IMT            | 232         | 21.1       |
| Quartz         | 38          | 3.5        |
| Other          | 28          | 2.6        |
| Chert          | 24          | 2.2        |
| Quartzite      | 17          | 1.5        |
| Porcellanite   | 8           | 0.7        |
| Volcanic       | 7           | 0.6        |
| Petrified wood | 6           | 0.5        |
| Chalcedony     | 1           | 0.1        |
| <b>Total</b>   | <b>1098</b> | <b>100</b> |

Table 20: Breakdown of Raw Material Types in the Bengalla Coal Mine and Mt Pleasant Coal Lease Assemblages (after Rich 1993: 25, Table 2 and Rich 1995: 31, Table 9)

|              | Bengalla Coal Mine |            | Mt Pleasant Coal Lease |            |
|--------------|--------------------|------------|------------------------|------------|
| Type         | Number             | %          | Number                 | %          |
| Silcrete     | 1067               | 60         | 802                    | 57.9       |
| IMTC         | 452                | 26         | 388                    | 28         |
| Quartz       | 65                 | 4          | 49                     | 3.5        |
| Other        | 102                | 6          | 68                     | 4.9        |
| Quartzite    | 0                  | 0          | 7                      | 0.5        |
| Volcanic     | 74                 | 4          | 71                     | 5.1        |
| <b>Total</b> | <b>1760</b>        | <b>100</b> | <b>1385</b>            | <b>100</b> |

As to the source(s) of the raw materials represented in the survey assemblage, existing archaeological and geological data for the greater Bengalla area suggest that, with the possible exception of porcellanite (see Hughes 1984: 79 and Kuskie and Clarke 2004:412-13), all are available in gravel deposits associated with the nearby Hunter River. Along the river itself, locally occurring point and mid-channel gravel bars are known to contain a variety of materials suitable for chipped and ground stone tool manufacture, including silcrete, IMT, quartz, quartzite, chert, petrified wood and a variety of igneous rocks (A.McLaren & G.Oakes, pers. obs., May-June 2012). Locally occurring deposits of 'stranded' Tertiary ridge gravels are likewise known to contain a variety of suitable materials and were certainly exploited by Aboriginal people in the past, as evidenced by the presence of a large stone extraction or quarry site (Site B10 (37-2-0579)) in the southeastern portion of the Study Area.

Now largely destroyed, the B10 (37-2-0579) quarry site was first identified and recorded by Elizabeth White (nee Rich) in 1993 and subsequently subject to partial salvage as a condition of a 'Consent to Destroy Relics' issued to the BMC in 1998 (Rich 1993, 1998). In topographic terms, the site is located on the margins of a long low ridge overlooking the Hunter River floodplain, with elevations along the ridge ranging from 5 to 20 m. White (1998: 14) reports a total site area of approximately 0.26 km<sup>2</sup>, calculated on the basis of observed surface evidence. Cobbles and boulders of silcrete, petrified wood and a variety of other rock types eroding from the ridgeline in question have been interpreted as part of a high-energy fluvial deposit associated with a palaeo-Hunter River (White 1998: 14). The total estimated thickness of the gravel deposit within the site was approximately 5 m.

Archaeological excavations within B10 (37-2-0579) indicate that a range of stone working activities were undertaken within the site, including the *in-situ* flaking of embedded sub-angular silcrete boulders for the purposes of removing flakes and blocks for subsequent on-site reduction and the heating of silcrete blanks to improve flaking quality (White 1998: 52). Interestingly, no evidence for backed artefact manufacture was identified in either of the areas excavated by White (1998). Notable differences in the composition of the chipped stone assemblages recovered from the two excavated portions of the B10 (37-2-0579) quarry have been interpreted as a product of spatial variability in stone working and associated settlement-subsistence activities (White 1998: 52). At the same time, they have been used to suggest that available excavated data from the B10 (37-2-0579) site cannot be considered representative (White 1998: i).

As alluded to by Rich (1993: 24) almost two decades ago, the presence of what appears to be a large quarry site within the Bengalla area raises the possibility that most, if not all, of the silcrete used for chipped stone tool manufacture within this area was procured from this source. This possibility notwithstanding, it should be noted that previous analyses of the relationship between proximity to the B10 (37-2-0579) quarry site and the size and character of silcrete assemblages recovered from the greater Bengalla area (i.e., Rich 1995: 34-8; White 1998: 91-103) provide little support for a standard distance decay or stone rationing model for this source (cf. McNiven 1993). Linear regression analyses and correlation statistics for the maximum linear dimensions of complete silcrete cores ( $n = 55$ ) and flakes ( $n = 258$ ) identified during the current survey are similarly suggestive, with both indicating extremely weak, statistically non-significant relationships (flakes:  $r = 0.25$ ,  $r^2 = .001$ ,  $p > 0.05$ ; cores:  $r = 0.217$ ,  $r^2 = .047$ ,  $p > 0.05$ ). Together with the results of White's (1995, 1998) previous analyses, available data suggest that proximity to the B10 (37-2-0579) quarry was not a key determinant of silcrete assemblage composition and density in the greater Bengalla area. Proximity to this source, it appears, was likely only one of many factors affecting the size and composition of these assemblages, with spatial variability in the organisation of settlement and subsistence activities, for example, likely exerting a strong influence on assemblage composition and site-based artefact densities (White 1998: 104). The possibility that other, previously undocumented sources of silcrete are present within the Bengalla landscape may also be relevant, as may the distances thus far tested (White 1998: 104).

#### 10.4.3 The Core Assemblage

Eighty-seven complete cores and two core fragments were identified during the current survey, all of which displayed detachment scars consistent with direct freehand percussion using hand-held hammerstones. All but six of the complete cores identified during survey comprise non-specialised flake cores, with varying combinations of intermediate and expanding flake scars (after Holdaway et al. 2004: 184). Specialised core forms are limited to four tranchet or 'Redbank A' cores (after Hiscock 1993) and two microblade cores. Following Hiscock (1993) and Moore (2000), it is highly likely that all six of these specialised core forms were associated with backed artefact manufacture. No bipolar cores were recorded during survey. However, the identification of three potential bipolar flakes suggests that bipolar reduction may also have been employed by Aboriginal knappers in the Study Area, albeit infrequently. A breakdown of the proportions of different core types in the survey assemblage (Table 21) shows that both multidirectional ( $n = 42$ , 48.3%) and unidirectional ( $n = 31$ , 35.6%) cores are well represented in the Study Area, with bidirectional ( $n = 5$ , 5.7%) and bifacial ( $n = 9$ , 10.3%) cores also present but comparatively poorly represented. Descriptive statistics for the maximum linear dimensions of recorded core types are provided in Table 22. Together with the results of inter-type T-test comparisons (Table 23), these data suggest that core type has little relationship to variation in the extent of reduction within the Study Area and support the hypothesis that *at least* four different methods of core reduction were employed by Aboriginal knappers camping within, or passing through, the Bengalla area.

Table 21: Breakdown of Core Types in the Survey Assemblage (core types after Holdaway and Stern 2004: 180)

| Core type        | Number    | %          |
|------------------|-----------|------------|
| Unidirectional   | 31        | 35.6       |
| Multidirectional | 42        | 48.3       |
| Bidirectional    | 5         | 5.7        |
| Bifacial         | 9         | 10.3       |
| <b>Total</b>     | <b>87</b> | <b>100</b> |

Table 22: Descriptive Statistics for the Maximum Linear Dimensions of Recorded Core Types

| Statistic | Unidirectional | Multidirectional | Bidirectional | Bifacial |
|-----------|----------------|------------------|---------------|----------|
| Mean      | 65.5           | 53.2             | 49.9          | 77.6     |
| St. dev.  | 31.3           | 27.4             | 15.5          | 37       |
| CV        | 47.8%          | 51.4%            | 30.9%         | 47.7%    |
| Min       | 25.9           | 25.8             | 32.4          | 35.5     |
| Max       | 165            | 180              | 65.7          | 155      |
| Total (n) | 31             | 42               | 5             | 9        |

Table 23: T-test Results for Comparisons of Mean Maximum Linear Dimensions of Recorded Core Types

| Comparison                          | Significance value            |
|-------------------------------------|-------------------------------|
| Unidirectional vs. multidirectional | t = 1.786, df = 71, p = .078  |
| Unidirectional vs. bidirectional    | t = 1.082, df = 34, p = .278  |
| Unidirectional vs. bifacial         | t = -.982, df = 38, p = .332  |
| Multidirectional vs. bidirectional  | t = .261, df = 45, p = .795   |
| Multidirectional vs. bifacial       | t = -2.280, df = 49, p = .027 |
| Bifacial vs. bidirectional          | t = 1.574, df = 12, p = .141  |

Raw material data for complete cores (n = 87) (**Table 8**) are more-or-less consistent with that of the assemblage as a whole, with the majority (63.2%, n = 55) manufactured on silcrete blanks, followed by IMT (13.8%, n = 12) and a selection of other materials including quartzite (n = 4, 4.6%), quartz (n = 3, 3.4%), chert (n = 2, 2.3%), petrified wood (n = 2, 2.3%), porcellanite (n = 2, 2.3%) and 'other' materials (n = 7, 8%). Significantly, available cortical and body form data for identified cores suggest that a substantial proportion were manufactured on flakes imported into the Study Area from 'on-source' reduction areas outside of it. Although the extent of reduction frequently precludes positive identification, with 49.4% of cores (n = 43) made on blanks of indeterminate origin, 39.1% (n = 34) of the cores identified during survey were manufactured on flakes. Cores manufactured on complete and fragmentary cobbles, in contrast, account for 11.5% (n = 10) of the total. Metrical data for identified flake blank cores are consistent with the preferential on-source selection, for export, of large, partially decorticated flakes, with recorded examples exhibiting an average length of 63.7±25.8 mm (range: 27-155 mm), average width of 48.2±19.1 mm (range: 19.3-116 mm) and average thickness of 25.6±10.8 mm (range: 8.6-53 mm). As noted above, cortical data for identified flake blank cores (**Table 24**) are likewise consistent with the regular importation of blanks, with all but two (i.e., 94.1%) examples exhibiting less than 50% cortex at discard.

Table 24: Breakdown of Raw Materials in Complete Core Assemblage

| Type           | Number    | %          |
|----------------|-----------|------------|
| Silcrete       | 55        | 63.2       |
| IMT            | 12        | 13.8       |
| Quartz         | 3         | 3.4        |
| Other          | 7         | 8          |
| Chert          | 2         | 2.3        |
| Quartzite      | 4         | 4.6        |
| Porcellanite   | 2         | 2.3        |
| Petrified wood | 2         | 2.3        |
| <b>Total</b>   | <b>87</b> | <b>100</b> |

Table 25: Frequency of Complete Cores with Different Amounts of Cortex

| Cortex %     | Number    | %          |
|--------------|-----------|------------|
| None         | 18        | 52.9       |
| 1-50%        | 14        | 41.2       |
| 51-99%       | 2         | 5.9        |
| <b>Total</b> | <b>34</b> | <b>100</b> |

#### 10.4.4 The Flake Assemblage

Unretouched flakes are well represented in the survey assemblage, accounting for 58.5% (n = 642) of the total. A breakdown of relative proportions of flake types within the assemblage (**Table 26**) indicates that the majority (65.7%, n = 422) comprise complete flakes, as defined by Holdaway and Stern (2004: 111). Proximal flakes are also well represented, accounting for 28% (n = 180) of the total. Remaining flake types include 22 longitudinally split flakes (3.4%), seventeen redirecting flakes and a single hatchet reworking flake. Redirecting flakes retain former platform edges and are indicative of core rotation. Two hundred and thirty-eight flake shatter fragments were also recorded during survey. Complete unretouched flakes (n = 439, hatchet reworking flake excluded) in the survey assemblage are generally small in size, with an average length of 30.6±13.4 mm (range: 8-95.7 mm), average width of 25.5±11.3 mm (range: 7-76.3 mm) and average thickness of 9.1±5.3 mm (range: 1.1-54.7 mm). However, large flakes are also present, a legacy of their importation into the study area from on-source reduction areas. Elongation data (**Table 27** and **Figure 10**) indicate a population of predominantly short, broad flakes, with 74.5% (n = 327) exhibiting a length-breadth ratio between 0 and 1.5. True blades are present but rare.

Table 26: Relative Proportions of Flake Types in Survey Assemblage

| Flake type        | Number     | %          |
|-------------------|------------|------------|
| Complete          | 422        | 65.7       |
| Proximal          | 180        | 28         |
| Split             | 22         | 3.4        |
| Redirecting       | 17         | 2.6        |
| Hatchet reworking | 1          | 0.2        |
| <b>Total</b>      | <b>439</b> | <b>100</b> |

Table 27: Flake Elongation Data for Complete Unretouched Flakes

| Elongation   | Number     | %          |
|--------------|------------|------------|
| 0-0.5        | 7          | 1.6        |
| 0.6-1        | 144        | 32.8       |
| 1-1.5        | 176        | 40.1       |
| 1.6-2        | 70         | 15.9       |
| 2+           | 42         | 9.6        |
| <b>Total</b> | <b>439</b> | <b>100</b> |

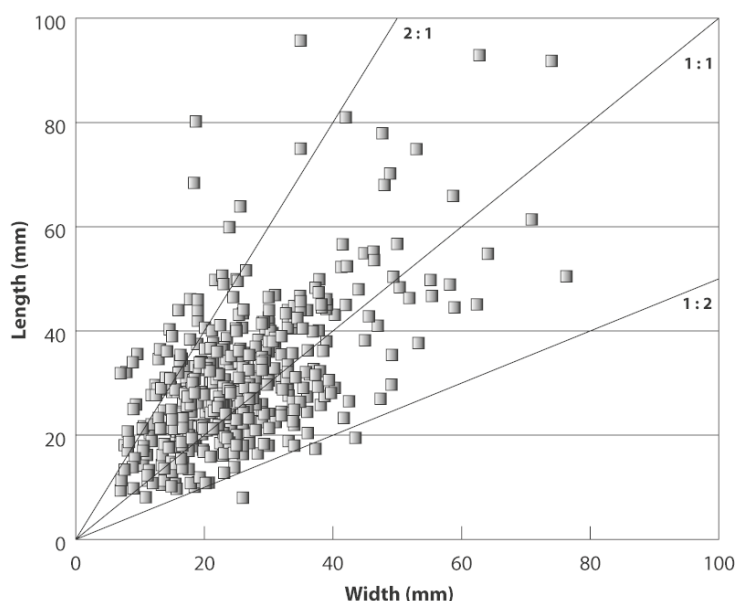


Figure 10: Length-width Scatterplot for Complete Unretouched Flakes in the Survey Assemblage (hatchet reworking flake excluded)

A comparison of the lengths of complete unretouched flakes and the longest cores scars in the survey assemblage (**Figure 11**) shows that the two share a similar distribution, supporting the inference that the former were struck from the cores discarded within the Study Area. Dorsal cortical data for complete unretouched flakes (**Table 28**), meanwhile, support the suggestion that the majority of blanks used as cores within the Study Area were fully or partially decorticated prior to reduction, an observation consistent with the regular importation, and subsequent reduction of, flakes and cobbles from on-source reduction areas (Moore 2000). As indicated in **Table 28**, 70.4% ( $n = 309$ ) of the complete unretouched flakes identified during survey exhibited no dorsal cortex, with a further 23.5% ( $n = 103$ ) exhibiting between 1 and 50% dorsal cortex. Fully and predominantly corticated dorsal surfaces, in contrast, are conspicuously rare. Striking platform data for complete unretouched flakes (**Table 29**) provide further support for the reduction as cores of imported blanks and their products (e.g., cores made on flakes struck from imported flakes), with a cortical-to-non-cortical platform ratio of 9.5:1. More generally, the proportions of different platform types represented in the complete untouched flake assemblage are not inconsistent with the representation of core types in the survey assemblage. Taken at face value, the relative proportion of single and multiple facet platforms in the assemblage appears to be at odds with relative representation of unidirectional and multidirectional cores. However, it is highly likely that a significant proportion were struck from non-intensively reduced multidirectional cores. Single facet platforms may also have been produced during bidirectional and bifacial core reduction. Finally, although poorly represented, the presence of faceted platforms within the survey assemblage is indicative of systematic core reduction.

Table 28: Frequency and Percentage of Complete Unretouched Flakes with Different Amounts of Cortex

| Dorsal Cortex % | Number     | %          |
|-----------------|------------|------------|
| None            | 309        | 70.4       |
| 1-50%           | 103        | 23.5       |
| 51-99%          | 22         | 5          |
| Complete        | 5          | 1.1        |
| <b>Total</b>    | <b>439</b> | <b>100</b> |

Table 29: Relative Frequencies of Striking Platform Types in Complete Unretouched Flake Assemblage

| Platform Type | Number     | %          |
|---------------|------------|------------|
| Single        | 305        | 69.5       |
| Multiple      | 70         | 15.9       |
| Cortical      | 42         | 9.6        |
| Crushed       | 13         | 3          |
| Faceted       | 9          | 2.1        |
| <b>Total</b>  | <b>439</b> | <b>100</b> |

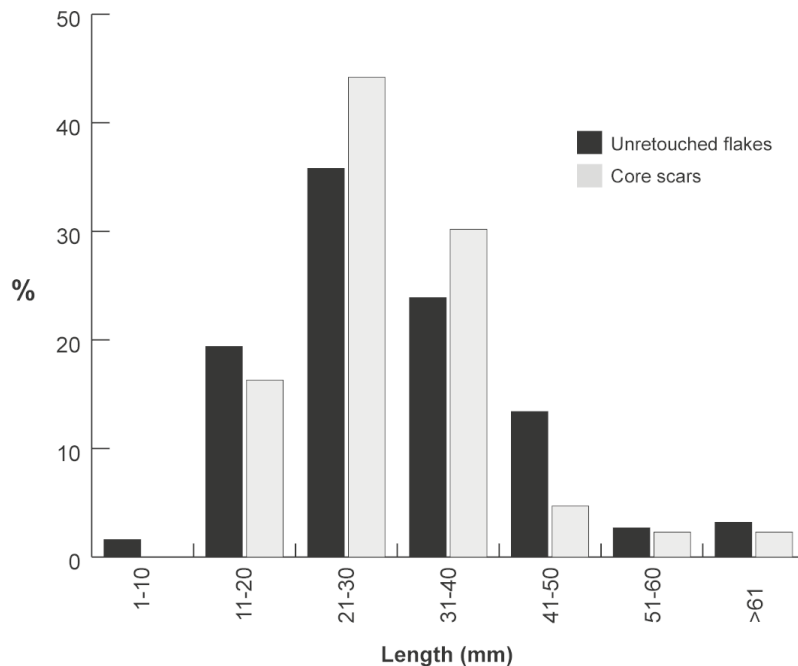


Figure 11: Comparison of Complete Unretouched Flake Lengths (n = 439) and Maximum Core Scar Lengths (n = 87)

#### 10.4.5 The Tool Assemblage

**Table 30** provides a breakdown of the tool sub-component of the survey assemblage (n = 32). As indicated, backed artefacts were the most common type of tool identified, with 12 examples accounting for 37.5% of the total tool sub-assemblage. Scrapers<sup>2</sup> were also well represented, with eleven examples recorded. Remaining tool types included six miscellaneous retouched flakes, two hatchet-heads and one hatchet reworking flake.

With only one exception, made on an IMT blank, recorded backed artefacts within the Study Area were manufactured on silcrete blanks. Symmetrical (n = 6) examples dominate, with three asymmetrical (i.e., Geometric microliths) and three indeterminate examples also recorded. Complete examples (n = 6) exhibit an average length of 21.9±7.3 mm (range: 16.4-36.4 mm), average width of 11±2.7 mm (range: 7.5-14.2 mm) and average thickness of 4.6±3 mm (range: 2.2-10.6 mm). Broken examples (n = 6) likely represent manufacturing failures. All but two of the backed artefacts identified during survey exhibit unidirectional backing.

Scrapers were manufactured on silcrete (n = 7), IMT (n = 2) and 'other' (n = 2) flake blanks. Complete examples (n = 11) have an average length of 41.2±13.2 mm (range: 19.3-58.2 mm), average width of 36.4±10.9 mm (range: 15.7-54.3 mm) and average thickness of 15.5±6.5 mm (range: 5.3-21.9 mm). Cross comparison of these data with that of the unretouched flake population suggest the preferential selection of larger blanks for scraper production.

<sup>2</sup> Note that a scraping function for these implements is inferred on the basis of retouch morphology, not demonstrated.

Retouch on all complete examples was initiated from the ventral surface and was applied to one (n = 5) or more (n = 6) margins. Recorded examples exhibit a mean retouched edge angle of 67.3°.

Identified hatchet-heads include a near complete edge-edge examples missing part of its cutting edge and broken, bifacially-flaked specimen with no remaining evidence of edge grinding. Both were manufactured on unidentified volcanic materials. A single hatchet reworking flake was also identified during survey and attests to the maintenance or reworking of hatchet-heads post-grinding. Reasons for discard for the two identified hatchet-heads are difficult to establish with certainty. However, one appears have been abandoned following an episode of reworking which has irreversibly altered the morphology of the hatchet's cutting edge. The other, meanwhile, appears to represent a manufacturing failure.

**Table 30: The Tool Assemblage**

| Type                    | Number    | %          |
|-------------------------|-----------|------------|
| Backed artefacts        | 12        | 37.50      |
| Scrapers                | 11        | 34.38      |
| Misc. retouched flakes  | 6         | 18.75      |
| Hatchet-heads           | 2         | 6.25       |
| Hatchet reworking flake | 1         | 3.13       |
| <b>Total</b>            | <b>32</b> | <b>100</b> |

## 10.5 Subsurface Archaeological Sensitivity of the Study Area

Subsurface archaeological potential is addressed in the context of this assessment by the concept of 'archaeological sensitivity'. **Figure 12** provides archaeological sensitivity mapping based on three key factors including the nature and extent of visible surface artefacts at the site, a review of the findings of previous archaeological excavations in analogous landforms in the surrounding area, and on-site observations of post-depositional processes affecting artefact exposure and burial. Using these variables, the level of archaeological sensitivity has been graded into three categories: nil, low and high. These ratings have then been applied to the Study Area to determine levels of potential subsurface deposit (**Table 31**).

**Table 31: Rating Scheme for Archaeological Sensitivity**

| Rating | Definition                                                                                                                                                                                                                                                    | Finding                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|--------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Nil    | Land with no potential for subsurface archaeological deposit(s) due to past ground disturbance(s).                                                                                                                                                            | Areas of damming, built structures and roads have been identified as having no potential for subsurface deposit                                                                                                                                                                                                                                                                                                                                           |
| Low    | Subsurface archaeological deposit(s) may be present. Relative to areas of high sensitivity, lower artefact counts, densities and assemblage richness values expected. Integrity of deposit(s) will be dependent on the nature of localised land disturbances. | The majority of the Study Area is considered to have low potential for subsurface deposit on the basis on landscape disturbances, particularly associated with sheet, gully and rill erosion.                                                                                                                                                                                                                                                             |
| High   | Subsurface archaeological deposit(s) may be present. Relative to areas of low sensitivity, higher artefact counts, densities and assemblage richness values expected. Integrity of deposit(s) will be dependent on the nature of localised land disturbances. | Dry Creek and its tributaries have been identified, on the basis of its geomorphology and previous excavations (Rich 1998), as highly sensitive. Surface artefact densities identified during the archaeological survey indicate that the most sensitive area is approximately 100 m either side of Dry Creek. However, subsurface archaeological deposit in this area will be in varying condition as a result of disturbances and geomorphic processes. |

## 10.6 Evaluation of Predictive Model

**Table 32** provides an evaluation of the predictive model provided in **Section 7.0**.

**Table 32: Evaluation of Predictive Model**

| Prediction                                                                                                                                                   | Survey Result                                                                                                                                                                   |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| The majority of scatters will occur in association with creek lines                                                                                          | The results of the archaeological survey support this prediction. 87% (n=962) of artefacts identified were within 100 m of a creek line.                                        |
| Scatters are also likely to occur on hillslopes and ridge crests, often at a vantage point over the surrounding landscape.                                   | The results of the archaeological survey support this prediction, albeit with low artefact counts within those landforms.                                                       |
| Chipped stone artefacts will be the most common form of artefact present within identified scatters.                                                         | The results of the archaeological survey support this prediction. All but three artefacts comprising of two axes and one re-working flake, were chipped stone artefacts.        |
| Silcrete followed by IMT will be the dominant raw material across the majority of sites.                                                                     | The results of the archaeological survey support this prediction. Silcrete accounts for 67.1% of all artefactual material followed by mudstone 21.1%.                           |
| Flake debitage will dominate recorded site assemblages whilst retouched will be rare.                                                                        | The results of the archaeological survey support this prediction. Flake debitage accounts for 80.1% of the assemblage.                                                          |
| Open surface scatters along creek lines, slopes and ridgetops will exhibit varying degrees of archaeological integrity, depending on the effects of erosion. | The results of the archaeological survey support this prediction, noting sheet, gully and rill erosion occur to varying degrees across the Study Area.                          |
| The majority of isolated artefacts will occur within in association with creek lines.                                                                        | The results of the archaeological survey support this prediction. 87% (n=962) of artefacts identified were within 100 m of a creek line.                                        |
| The majority of isolated artefacts will comprise chipped stone artefacts.                                                                                    | The results of the archaeological survey support this prediction, as all isolated artefacts consist of chipped stone artefacts.                                                 |
| Isolated artefacts will exhibit varying degrees of integrity.                                                                                                | The results of the archaeological survey support this prediction, noting sheet, gully and rill erosion occur to varying degrees across at varying sites across the Study Area.  |
| Archaeological deposits are likely to occur in alluvial soils along higher order creek lines.                                                                | The results of the archaeological survey support this prediction, noting Dry Creek, a 4 <sup>th</sup> order creek line, as having the highest potential for subsurface deposit. |
| Archaeological deposits will have varying degrees of integrity, particularly along creek lines, which experience significant erosion.                        | The results of the archaeological survey support this prediction, noting sheet, gully and rill erosion occur to varying degrees across the Study Area.                          |
| Scarred trees may occur where original remnant vegetation remains.                                                                                           | No scarred trees were identified during the archaeological survey. However, four previously recorded AHIMS scarred trees occur within the Study Area.                           |
| Quarry sites may occur where exposed silcrete and mudstone outcrops occur.                                                                                   | No new quarry sites were identified during the archaeological survey.                                                                                                           |

## 10.7 Reassessment of Occupation Models

Section 6.1.4 outlined models of Aboriginal occupation in the Hunter Valley proposed in past archaeological assessments. Table 33 discusses these models with reference to the findings of the archaeological survey.

Table 33: Assessment of Occupation Models

| Researcher(s)                  | Summary of Model                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Archaeological Survey Results                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|--------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Hughes (1984)                  | Hughes proposed the often-quoted model of Aboriginal campsite location as commonly being found within 50 m of watercourses. Hughes argues that site sizes will diminish as the size of the watercourse decreases.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | The results of the archaeological survey support this assessment in part but extend the prediction area to the 50 m to 100 m zone. The greatest percentage of artefacts 87% (n=962) were recorded within 100 m of a creek line. Of those, 74.8% (n=720) were located within the 0-50 m range.                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| Koettig (1994)                 | Using ethnographic accounts, Koettig proposed camps were ordered according to strict rules based on: the location of water sources, the size and composition of the group or groups camping, and the length of the stay. Koettig further proposes: <ul style="list-style-type: none"> <li>Where occupation is infrequent, archaeological features at a site may be widely distributed and relatively infrequent.</li> <li>If, over time, occupation episodes are overprinted at the same site, then the evidence from different activity areas would be closer together and even superimposed.</li> <li>The longer the stay of groups at a campsite, the greater the types of activities that should be reflected and the greater the disturbance of occupation debris on the ground.</li> </ul> | Interpreting the results of the survey using Koettig's hypothesis generates three key models of occupation. <ul style="list-style-type: none"> <li>A number of sites within the Study Area can be interpreted as sites of infrequent visitation and activity by Aboriginal people.</li> <li>Given the high artefact densities at several sites and dispersed spatial distribution, it is likely more than one occupation episode has occurred at a number of sites.</li> <li>Artefact analysis and test excavation at larger sites within the Study Area is likely to demonstrate a greater number of activities were occurring at these sites. This result could be interpreted as representing extended occupation of a site by Aboriginal people.</li> </ul> |
| Dean-Jones and Mitchell (1993) | Dean-Jones and Mitchell (1993) correlate Aboriginal occupation with ridgelines due to their elevated position providing ease of movement across the landscape and greater visibility. Other landscapes such as terraces and mid slopes are also given preference, particularly during colder months when lower terrain may have been subject to frost hollow effects. Larger sites were noted to occur in valleys, as a result of greater resources. Water salinity was also raised as a potential influence on seasonality of occupation.                                                                                                                                                                                                                                                       | The results of the archaeological survey moderately support the notion that Aboriginal people used upper slopes and ridgelines as only a small number of artefacts (n = 70, 6%) were identified on hilltops, ridges and crests. Mid slopes do not appear to be given preference within the Study Area. However, lower slopes were clearly preferred accounting for 81% (n= 885) of all artefactual material identified. Seasonal use of areas cannot be easily assessed based on surface survey alone.                                                                                                                                                                                                                                                          |
| Rich (1995)                    | Rich argued that Aboriginal people utilised technological solutions in conjunction with other survival strategies. Aboriginal groups were mobile and moved according to the location of resources in an area.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | The model is difficult to assess, given that resources present today may not be reflective of past resource availability.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| Witter (1995)                  | Witter proposed that the majority of occupation sites are peripheral to one or more base camps in close association with the Hunter River. These base camps would contain archaeological evidence of more intensive use from larger groups of Aboriginal people.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | This model cannot be assessed with the results of the archaeological survey alone.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |

| Researcher(s) | Summary of Model                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Archaeological Survey Results                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|---------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Mills (2000)  | Mills found evidence of Aboriginal activity associated with the full length of creek lines from their headwaters to the floodplain. Mills agreed with Dyal (1981b) that Aboriginal people used upper hill slopes for hunting and foraging after rain, when grasses and fruits were plentiful and adequate water was retained in pools to attract animals and sustain humans.                                                                                                                                                                       | The archaeological survey supports Mills' model that Aboriginal activity was associated with the full length of creek lines within the Study Area, however, what activities occurred in these areas cannot be easily surmised from the survey alone.                                                                                                                                                                                                                                                                                                         |
| Kuskie (2000) | Kuskie (2000) indicated that the entire landscape was utilised by Aboriginal people to varying extents. Kuskie refines Hughes' model (1984) relating Aboriginal occupation sites adjacent to watercourses by proposing that level to gently inclined landforms were preferred. Kuskie also finds that occupation sites are more commonly associated with third and fourth order creeks and vantage points. Kuskie found that Aboriginal people used and occupied the entire Mt Arthur North area but at varying intensities and at different time. | The survey supports Kuskie's findings that the entire landscape was utilised by Aboriginal people, though finds that greater levels of activity occurred in particular landscapes i.e. creek lines. The survey also supports the idea that level to gently inclined landforms was preferred. The idea that occupation sites are more commonly associated with 3 <sup>rd</sup> and 4 <sup>th</sup> order creek lines is supported by the survey results. Uses of landscape based on seasonality are difficult to assess from the archaeological survey alone. |



AREAS OF ARCHAEOLOGICAL SENSITIVITY  
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FIGURE 12

AECOM

## 11.0 Significance Assessment

Heritage sites and places hold value for different communities in a variety of different ways. As recently highlighted by Bourke and Smith (Burke et al. n.d.: 227), one of the primary responsibilities of cultural heritage practitioners is determine which heritage sites and places are worthy of preservation and management (and why) and, conversely, which are not (and why). This, by necessity, requires an assessment of relative cultural significance.

In Australia, the primary guide to the assessment of cultural significance is the *Australian ICOMOS Charter for the Conservation of Places of Cultural Significance* (1999), informally known as the *Burra Charter*, which defines it as the “aesthetic, historic, scientific, social or spiritual value for past, present or future generations” of a site or place. With respect to Aboriginal sites and places, it is possible to identify two major streams in the overall significance assessment process: the assessment of scientific significance by archaeologists and the assessment of cultural or social significance to Aboriginal people.

### 11.1 Scientific Significance

Scientific value refers to the contribution that the heritage resource (i.e. an Aboriginal site or place) can make to knowledge and understanding of the past. It is assessed according to the rarity, representativeness or research potential of a site. These factors are inter-related. The degree to which the heritage resource can contribute to knowledge is summed up in the notion of significance, which increases according to the degree of research potential and rarity of a site or area.

#### 11.1.1 Levels of Scientific Significance

To adequately assess significance, evidence is required, which includes information about the presence of subsurface deposits, integrity of these deposits, nature of site contents and extent of the site. A review of information about previously recorded sites within the local area and region enables the rarity and representativeness of a site to be assessed.

- *High significance* is usually attributed to sites, which are so rare or unique that the loss of the site would affect our ability to understand aspects of past Aboriginal use/occupation for an area. In some cases, a site may be considered highly significant because its type is now rare due to destruction of the archaeological record through development.
- *Moderate significance* can be attributed to sites that provide information on an established research question or on the basis of moderate rareness.
- *Low significance* is attributed to sites that cannot contribute new information about past Aboriginal use/occupation of an area. This may be due to site disturbance or the nature of the site's contents.

#### 11.1.2 Research Potential

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

The capacity of a site to address research questions is predicated on a definition of what the key research issues are for a region. In the Hunter Valley such questions will revolve around stone tool manufacture, settlement patterning; how regional resources were used; how uses changed throughout the Holocene; and how these changes manifested in the archaeological record.

Some archaeologists suggest that the value of a place/object can be judged by answering the following questions:

- Can the site contribute knowledge that no other resource can?
- Can it provide information not available on other sites?
- Can it answer pertinent research questions?

### 11.1.3 Rarity and Representativeness

Rarity and representativeness are related concepts. The comparative rarity of a site is a consideration in assessing scientific significance; a certain site type may be “one of a kind” in one region, but very common in another. Artefacts of a particular type may be common in one region, but outside the known distribution in another.

### 11.1.4 Integrity

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

### 11.1.5 Application of the Scientific Significance for the Project

An assessment of the scientific significance of newly and previously recorded Aboriginal archaeological sites within the Study Area is presented in **Table 34** and shown on **Figure 13**. Significance ratings are offered on the basis of the assessed research potential, rarity and representativeness of each site within an arbitrary 30 km<sup>2</sup> ‘region’ centred on the Study Area.

**Table 34: Summary of Significance Assessment of Sites within the Study Area**

| Site Type          | Significance         |          |                      |            |
|--------------------|----------------------|----------|----------------------|------------|
|                    | High                 | Moderate | Low                  | Total      |
| Artefact Scatters  | 0                    | 2        | 143                  | 145        |
| Isolated artefacts | 0                    | 0        | 139                  | 139        |
| Scarred Trees      | 0                    | 4        | 0                    | 4          |
| Stone Quarry*      | 1 (southern section) | 0        | 1 (northern section) | 1          |
| <b>Total</b>       | <b>1</b>             | <b>6</b> | <b>283</b>           | <b>289</b> |

*\*Note B10 quarry site (37-2-0579) has been split into two areas which have been subsequently assessed separately*

#### *High Significance*

The southern portion of B10 quarry site (37-2-0579) has been assessed as highly significant. A rating of highly significant has been attributed to this site due to its rarity and high research value given its ability to answer questions related to raw material use and procurement.

#### *Moderate Significance*

A total of six sites identified within the Study Area have been rated as moderately significant. Moderate significance has been attributed to two artefact scatter sites (BM-AS16-12 and 37-2-0599) as a result of their relatively large counts of artefacts. Furthermore, while artefact scatter site BM-AS16-12 is considered to have low potential for subsurface deposit, site 37-2-0599 has been assessed as having high potential for subsurface deposit and on that basis is considered of moderate significance. All four scarred trees (37-2-2903, 37-2-3064, 37-2-3095, and 37-2-3107) within the Study Area have been assessed as moderately significant, both in this assessment and as part of the CQCHM (2010) assessment, due to their relative rarity in the region<sup>3</sup>.

#### *Low Significance*

A total of 282 i.e., the remaining sites, have been rated as of low significance. Low significance is attributed to sites that are common in the local and regional area, are highly disturbed, or have few artefact numbers.

<sup>3</sup> 45 Scarred trees are registered on AHIMS within a 30 x 30 km region centred on the Study Area as of 13 June 2012.

In addition, the northern mapped portion of B10 quarry site (37-2-0579) has been assessed as of low significance. This assessment is based on the following contributing factors:

- A lack of identified surface archaeology, including raw material suitable for knapping, both as part of the current assessment and Rich's (1993) assessment;
- Past excavations i.e. White (1998) and ERM (2007)) support Rich's observation that significantly fewer artefacts numbers will occur at the northern extent of the ridgeline mapped as B10. White's original excavation in the central portion of the ridgeline identified 4,454 artefacts, while ERM's exaction in the middle/northern portion of the ridgeline identified 170 artefacts; and
- Past disturbances, including the construction of the Bengalla haul road, has potentially impacted the integrity of the northern portion of the ridgeline.

Combined, these factors indicate the northern portion of B10 is of low research value.

## 11.2 Social (Cultural) Significance

Social or cultural values, within an Aboriginal Cultural Heritage Assessment refer to the spiritual, traditional, historical or contemporary associations and attachments a place or area has for Aboriginal people (NSW OEH 2011). As such, these values and their social significance can only be identified through consultation with Aboriginal people. Accordingly, throughout the assessment process, Hansen Bailey and AECOM have actively sought the opinions of RAPs on this matter, both verbally and in writing. Opportunities for the provision of cultural information have been provided at all stages of the assessment process.

Opportunities for RAPs to contribute knowledge of the social or cultural values of the Project Boundary have been provided at these times:

- A request during provision of the Project methodology for any initial comments regarding the Aboriginal cultural heritage values of the Project Boundary;
- During the planning meeting where RAPs were provided information about the scope of the Project, and the proposed cultural heritage assessment process;
- During the archaeological survey with either AECOM or Hansen Bailey;
- Opportunity were provided for personal meetings with knowledge holders who wish to share cultural heritage knowledge; and
- During the provision of the draft Aboriginal heritage impact assessment prior to its finalisation.

Social or cultural values are applicable to sites, items and landscapes. Aboriginal sites with archaeological evidence are all of value to the Aboriginal community because they represent a tangible connection with pre-European Aboriginal life.

### 11.2.1 Summary

The archaeological survey for the Project identified a rich landscape of past Aboriginal activity as evidenced from the numbers of stone artefacts recorded over the Study Area. Surface artefacts, which form Aboriginal archaeological and cultural sites, were recorded over the entire landscape but most intensely associated with creeklines and drainage lines, including Dry Creek. While having varying degrees of scientific significance, these stone artefacts are of cultural importance to Aboriginal people as they attest to the occupation and use of the Study Area by Aboriginal people in the past and provide an important tangible link to their heritage.

The identification of stone artefacts and archaeological sites notwithstanding, RAPs involved in the assessment process have not disclosed any specific knowledge related these artefacts or sites. However, during the archaeological survey, RAP representatives noted the importance of B10 quarry site for its rarity in the Hunter Region, being one of only a handful of these site types found locally. In addition, RAPs highlighted several key landscape features as important on the basis of their associated archaeological record. Dry Creek was highlighted by RAP representatives as a focal point for past Aboriginal activity due to higher artefact numbers identified in association with it. RAPs expressed interest at finding artefact scatter BM-AS26-12 on the crest of a hill on the western boundary of the Study Area. This highlighted the importance of vantage points in Aboriginal site selection.

Wanaruah LALC stated that the Study Area was important to Aboriginal people due to its proximity to an Aboriginal song line, which Mt Arthur was one of the guiding landmarks. In addition, Wanaruah LALC noted the Study Area is important as it is within walking distance to a number of known ceremonial areas (not identified).



ARCHAEOLOGICAL SIGNIFICANCE

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FIGURE 13

## 12.0 Impact Assessment

### 12.1 Project Construction Details and Impacts

As outlined in **Section 1.0**, BMC is seeking a new Development Consent under Part 4 Division 4.1 of the EP&A Act to enable mining to continue directly at a rate of up to 15 Mtpa for a 24 year period. A discussion is made below of each proposed activity and its potential impact on Aboriginal archaeological and cultural heritage values within the Study Area (**Figure 14**).

#### 12.1.1 Open Cut Mining

Open cut mining is proposed to continue westward towards the western edge of the Project Boundary generally as shown on **Figure 14**. Open cut mining refers to a method of extracting rock or minerals from the earth through surface intrusion. This involves the sequential removal of soil, overburden and interburden above and between each coal seam, coal removal, progressive backfilling and rehabilitation of mined-out areas. This method of extraction will result in the disturbance or destruction of the ground surface.

The continuation of open cut mining will result in impacts to 231 Aboriginal sites.

#### 12.1.2 Haul Roads

To facilitate open cut mining in the Project Boundary a series of haul roads will require construction. These will be located within the Disturbance Boundary within the boundary of proposed open cut areas as shown on **Figure 14**.

The construction of haul roads will result in impacts to two Aboriginal archaeological sites.

#### 12.1.3 Coal Handling and Preparation Plant (CHPP) & Infrastructure

The Project will include the upgrading of the Bengalla CHPP to accommodate additional ROM coal productions levels up to 15 Mtpa.

No Aboriginal archaeological sites will be impacted as a result of upgrading the CHPP.

#### 12.1.4 Rail Loop and Associated Coal Handling Infrastructure

The Project will involve the transport of product coal by rail to the Port of Newcastle for sale to the export market with lesser amounts supplied for use in local power stations. Product coal will continue to be conveyed from the product stockpiles to the existing Bengalla Rail Loop and associated train load out facility. The following upgrades will also be required as part of the Project:

- Installation of a reclaiming system, designed to operate at the Project rates required; and
- Upgrades to the existing train load out conveyors to a capacity of 5,000 tph.

No Aboriginal archaeological sites will be impacted as a result of upgrading the rail load out and associated coal handling infrastructure.

#### 12.1.5 Mine Site Facilities

The existing administration office, bath house and workshops will continue to be utilised for the Project with at least the following extensions to the Bengalla infrastructure required:

- Additional parking for heavy and light vehicles;
- A vehicle maintenance workshop with supporting services; Administration, training, crib and amenities building;
- Light and heavy vehicle wash station incorporating a catch dam, sediment control dam and oil separator; Raw and fire water tanks; and Tyre laydown area; and
- The relocation of the existing helipad, the in-pit shut down and erection pads.

The construction of additional mine site facilities will result in impacts to three Aboriginal archaeological sites.

#### 12.1.6 Site Access

All access to the Project will remain via the existing Bengalla Access Road off the Bengalla Link Road. To facilitate mining related activities in the south-western corner of the Project Boundary, a 6 km section of the Bengalla Link Road will need to be realigned.

The realignment of Bengalla Link Road will result in direct impacts to two Aboriginal archaeological sites.

#### **12.1.7 Water Management**

##### *Mine Water Management System*

Amendments to the Bengalla water management system required for the Project will be integrated with the existing water management system to enable optimal collection, use, recovery and recycling of water within the Project Boundary. The initial catchment areas above the mining area will require a system of catch dams, bunds, piped transfers and diversion drains to ensure that the water upstream does not inundate the mining area during large rainfall events.

Amendments to the Bengalla water management system through damming will result in impacts to eight Aboriginal archaeological sites.

##### *Dry Creek Diversion*

Dry Creek is an ephemeral creek that generally only flows following periods of intense rainfall due to its relatively small catchment area. As mining progresses to the west, it is anticipated that Dry Creek will be intercepted at approximately Year 5 of operations. As such, the construction of water storages and temporary diversion of Dry Creek will be required to divert clean water around mining operations through the use of a pipe network. Prior to the completion of mining in Year 24, a permanent re-alignment of Dry Creek will be constructed.

No Aboriginal archaeological sites will be impacted as a result of interim Dry Creek diversion.

#### **12.1.8 General Run of Mine Activities**

This impact category relates to activities that fall within the Disturbance Boundary for the Project but are not located within the footprint of proposed open cut mining areas and mine-related infrastructure. These activities include:

- Minor adjustments to mining infrastructure following detailed design;
- Bushfire management;
- Roads and access tracks;
- Minor buildings;
- General earthworks;
- Visual mitigation;
- Fencing;
- Water management; and
- Control structures.

Given the possible occurrence of these activities within the Disturbance Boundary over the 24-year life of the Project, there is the potential for 20 Aboriginal sites to be impacted. A precautionary approach dictates that the 20 sites should be considered as likely to be impacted by these activities and as such be appropriately managed and mitigated.

#### **12.1.9 Sites Not Impacted**

A total of 26 Aboriginal sites will not be impacted by the Project.

## 12.2 Summary of Impacts

Table 35 presents a summary of impacts to known Aboriginal sites within the Project Boundary. Note, a number of Aboriginal sites will be impacted by multiple activities and therefore are listed in the table multiple times.

Table 35: Summary of Impacts to Known Aboriginal Sites

| Impact                                                                                    | Site ID/Name | Site Type                 | Significance |
|-------------------------------------------------------------------------------------------|--------------|---------------------------|--------------|
| <b>Open Cut</b><br><br><u>Significance Tally</u><br>High – 0<br>Moderate – 5<br>Low – 223 | 37-2-0578    | Artefact Scatter          | Low          |
|                                                                                           | 37-2-0579    | Quarry (northern section) | Low          |
|                                                                                           | 37-2-0583    | Artefact Scatter          | Low          |
|                                                                                           | 37-2-0584    | Artefact Scatter          | Low          |
|                                                                                           | 37-2-0585    | Artefact Scatter          | Low          |
|                                                                                           | 37-2-0586    | Artefact Scatter          | Low          |
|                                                                                           | 37-2-0587    | Artefact Scatter          | Low          |
|                                                                                           | 37-2-0589    | Artefact Scatter          | Low          |
|                                                                                           | 37-2-0590    | Artefact Scatter          | Low          |
|                                                                                           | 37-2-0591    | Artefact Scatter          | Low          |
|                                                                                           | 37-2-0592    | Artefact Scatter          | Low          |
|                                                                                           | 37-2-0593    | Artefact Scatter          | Low          |
|                                                                                           | 37-2-0594    | Artefact Scatter          | Low          |
|                                                                                           | 37-2-0595    | Artefact Scatter          | Low          |
|                                                                                           | 37-2-0596    | Artefact Scatter          | Low          |
|                                                                                           | 37-2-0597    | Artefact Scatter          | Low          |
|                                                                                           | 37-2-0598    | Artefact Scatter          | Low          |
|                                                                                           | 37-2-0599    | Artefact Scatter          | Moderate     |
|                                                                                           | 37-2-0600    | Artefact Scatter          | Low          |
|                                                                                           | 37-2-0602    | Artefact Scatter          | Low          |
|                                                                                           | 37-2-0603    | Artefact Scatter          | Low          |
|                                                                                           | 37-2-0604    | Artefact Scatter          | Low          |
|                                                                                           | 37-2-2097    | Isolated Artefact         | Low          |
|                                                                                           | 37-2-2098    | Isolated Artefact         | Low          |
|                                                                                           | 37-2-2099    | Isolated Artefact         | Low          |
|                                                                                           | 37-2-2100    | Isolated Artefact         | Low          |
|                                                                                           | 37-2-2101    | Isolated Artefact         | Low          |
|                                                                                           | 37-2-2102    | Isolated Artefact         | Low          |
|                                                                                           | 37-2-2103    | Isolated Artefact         | Low          |
|                                                                                           | 37-2-2843    | Isolated Artefact         | Low          |
|                                                                                           | 37-2-2844    | Isolated Artefact         | Low          |
|                                                                                           | 37-2-2845    | Isolated Artefact         | Low          |
|                                                                                           | 37-2-2846    | Isolated Artefact         | Low          |
|                                                                                           | 37-2-3041    | Artefact Scatter          | Low          |
|                                                                                           | 37-2-3042    | Artefact Scatter          | Low          |
|                                                                                           | 37-2-3043    | Artefact Scatter          | Low          |
|                                                                                           | 37-2-3044    | Isolated Artefact         | Low          |
|                                                                                           | 37-2-3045    | Artefact Scatter          | Low          |
|                                                                                           | 37-2-3046    | Isolated Artefact         | Low          |

| Impact | Site ID/Name | Site Type         | Significance |
|--------|--------------|-------------------|--------------|
|        | 37-2-3047    | Isolated Artefact | Low          |
|        | 37-2-3048    | Isolated Artefact | Low          |
|        | 37-2-3049    | Artefact Scatter  | Low          |
|        | 37-2-3050    | Isolated Artefact | Low          |
|        | 37-2-3051    | Artefact Scatter  | Low          |
|        | 37-2-3052    | Artefact Scatter  | Low          |
|        | 37-2-3053    | Artefact Scatter  | Low          |
|        | 37-2-3054    | Artefact Scatter  | Low          |
|        | 37-2-3055    | Isolated Artefact | Low          |
|        | 37-2-3056    | Artefact Scatter  | Low          |
|        | 37-2-3057    | Isolated Artefact | Low          |
|        | 37-2-3058    | Artefact Scatter  | Low          |
|        | 37-2-3059    | Isolated Artefact | Low          |
|        | 37-2-3060    | Isolated Artefact | Low          |
|        | 37-2-3061    | Artefact Scatter  | Low          |
|        | 37-2-3062    | Isolated Artefact | Low          |
|        | 37-2-3063    | Isolated Artefact | Low          |
|        | 37-2-3064    | Scarred Tree      | Moderate     |
|        | 37-2-3065    | Artefact Scatter  | Low          |
|        | 37-2-3066    | Artefact Scatter  | Low          |
|        | 37-2-3067    | Artefact Scatter  | Low          |
|        | 37-2-3068    | Isolated Artefact | Low          |
|        | 37-2-3069    | Artefact Scatter  | Low          |
|        | 37-2-3070    | Isolated Artefact | Low          |
|        | 37-2-3071    | Artefact Scatter  | Low          |
|        | 37-2-3072    | Artefact Scatter  | Low          |
|        | 37-2-3073    | Artefact Scatter  | Low          |
|        | 37-2-3074    | Isolated Artefact | Low          |
|        | 37-2-3075    | Isolated Artefact | Low          |
|        | 37-2-3076    | Isolated Artefact | Low          |
|        | 37-2-3077    | Artefact Scatter  | Low          |
|        | 37-2-3078    | Isolated Artefact | Low          |
|        | 37-2-3079    | Isolated Artefact | Low          |
|        | 37-2-3080    | Isolated Artefact | Low          |
|        | 37-2-3081    | Artefact Scatter  | Low          |
|        | 37-2-3082    | Artefact Scatter  | Low          |
|        | 37-2-3083    | Artefact Scatter  | Low          |
|        | 37-2-3084    | Isolated Artefact | Low          |
|        | 37-2-3085    | Artefact Scatter  | Low          |
|        | 37-2-3086    | Artefact Scatter  | Low          |
|        | 37-2-3087    | Artefact Scatter  | Low          |
|        | 37-2-3088    | Artefact Scatter  | Low          |
|        | 37-2-3089    | Artefact Scatter  | Low          |
|        | 37-2-3090    | Artefact Scatter  | Low          |
|        | 37-2-3091    | Artefact Scatter  | Low          |

| Impact | Site ID/Name | Site Type         | Significance |
|--------|--------------|-------------------|--------------|
|        | 37-2-3092    | Artefact Scatter  | Low          |
|        | 37-2-3093    | Isolated Artefact | Low          |
|        | 37-2-3094    | Artefact Scatter  | Low          |
|        | 37-2-3095    | Scarred Tree      | Moderate     |
|        | 37-2-3096    | Isolated Artefact | Low          |
|        | 37-2-3097    | Artefact Scatter  | Low          |
|        | 37-2-3098    | Artefact Scatter  | Low          |
|        | 37-2-3099    | Artefact Scatter  | Low          |
|        | 37-2-3100    | Artefact Scatter  | Low          |
|        | 37-2-3101    | Artefact Scatter  | Low          |
|        | 37-2-3102    | Artefact Scatter  | Low          |
|        | 37-2-3103    | Artefact Scatter  | Low          |
|        | 37-2-3104    | Artefact Scatter  | Low          |
|        | 37-2-3105    | Artefact Scatter  | Low          |
|        | 37-2-3106    | Isolated Artefact | Low          |
|        | 37-2-3107    | Scarred Tree      | Moderate     |
|        | 37-2-3108    | Isolated Artefact | Low          |
|        | 37-2-3109    | Isolated Artefact | Low          |
|        | 37-2-3110    | Artefact Scatter  | Low          |
|        | 37-2-3111    | Isolated Artefact | Low          |
|        | 37-2-3112    | Artefact Scatter  | Low          |
|        | 37-2-3113    | Isolated Artefact | Low          |
|        | 37-2-3114    | Artefact Scatter  | Low          |
|        | 37-2-3115    | Artefact Scatter  | Low          |
|        | 37-2-3116    | Artefact Scatter  | Low          |
|        | 37-2-3117    | Isolated Artefact | Low          |
|        | 37-2-3118    | Artefact Scatter  | Low          |
|        | 37-2-3119    | Artefact Scatter  | Low          |
|        | 37-2-3120    | Artefact Scatter  | Low          |
|        | 37-2-3121    | Isolated Artefact | Low          |
|        | 37-2-3122    | Artefact Scatter  | Low          |
|        | 37-2-3123    | Isolated Artefact | Low          |
|        | 37-2-3124    | Artefact Scatter  | Low          |
|        | 37-2-3125    | Artefact Scatter  | Low          |
|        | 37-2-3126    | Artefact Scatter  | Low          |
|        | 37-2-3127    | Artefact Scatter  | Low          |
|        | 37-2-3128    | Artefact Scatter  | Low          |
|        | 37-2-3129    | Artefact Scatter  | Low          |
|        | 37-2-3130    | Artefact Scatter  | Low          |
|        | 37-2-3131    | Artefact Scatter  | Low          |
|        | 37-2-3132    | Isolated Artefact | Low          |
|        | 37-2-3133    | Artefact Scatter  | Low          |
|        | 37-2-3134    | Artefact Scatter  | Low          |
|        | 37-2-3135    | Artefact Scatter  | Low          |
|        | 37-2-3136    | Artefact Scatter  | Low          |

| Impact | Site ID/Name | Site Type         | Significance |
|--------|--------------|-------------------|--------------|
|        | 37-2-3137    | Artefact Scatter  | Low          |
|        | 37-2-3138    | Isolated Artefact | Low          |
|        | 37-2-3139    | Artefact Scatter  | Low          |
|        | 37-2-3140    | Artefact Scatter  | Low          |
|        | 37-2-3141    | Artefact Scatter  | Low          |
|        | 37-2-3142    | Artefact Scatter  | Low          |
|        | 37-2-3143    | Isolated Artefact | Low          |
|        | 37-2-3144    | Artefact Scatter  | Low          |
|        | 37-2-3145    | Isolated Artefact | Low          |
|        | 37-2-3146    | Artefact Scatter  | Low          |
|        | 37-2-3147    | Artefact Scatter  | Low          |
|        | 37-2-3148    | Artefact Scatter  | Low          |
|        | 37-2-3149    | Artefact Scatter  | Low          |
|        | 37-2-3150    | Artefact Scatter  | Low          |
|        | 37-2-3151    | Isolated Artefact | Low          |
|        | 37-2-3152    | Artefact Scatter  | Low          |
|        | 37-2-3153    | Isolated Artefact | Low          |
|        | 37-2-3154    | Artefact Scatter  | Low          |
|        | 37-2-3155    | Artefact Scatter  | Low          |
|        | 37-2-3157    | Isolated Artefact | Low          |
|        | 37-2-3158    | Artefact Scatter  | Low          |
|        | 37-2-3159    | Artefact Scatter  | Low          |
|        | 37-2-3160    | Artefact Scatter  | Low          |
|        | 37-2-3161    | Isolated Artefact | Low          |
|        | 37-2-3162    | Artefact Scatter  | Low          |
|        | 37-2-3163    | Isolated Artefact | Low          |
|        | 37-2-3164    | Isolated Artefact | Low          |
|        | 37-2-3534    | Isolated Artefact | Low          |
|        | 37-2-3535    | Isolated Artefact | Low          |
|        | 37-2-3536    | Artefact Scatter  | Low          |
|        | 37-2-3537    | Artefact Scatter  | Low          |
|        | 37-2-3538    | Isolated Artefact | Low          |
|        | 37-2-3539    | Isolated Artefact | Low          |
|        | 37-2-3540    | Isolated Artefact | Low          |
|        | 37-2-3541    | Isolated Artefact | Low          |
|        | 37-2-3542    | Isolated Artefact | Low          |
|        | 37-2-3543    | Artefact Scatter  | Low          |
|        | 37-2-3544    | Isolated Artefact | Low          |
|        | 37-2-3545    | Isolated Artefact | Low          |
|        | 37-2-3546    | Isolated Artefact | Low          |
|        | 37-2-3547    | Isolated Artefact | Low          |
|        | 37-2-3548    | Artefact Scatter  | Low          |
|        | 37-2-3549    | Isolated Artefact | Low          |
|        | 37-2-3550    | Isolated Artefact | Low          |
|        | 37-2-3551    | Isolated Artefact | Low          |

| Impact | Site ID/Name | Site Type         | Significance |
|--------|--------------|-------------------|--------------|
|        | 37-2-3552    | Isolated Artefact | Low          |
|        | 37-2-4060    | Isolated Artefact | Low          |
|        | 37-2-4061    | Artefact Scatter  | Low          |
|        | 37-2-4062    | Artefact Scatter  | Low          |
|        | 37-2-4063    | Artefact Scatter  | Low          |
|        | BM-AS01-12   | Artefact Scatter  | Low          |
|        | BM-AS02-12   | Artefact Scatter  | Low          |
|        | BM-AS03-12   | Artefact Scatter  | Low          |
|        | BM-AS04-12   | Artefact Scatter  | Low          |
|        | BM-AS16-12   | Artefact Scatter  | Moderate     |
|        | BM-AS17-12   | Artefact Scatter  | Low          |
|        | BM-IA01-12   | Isolated Artefact | Low          |
|        | BM-IA02-12   | Isolated Artefact | Low          |
|        | BM-IA03-12   | Isolated Artefact | Low          |
|        | BM-IA04-12   | Isolated Artefact | Low          |
|        | BM-IA05-12   | Isolated Artefact | Low          |
|        | BM-IA09-12   | Isolated Artefact | Low          |
|        | MTP-1403     | Artefact Scatter  | Low          |
|        | MTP-1404     | Isolated Artefact | Low          |
|        | MTP-1405     | Isolated Artefact | Low          |
|        | MTP-1406     | Isolated Artefact | Low          |
|        | MTP-1407     | Isolated Artefact | Low          |
|        | MTP-1408     | Isolated Artefact | Low          |
|        | MTP-1409     | Isolated Artefact | Low          |
|        | MTP-1411     | Isolated Artefact | Low          |
|        | MTP-1415     | Isolated Artefact | Low          |
|        | MTP-1416     | Isolated Artefact | Low          |
|        | MTP-1417     | Isolated Artefact | Low          |
|        | MTP-1418     | Isolated Artefact | Low          |
|        | MTP-1420     | Isolated Artefact | Low          |
|        | MTP-1428     | Isolated Artefact | Low          |
|        | MTP-1429     | Isolated Artefact | Low          |
|        | MTP-1432     | Isolated Artefact | Low          |
|        | MTP-1433     | Isolated Artefact | Low          |
|        | MTP-1437     | Isolated Artefact | Low          |
|        | MTP-1438     | Isolated Artefact | Low          |
|        | MTP-1439     | Isolated Artefact | Low          |
|        | MTP-1440     | Isolated Artefact | Low          |
|        | MTP-1442     | Isolated Artefact | Low          |
|        | MTP-1443     | Isolated Artefact | Low          |
|        | MTP-1444     | Isolated Artefact | Low          |
|        | MTP-1445     | Isolated Artefact | Low          |
|        | MTP-1447     | Isolated Artefact | Low          |
|        | MTP-1448     | Isolated Artefact | Low          |
|        | MTP-1449     | Isolated Artefact | Low          |

| Impact                                                                                                           | Site ID/Name | Site Type         | Significance |
|------------------------------------------------------------------------------------------------------------------|--------------|-------------------|--------------|
|                                                                                                                  | MTP-1450     | Isolated Artefact | Low          |
|                                                                                                                  | MTP-1451     | Isolated Artefact | Low          |
|                                                                                                                  | MTP-1452     | Isolated Artefact | Low          |
|                                                                                                                  | MTP-1455     | Artefact Scatter  | Low          |
|                                                                                                                  | MTP-1456     | Artefact Scatter  | Low          |
|                                                                                                                  | MTP-1458     | Isolated Artefact | Low          |
|                                                                                                                  | MTP-1459     | Isolated Artefact | Low          |
|                                                                                                                  | MTP-AS01-12  | Artefact Scatter  | Low          |
|                                                                                                                  | MTP-AS02-12  | Artefact Scatter  | Low          |
|                                                                                                                  | MTP-AS03-12  | Artefact Scatter  | Low          |
|                                                                                                                  | MTP-IA01-12  | Isolated Artefact | Low          |
|                                                                                                                  | MTP-IA02-12  | Isolated Artefact | Low          |
| <b>Haul Roads</b><br><br><u>Significance Tally</u><br>High – 0<br>Moderate – 0<br>Low – 2                        | 37-2-4060    | Isolated Artefact | Low          |
|                                                                                                                  | BM-IA09-12   | Isolated Artefact | Low          |
| <b>Mine Site Facilities</b><br><br><u>Significance Tally</u><br>High – 0<br>Moderate – 1<br>Low – 2              | BM-AS16-12   | Artefact Scatter  | Low          |
|                                                                                                                  | BM-AS18-12   | Artefact Scatter  | Moderate     |
|                                                                                                                  | BM-AS19-12   | Artefact Scatter  | Low          |
| <b>Site Access</b><br><br><u>Significance Tally</u><br>High – 0<br>Moderate – 0<br>Low – 2                       | BM-IA16-12   | Isolated Artefact | Low          |
|                                                                                                                  | BM-IA22-12   | Isolated Artefact | Low          |
| <b>Water Management System (damming)</b><br><br><u>Significance Tally</u><br>High – 0<br>Moderate – 0<br>Low – 8 | 37-2-3287    | Isolated Artefact | Low          |
|                                                                                                                  | 37-2-3288    | Isolated Artefact | Low          |
|                                                                                                                  | BM-AS11-12   | Artefact Scatter  | Low          |
|                                                                                                                  | BM-AS24-12   | Artefact Scatter  | Low          |
|                                                                                                                  | BM-AS25-12   | Artefact Scatter  | Low          |
|                                                                                                                  | BM-IA13-12   | Isolated Artefact | Low          |
|                                                                                                                  | BM-IA17-12   | Isolated Artefact | Low          |
|                                                                                                                  | BM-IA20-12   | Isolated Artefact | Low          |
| <b>Run of Mine Activities</b><br><br><u>Significance Tally</u><br>High – 0<br>Moderate – 0<br>Low – 20           | 37-2-1463    | Artefact Scatter  | Low          |
|                                                                                                                  | 37-2-2560    | Artefact Scatter  | Low          |
|                                                                                                                  | 37-2-3281    | Artefact Scatter  | Low          |
|                                                                                                                  | 37-2-3282    | Isolated Artefact | Low          |
|                                                                                                                  | 37-2-3283    | Isolated Artefact | Low          |
|                                                                                                                  | 37-2-3289    | Isolated Artefact | Low          |
|                                                                                                                  | 37-2-3840    | Isolated Artefact | Low          |
|                                                                                                                  | BM-AS05-12   | Artefact Scatter  | Low          |

| Impact                                                                                       | Site ID/Name | Site Type         | Significance |
|----------------------------------------------------------------------------------------------|--------------|-------------------|--------------|
|                                                                                              | BM-AS06-12   | Artefact Scatter  | Low          |
|                                                                                              | BM-AS07-12   | Artefact Scatter  | Low          |
|                                                                                              | BM-AS12-12   | Artefact Scatter  | Low          |
|                                                                                              | BM-AS13-12   | Artefact Scatter  | Low          |
|                                                                                              | BM-AS14-12   | Artefact Scatter  | Low          |
|                                                                                              | BM-IA07-12   | Isolated Artefact | Low          |
|                                                                                              | BM-IA08-12   | Isolated Artefact | Low          |
|                                                                                              | BM-IA11-12   | Isolated Artefact | Low          |
|                                                                                              | BM-IA12-12   | Isolated Artefact | Low          |
|                                                                                              | BM-IA18-12   | Isolated Artefact | Low          |
|                                                                                              | BM-IA21-12   | Isolated Artefact | Low          |
|                                                                                              | MTP-1412     | Artefact Scatter  | Low          |
| <b>Not Impacted</b><br><br><u>Significance Tally</u><br>High – 0<br>Moderate – 1<br>Low – 25 | 37-2-2561    | Artefact Scatter  | Low          |
|                                                                                              | 37-2-2565    | Isolated Artefact | Low          |
|                                                                                              | 37-2-2892    | Isolated Artefact | Low          |
|                                                                                              | 37-2-2896    | Isolated Artefact | Low          |
|                                                                                              | 37-2-2903    | Scarred Tree      | Moderate     |
|                                                                                              | 37-2-2916    | Isolated Artefact | Low          |
|                                                                                              | 37-2-3285    | Isolated Artefact | Low          |
|                                                                                              | 37-2-3286    | Isolated Artefact | Low          |
|                                                                                              | BM-AS08-12   | Artefact Scatter  | Low          |
|                                                                                              | BM-AS09-12   | Artefact Scatter  | Low          |
|                                                                                              | BM-AS10-12   | Artefact Scatter  | Low          |
|                                                                                              | BM-AS15-12   | Artefact Scatter  | Low          |
|                                                                                              | BM-AS20-12   | Artefact Scatter  | Low          |
|                                                                                              | BM-AS21-12   | Artefact Scatter  | Low          |
|                                                                                              | BM-AS22-12   | Artefact Scatter  | Low          |
|                                                                                              | BM-AS23-12   | Artefact Scatter  | Low          |
|                                                                                              | BM-AS26-12   | Artefact Scatter  | Low          |
|                                                                                              | BM-IA06-12   | Isolated Artefact | Low          |
|                                                                                              | BM-IA10-12   | Isolated Artefact | Low          |
|                                                                                              | BM-IA14-12   | Isolated Artefact | Low          |
|                                                                                              | BM-IA15-12   | Isolated Artefact | Low          |
|                                                                                              | BM-IA19-12   | Isolated Artefact | Low          |
|                                                                                              | BM-IA23-12   | Isolated Artefact | Low          |
|                                                                                              | MTP-1401     | Isolated Artefact | Low          |
|                                                                                              | MTP-1402     | Isolated Artefact | Low          |
|                                                                                              | MTP-1410     | Isolated Artefact | Low          |

\*Note: several sites may be impacted by multiple activities.

## 13.0 Cumulative Impact Assessment

### 13.1 Assessment of Ecologically Sustainable Development (ESD)

In NSW, the NPW Act provides the legislative framework for the protection of Aboriginal objects and places. Section 2A(2) of the NPW Act stipulates that such protection is to be achieved by applying the principles of Ecologically Sustainable Development (ESD). ESD requires the integration of *economic* and *environmental* considerations (including cultural heritage) in decision-making processes and, in the context of Aboriginal cultural heritage in NSW, can be achieved through the implementation of two key principles: intergenerational equity and the precautionary principle.

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. With regards to Aboriginal heritage, intergenerational equity can be assessed in terms of cumulative impacts to Aboriginal objects and places in a region. Central to any assessment of intergenerational equity is the proposition that regions with fewer Aboriginal objects and places necessarily retain fewer opportunities for future generations of Aboriginal people to enjoy their cultural heritage. Accordingly, information regarding the known and potential Aboriginal heritage resource within a given region lies at heart of any assessment of intergenerational equity.

The precautionary principle holds 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 NSW, the precautionary principle is relevant to OEH's consideration of potential impacts to Aboriginal cultural heritage in situations where:

- The proposed development 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.

In these instances, OEH has indicated that a precautionary approach should be taken and all cost-effective measures implemented to prevent or reduce damage to Aboriginal objects and/or places.

#### 13.1.1 Intergenerational Equity - Cumulative Impacts of the Project on Aboriginal Heritage

In the context of the current assessment, three avenues for assessing the cumulative impact of the Project on Aboriginal heritage can be pursued:

- A comparison, using archaeological survey undertaken for the current project in conjunction with an AHIMS search, of sites impacted within the Study Area against those not impacted within the Study Area;
- A comparison, using the results of an AHIMS search, of the impacted Aboriginal heritage resource in the Study Area with that of the surrounding region; and
- The use of aerial photographs, topographic maps and GIS data to identify the *potential* Aboriginal heritage resource of the surrounding region.

#### **Identified Resource - Study Area**

A total of 289 Aboriginal archaeological sites have been identified within the Study Area as a result of the archaeological survey and an AHIMS search. From this total, 263 sites will be impacted or partially impacted by the Project, and a further 26 will not be impacted, as identified in **Table 36**.

Table 36: Cumulative Impact Identified Resource

| Site Type          | Total Sites in the Study Area | Sites Impacted           | Sites Not Impacted |
|--------------------|-------------------------------|--------------------------|--------------------|
| Artefact scatters  | 145                           | 134                      | 11                 |
| Isolated artefacts | 139                           | 125                      | 14                 |
| Scarred trees      | 4                             | 3                        | 1                  |
| Stone quarries*    | 1                             | 1 (B10 northern section) | 0                  |
| <b>Total</b>       | <b>289</b>                    | <b>263</b>               | <b>26</b>          |

*Note: B10 quarry site (37-2-0579) has been split into two areas which have subsequently been assessed separately. The northern portion of low significance will be impacted but the remainder of the site will not.*

As indicated above, 263 sites have been identified as being impacted or partially impacted by the Project, of which 259 are isolated finds and artefact scatters. Based on these figures, stone artefacts sites that will be impacted by the Project account for 91.2% of all known stone artefact sites within the Study Area. These results suggest that the loss of the 259 isolated finds and artefact scatter sites in question would constitute a significant impact to the identified Aboriginal heritage resource within the Study Area.

Impacts to three of four scarred trees registered on AHIMS that occur within the Study Area accounts for 75% of the total identified within the Study Area. These results suggest that the loss of the three scarred trees in question would constitute a significant impact to the identified Aboriginal heritage scattered tree resource within the Study Area.

Impacts to the northern section of B10 quarry site (37-2-0579) are not considered to represent a significant impact to the identified quarry resource in the Study Area or region (discussed below). This is due to a lack of identified artefacts in the originally mapped B10 boundary, viewed in conjunction with past mine related disturbances to this area, and previous archaeological excavations undertaken at B10, all of which indicate the northern area is of low research value. In addition, no impacts are proposed to the larger southern portion of the B10 quarry resource where surface artefacts have previously been identified, and there have been fewer past disturbances.

#### **Identified Resource – AHIMS 30 x 30 km Region**

A search of the AHIMS database for a 30 x 30 km region (study region) centred on the Study Area provides another method of assessing the cumulative impact of the Project on the existing Aboriginal heritage resource of the study region. A search of the database was undertaken on 14 June 2012 and returned 2,838 records of currently valid sites. A breakdown of site types is provided in **Table 37**.

Table 37: Identified Resource 30 x 30 KM

| Site Type                            | Number of Features AHIMS |
|--------------------------------------|--------------------------|
| Artefact scatters and isolated finds | 2838                     |
| Scarred trees                        | 45                       |
| Stone quarries                       | 6                        |
| <b>Total</b>                         | <b>2889</b>              |

Alongside those identified within the Project Boundary, existing Aboriginal sites in the study region offer opportunities for future research, conservation and education. As indicated above, a total of 259 isolated finds and artefact scatters will be impacted by the Project. On current evidence, these sites represent 9.1% of all known artefact scatters and isolated sites within the study region. Due to significant differences in the quantity and quality of information available on AHIMS site cards for stone artefact sites in the region, a direct comparison of the significance and character of stone artefact sites within and outside the Study Area is not possible. Nonetheless, it should be noted that of the sites impacted, none have been rated as having high scientific significance and only seven of moderate significance. Together with the figures above, this suggests that the loss of the 259 sites in question would constitute a moderate impact to the identified Aboriginal heritage resource of the region.

In addition, three scarred trees will be impacted as a result of the Project. On current evidence, these trees represent 6.6% of all known scarred tree sites in the study region. Destruction of these trees therefore constitutes a moderate impact to known scarred tree sites within the region.

### **Potential Resource**

AHIMS results only represent a fraction of the likely archaeological resource present within a region, as these results are only representative of land that has been subject to archaeological investigations. Accordingly, an assessment of the *potential* Aboriginal heritage resource of the study region is also required. For the present analysis, aerial photographs, topographic maps and GIS data have been used to prepare a preliminary assessment of this resource.

As shown in **Table 38** analysis of available aerial photography and GIS data for study region indicates that, when combined with the total amount of land proposed to be impacted by open cut mining operations within the Project Area, grossly modified or disturbed terrain (i.e. urban areas, roads, coal mines, power stations, etc) accounts for 8.86% of the total study region. Within these areas, there is considered to be a low potential for archaeological sites. The vast majority of land within the area is low-intensity rural land use (68.78%). Undisturbed 'natural' terrain makes up the remaining 22.36%.

Viewed from an archaeological perspective, the results of the land use analysis presented in **Table 38** suggest that a significant portion of the study region represents a potential Aboriginal heritage resource. As noted above, Aboriginal heritage is unlikely to survive in areas of disturbed terrain (8.86%). However, numerous studies have shown that rural areas can, and frequently do, retain evidence of past Aboriginal occupation and/or activity, albeit typically of lower integrity to that identified in otherwise undisturbed areas. Therefore, combining low-intensity rural land use (68.78%) and undisturbed terrain (22.36%), it can be argued that 91.14% of the study region has the potential to retain evidence of past Aboriginal occupation and/or activity.

With regards to the existence, outside of the Project Boundary of environmental contexts that have the potential to contain sites comparable to that identified within it, an examination of available topographic mapping for the study region indicates that many such contexts exist. Particular attention, for example, is drawn to the northern undisturbed portion of Dry Creek, Sandy Creek and Coal Creek, to the north-west of the Project Boundary. As indicated by the results of the current assessment and previous archaeological investigations in the region, stone artefact sites are typically located in landform contexts within 100 or 200 m of watercourses, with larger, more complex sites associated with higher order streams. On the basis of this evidence alone, it can be concluded that the study region retains a significant, as yet unidentified, stone artefact resource.

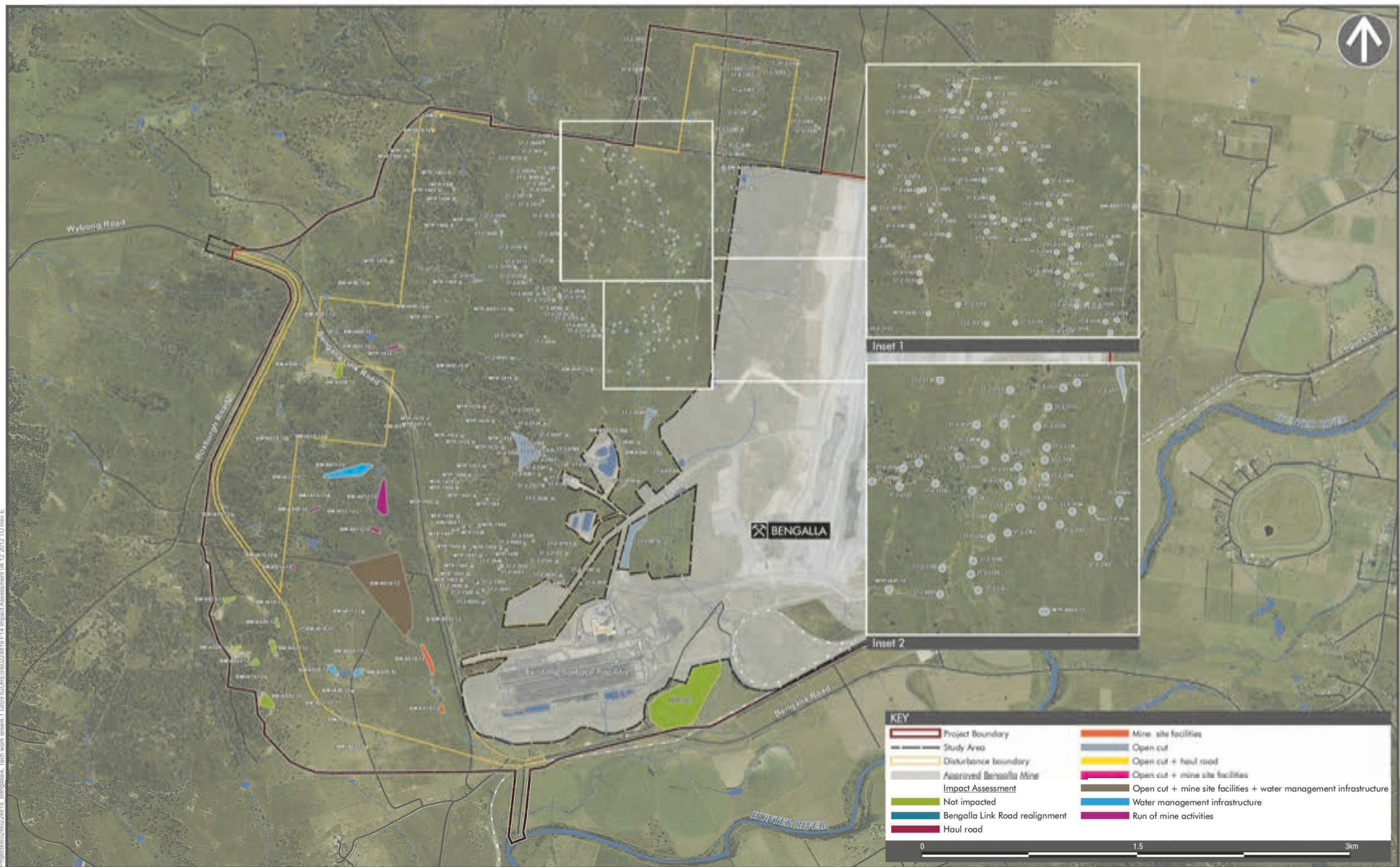
**Table 38: Land Use Analysis**

| <b>Disturbance category</b>                       | <b>Area (ha)</b> | <b>%</b>   |
|---------------------------------------------------|------------------|------------|
| Grossly modified/disturbed                        | 7,974            | 8.86       |
| Low-intensity rural land use                      | 61,906           | 68.78      |
| Conservation areas                                | 0                | 0          |
| Undisturbed/minimally disturbed 'natural' terrain | 20,120           | 22.36      |
| <b>Total</b>                                      | <b>90,000</b>    | <b>100</b> |

#### **13.1.2 The precautionary principle**

As indicated above, the precautionary principle holds 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 the context of the current assessment, it can be stated that AECOM has adopted a precautionary approach in our assessment of the impacts of the Project on identified Aboriginal sites within the Study Area and that this approach is reflected in our proposed management strategy (**Section 14.0**).



**IMPACT ASSESSMENT**  
 Bengalla Continuation of Mining Project  
 Aboriginal Archaeological and Cultural Heritage Impact Assessment

FIGURE 14

## 14.0 Management Recommendations

### 14.1 Statutory Requirements

As indicated in **Section 1.0**, this Aboriginal archaeology and cultural heritage impact assessment forms part of an EIS being prepared by Hansen Bailey to support Bengalla Mine's Project Approval under Part 4, Division 4.1 of the EP&A Act.

The *Draft Guidelines for Aboriginal Cultural Heritage Impact Assessment and Community Consultation* (DEC 2005) detail the relevant statutory requirements for Aboriginal cultural heritage impact assessments conducted under Division 4.1 of Part 4 of the EP&A Act. Although not statutorily binding for Division 4.1 assessments, OEH's *Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales* (DECCW 2010a) and *Guide to Investigating, Assessing and Reporting on Aboriginal Cultural Heritage in NSW* (OEH 2011) provide 'best practice' documents for Aboriginal Cultural Heritage Impact Assessments in NSW. Both documents have been used in the formulation of the management strategy detailed below.

### 14.2 Management Strategy

A total of 263 Aboriginal archaeological sites have been identified as being directly impacted by the Project through open cut mining activities and/or the construction/maintenance of mine-related infrastructure. A management strategy to address the impacts of the Project on the known Aboriginal archaeological resource of the Study Area is provided below.

It is recommended that this strategy be detailed in a revised ACHMP for the Project, which should be prepared in consultation with RAPs, OEH and DP&I. Subject to Development Consent under Part 4, Division 4.1 of EP&A Act, this ACHMP will guide the management of the known and potential Aboriginal archaeological resource of the Project Area as well identified cultural values.

The ACHMP should contain procedures for consultation and involvement of RAPs in the management of Aboriginal cultural heritage values within the Study Area. In addition, the ACHMP will include details of proposed mitigation and management strategies of all Aboriginal sites, procedures for the identification and management of previously unrecorded sites, details of an appropriate long term arrangement for any Aboriginal objects salvaged, details of an Aboriginal cultural heritage education program for all contractors and personnel associated with construction activities and compliance procedures.

#### 14.2.1 AHIMS Site Cards

AHIMS sites cards will be completed and submitted to OEH for all newly recorded sites at the completion of the assessment.

#### 14.2.2 Archaeological Salvage Program

An archaeological salvage program should be undertaken for those sites within the Study Area impacted by the Project prior to disturbances. The program, which is to be detailed in the ACHMP for the Project, will incorporate the following two components:

##### ***Surface Collection (Salvage) of Stone Artefacts***

Two hundred and fifty nine isolated finds and artefact scatters, comprising two sites of moderate and 257 sites of low archaeological significance, will be directly impacted by the Project, resulting in their destruction. To mitigate these impacts, and in recognition that all sites are important to the Aboriginal community, surface artefact collection of all 259 artefact scatters and isolated finds will be undertaken prior to the commencement of mining activities. Surface collection is considered an appropriate and effective mitigation option for these sites given their content and level of archaeological significance. **Table 39** provides a list of sites to be surface collected.

Recovered artefacts should be subject to appropriate forms of analysis and managed in accordance with the ACHMP. RAPs should be involved in the collection of surface artefacts. Appropriate long-term management options for recovered artefacts should be developed in consultation with RAPs during the preparation of the ACHMP.

ASIR cards for all salvaged sites are required to be submitted to OEH at the completion of the salvage.

### ***Scarred Tree Assessment & Removal***

Three AHIMS registered scarred trees will be impacted by the Project (37-2-3095, 37-2-3107, and 37-2-3064). It is recommended that these trees be subject to an aborist inspection, with the participation of RAP representatives, prior to Project impacts, in order to assess their status as Aboriginal scarred trees. Should it be determined the scars on these trees are of Aboriginal origin they should be removed under the supervision of a qualified aborist, archaeologist and RAP representatives prior to impacts. Details for the scarred tree assessment, and possible removal, transport and long term storage should be incorporated into the revised ACHMP. Should it be determined they are not Aboriginal scarred trees they will not be managed as Aboriginal archaeological sites.

### ***Subsurface Archaeological Excavation***

Additional subsurface archaeological excavations have not been proposed for identified areas of archaeological sensitivity (i.e. Dry Creek and its tributaries for the following reasons):

- A comprehensive program of archaeological excavations, addressing questions pertaining to site location, site composition and specific research questions related to distance decay from B10 quarry site, has been undertaken on Dry Creek at site B33 (37-2-602) by Elizabeth White (1998);
- White (1998) excavated two locations on Dry Creek: B33-1 and B33-2. B33-1 comprised a 10 x 5 m area from which 142 artefacts were recorded, resulting in an artefact density of 2.84/m<sup>2</sup>. B33-2 comprised a roughly 5 x 3 m area from which 523 artefacts were recorded, resulting in an artefact density of 34.8/m<sup>2</sup>. These artefact densities are considered low/moderate within the context of the Hunter Valley (see Kuskie et al. 2004a; Hamm 2010);
- A review of geomorphological data, including soil assessments, in conjunction with observation made during the field survey, indicates that soils along Dry Creek and its tributaries are likely derived from erosional processes upslope. Consequently, artefacts identified within the area are likely to be in varying disturbed contexts. This was noted by White (1998: 62) who found the 'deposit appeared to be disturbed' at site B33-1. Turvey (in White 1998: 28) also notes it 'is unlikely that dateable archaeological material exists in this area due to the same erosional processes responsible for the material deposited in this channel system (from upslope)'. On this basis, archaeological excavations are not considered warranted; and
- As part of the proposed archaeological salvage program outlined above, a large assemblage of surface artefacts will be collected. The size of the assemblage is considered large enough to answer questions related to the location, duration, and complexity of past Aboriginal activities in the Bengalla landscape.

Subsurface archaeological excavations have not been proposed for the northern section of B10 quarry (37-2-0579) for the following reasons:

- A lack of identified surface archaeology directly within the area, including raw material suitable for knapping, both as part of the current assessment and Rich's (1993) assessment;
- Past excavations i.e. White (1998) and ERM (2007)) supports Rich's observation that significantly fewer artefacts numbers will occur at the northern extent of the B10 ridgeline. White's original excavation in the central portion of the ridgeline identified 4,454 artefacts, while ERM's exaction in the middle/northern portion of the ridgeline identified only 170 artefacts; and
- Past disturbances, including the construction of the Bengalla haul road has potentially impacted the integrity of the northern portion of the ridgeline on which B10 occurs.

### **14.2.3 Protection of Non-impacted Sites**

All Aboriginal sites not impacted by the Project but within the Project Boundary are to be protected from impacts (n=26). In addition, Aboriginal archaeological sites that will not be impacted by the Project but occur within 200 m of proposed impacts i.e. mine activities (n = 17) are to be protected via permanent stock-proof fencing and appropriate associated signage (**Table 39**). Site fencing is to be erected after consultation with a qualified archaeologist and RAP representatives. All relevant staff and contractors are to be made aware of the nature and locations of all sites as well as BMC's legal obligations with respect to them. Protected sites will need to be identified on all relevant mine site plans. Details for the care of protected sites should be incorporated into the ACHMP.

#### **14.2.4 Aboriginal Site Database**

The existing Aboriginal Site Database for the Project Boundary will be updated upon commencement of the Project to incorporate the findings of this assessment report. BMC will be responsible for the maintenance of this database which will, at a minimum, contain the name, type, size (where applicable), MGA coordinates and status of all Aboriginal sites identified as part of this assessment and previous assessments within the Project Boundary. The database is to be regularly updated throughout the operational life of Project.

#### **14.2.5 Aboriginal Heritage Induction & Cultural Awareness Training**

As part of Project inductions, an Aboriginal cultural heritage component should be included. This will outline current protocols and responsibilities with respect to the management of Aboriginal cultural heritage for the Project. It will also provide an overview of the site types present and procedures for reporting the identification of Aboriginal archaeological sites.

In addition, Aboriginal cultural awareness training will be undertaken for all staff whose roles may reasonably bring them into contact with Aboriginal sites and/or involve consultation with local Aboriginal community members.

The commitment to the development of the Aboriginal cultural awareness training package will be included in the ACMP.

#### **14.2.6 Management of Previously Unrecorded Aboriginal Objects**

##### **14.2.6.1 Open Artefact Sites**

In the event that previously unidentified Aboriginal objects are identified throughout the construction and operational phases of the Project, the following procedure is to be adopted:

1. All works must cease immediately in the area to prevent any further impacts to the object(s).
2. Notify the BMC Environmental Specialist immediately;
3. A qualified archaeologist will be engaged to determine the nature, extent and scientific significance of the object(s);
4. RAPs are to be notified in writing regarding the nature of the find and if required proposed management actions. RAPs will be requested to provide comments within seven days;
5. Appropriate management recommendations are then to be developed by BMC in consultation with OEH, an archaeologist, and RAPs.

##### **14.2.6.2 Human Skeletal Remains**

In the event that human skeletal remains are identified, the following procedure is to be adopted:

1. When suspected human remains are identified, all work in the near vicinity is to cease immediately;
2. Notify the BMC Environmental Specialist immediately;
3. The BMC Environmental Specialist is to notify the Police immediately;
4. The BMC Environmental Specialist is to contact OEH's Environment line on 131 555 to identify that possible skeletal remains have been discovered and that the police have been notified. OEH will provide details on the current processes involved for managing archaeological skeletal remains (both Aboriginal & historic);
5. Under the instructions of the Police, an area 50 m in radius is to be cordoned off using temporary fencing around the exposed suspected human remains site. On agreement between the Police and the BMC Environmental Specialist, work can continue outside of this area as long as there is no risk of interference to the human remains or the assessment of human remains;
6. If the remains are determined to be Aboriginal remains, then under the advice of OEH, consult with the RAPs; and
7. Do not recommence work at the location until all legal requirements and the reasonable requirements of OEH and the RAPs have been adequately addressed.

### 14.3 Summary of Management Mitigation Measures

**Table 39** presents a summary of management mitigation measures for Aboriginal sites within the Project Boundary.

Table 39: Summary of Management Mitigation Measures

| Management Mitigation Measures         | Site ID   | Site Type         |
|----------------------------------------|-----------|-------------------|
| <b>Surface Collection of Artefacts</b> | 37-2-0578 | Artefact Scatter  |
|                                        | 37-2-0583 | Artefact Scatter  |
|                                        | 37-2-0584 | Artefact Scatter  |
|                                        | 37-2-0585 | Artefact Scatter  |
|                                        | 37-2-0586 | Artefact Scatter  |
|                                        | 37-2-0587 | Artefact Scatter  |
|                                        | 37-2-0589 | Artefact Scatter  |
|                                        | 37-2-0590 | Artefact Scatter  |
|                                        | 37-2-0591 | Artefact Scatter  |
|                                        | 37-2-0592 | Artefact Scatter  |
|                                        | 37-2-0593 | Artefact Scatter  |
|                                        | 37-2-0594 | Artefact Scatter  |
|                                        | 37-2-0595 | Artefact Scatter  |
|                                        | 37-2-0596 | Artefact Scatter  |
|                                        | 37-2-0597 | Artefact Scatter  |
|                                        | 37-2-0598 | Artefact Scatter  |
|                                        | 37-2-0599 | Artefact Scatter  |
|                                        | 37-2-0600 | Artefact Scatter  |
|                                        | 37-2-0602 | Artefact Scatter  |
|                                        | 37-2-0603 | Artefact Scatter  |
|                                        | 37-2-0604 | Artefact Scatter  |
|                                        | 37-2-1463 | Artefact Scatter  |
|                                        | 37-2-2097 | Isolated Artefact |
|                                        | 37-2-2098 | Isolated Artefact |
|                                        | 37-2-2099 | Isolated Artefact |
|                                        | 37-2-2100 | Isolated Artefact |
|                                        | 37-2-2101 | Isolated Artefact |
|                                        | 37-2-2102 | Isolated Artefact |
|                                        | 37-2-2103 | Isolated Artefact |
|                                        | 37-2-2560 | Artefact Scatter  |
|                                        | 37-2-2843 | Isolated Artefact |
|                                        | 37-2-2844 | Isolated Artefact |
|                                        | 37-2-2845 | Isolated Artefact |
|                                        | 37-2-2846 | Isolated Artefact |
|                                        | 37-2-3041 | Artefact Scatter  |
|                                        | 37-2-3042 | Artefact Scatter  |
|                                        | 37-2-3043 | Artefact Scatter  |
|                                        | 37-2-3044 | Isolated Artefact |
|                                        | 37-2-3045 | Artefact Scatter  |
|                                        | 37-2-3046 | Isolated Artefact |
|                                        | 37-2-3047 | Isolated Artefact |
|                                        | 37-2-3048 | Isolated Artefact |
|                                        | 37-2-3049 | Artefact Scatter  |
|                                        | 37-2-3050 | Isolated Artefact |
|                                        | 37-2-3051 | Artefact Scatter  |
|                                        | 37-2-3052 | Artefact Scatter  |
|                                        | 37-2-3053 | Artefact Scatter  |
|                                        | 37-2-3054 | Artefact Scatter  |
|                                        | 37-2-3055 | Isolated Artefact |
|                                        | 37-2-3056 | Artefact Scatter  |
|                                        | 37-2-3057 | Isolated Artefact |
|                                        | 37-2-3058 | Artefact Scatter  |

| Management Mitigation Measures | Site ID   | Site Type         |
|--------------------------------|-----------|-------------------|
|                                | 37-2-3059 | Isolated Artefact |
|                                | 37-2-3060 | Isolated Artefact |
|                                | 37-2-3061 | Artefact Scatter  |
|                                | 37-2-3062 | Isolated Artefact |
|                                | 37-2-3063 | Isolated Artefact |
|                                | 37-2-3065 | Artefact Scatter  |
|                                | 37-2-3066 | Artefact Scatter  |
|                                | 37-2-3067 | Artefact Scatter  |
|                                | 37-2-3068 | Isolated Artefact |
|                                | 37-2-3069 | Artefact Scatter  |
|                                | 37-2-3070 | Isolated Artefact |
|                                | 37-2-3071 | Artefact Scatter  |
|                                | 37-2-3072 | Artefact Scatter  |
|                                | 37-2-3073 | Artefact Scatter  |
|                                | 37-2-3074 | Isolated Artefact |
|                                | 37-2-3075 | Isolated Artefact |
|                                | 37-2-3076 | Isolated Artefact |
|                                | 37-2-3077 | Artefact Scatter  |
|                                | 37-2-3078 | Isolated Artefact |
|                                | 37-2-3079 | Isolated Artefact |
|                                | 37-2-3080 | Isolated Artefact |
|                                | 37-2-3081 | Artefact Scatter  |
|                                | 37-2-3082 | Artefact Scatter  |
|                                | 37-2-3083 | Artefact Scatter  |
|                                | 37-2-3084 | Isolated Artefact |
|                                | 37-2-3085 | Artefact Scatter  |
|                                | 37-2-3086 | Artefact Scatter  |
|                                | 37-2-3087 | Artefact Scatter  |
|                                | 37-2-3088 | Artefact Scatter  |
|                                | 37-2-3089 | Artefact Scatter  |
|                                | 37-2-3090 | Artefact Scatter  |
|                                | 37-2-3091 | Artefact Scatter  |
|                                | 37-2-3092 | Artefact Scatter  |
|                                | 37-2-3093 | Isolated Artefact |
|                                | 37-2-3094 | Artefact Scatter  |
|                                | 37-2-3096 | Isolated Artefact |
|                                | 37-2-3097 | Artefact Scatter  |
|                                | 37-2-3098 | Artefact Scatter  |
|                                | 37-2-3099 | Artefact Scatter  |
|                                | 37-2-3100 | Artefact Scatter  |
|                                | 37-2-3101 | Artefact Scatter  |
|                                | 37-2-3102 | Artefact Scatter  |
|                                | 37-2-3103 | Artefact Scatter  |
|                                | 37-2-3104 | Artefact Scatter  |
|                                | 37-2-3105 | Artefact Scatter  |
|                                | 37-2-3106 | Isolated Artefact |
|                                | 37-2-3108 | Isolated Artefact |
|                                | 37-2-3109 | Isolated Artefact |
|                                | 37-2-3110 | Artefact Scatter  |
|                                | 37-2-3111 | Isolated Artefact |
|                                | 37-2-3112 | Artefact Scatter  |
|                                | 37-2-3113 | Isolated Artefact |
|                                | 37-2-3114 | Artefact Scatter  |
|                                | 37-2-3115 | Artefact Scatter  |
|                                | 37-2-3116 | Artefact Scatter  |
|                                | 37-2-3117 | Isolated Artefact |
|                                | 37-2-3118 | Artefact Scatter  |
|                                | 37-2-3119 | Artefact Scatter  |

| Management Mitigation Measures | Site ID   | Site Type         |
|--------------------------------|-----------|-------------------|
|                                | 37-2-3120 | Artefact Scatter  |
|                                | 37-2-3121 | Isolated Artefact |
|                                | 37-2-3122 | Artefact Scatter  |
|                                | 37-2-3123 | Isolated Artefact |
|                                | 37-2-3124 | Artefact Scatter  |
|                                | 37-2-3125 | Artefact Scatter  |
|                                | 37-2-3126 | Artefact Scatter  |
|                                | 37-2-3127 | Artefact Scatter  |
|                                | 37-2-3128 | Artefact Scatter  |
|                                | 37-2-3129 | Artefact Scatter  |
|                                | 37-2-3130 | Artefact Scatter  |
|                                | 37-2-3131 | Artefact Scatter  |
|                                | 37-2-3132 | Isolated Artefact |
|                                | 37-2-3133 | Artefact Scatter  |
|                                | 37-2-3134 | Artefact Scatter  |
|                                | 37-2-3135 | Artefact Scatter  |
|                                | 37-2-3136 | Artefact Scatter  |
|                                | 37-2-3137 | Artefact Scatter  |
|                                | 37-2-3138 | Isolated Artefact |
|                                | 37-2-3139 | Artefact Scatter  |
|                                | 37-2-3140 | Artefact Scatter  |
|                                | 37-2-3141 | Artefact Scatter  |
|                                | 37-2-3142 | Artefact Scatter  |
|                                | 37-2-3143 | Isolated Artefact |
|                                | 37-2-3144 | Artefact Scatter  |
|                                | 37-2-3145 | Isolated Artefact |
|                                | 37-2-3146 | Artefact Scatter  |
|                                | 37-2-3147 | Artefact Scatter  |
|                                | 37-2-3148 | Artefact Scatter  |
|                                | 37-2-3149 | Artefact Scatter  |
|                                | 37-2-3150 | Artefact Scatter  |
|                                | 37-2-3151 | Isolated Artefact |
|                                | 37-2-3152 | Artefact Scatter  |
|                                | 37-2-3153 | Isolated Artefact |
|                                | 37-2-3154 | Artefact Scatter  |
|                                | 37-2-3155 | Artefact Scatter  |
|                                | 37-2-3157 | Isolated Artefact |
|                                | 37-2-3158 | Artefact Scatter  |
|                                | 37-2-3159 | Artefact Scatter  |
|                                | 37-2-3160 | Artefact Scatter  |
|                                | 37-2-3161 | Isolated Artefact |
|                                | 37-2-3162 | Artefact Scatter  |
|                                | 37-2-3163 | Isolated Artefact |
|                                | 37-2-3164 | Isolated Artefact |
|                                | 37-2-3281 | Artefact Scatter  |
|                                | 37-2-3282 | Isolated Artefact |
|                                | 37-2-3283 | Isolated Artefact |
|                                | 37-2-3287 | Isolated Artefact |
|                                | 37-2-3288 | Isolated Artefact |
|                                | 37-2-3289 | Isolated Artefact |
|                                | 37-2-3534 | Isolated Artefact |
|                                | 37-2-3535 | Isolated Artefact |
|                                | 37-2-3536 | Artefact Scatter  |
|                                | 37-2-3537 | Artefact Scatter  |
|                                | 37-2-3538 | Isolated Artefact |
|                                | 37-2-3539 | Isolated Artefact |
|                                | 37-2-3540 | Isolated Artefact |
|                                | 37-2-3541 | Isolated Artefact |

| Management Mitigation Measures | Site ID    | Site Type         |
|--------------------------------|------------|-------------------|
|                                | 37-2-3542  | Isolated Artefact |
|                                | 37-2-3543  | Artefact Scatter  |
|                                | 37-2-3544  | Isolated Artefact |
|                                | 37-2-3545  | Isolated Artefact |
|                                | 37-2-3546  | Isolated Artefact |
|                                | 37-2-3547  | Isolated Artefact |
|                                | 37-2-3548  | Artefact Scatter  |
|                                | 37-2-3549  | Isolated Artefact |
|                                | 37-2-3550  | Isolated Artefact |
|                                | 37-2-3551  | Isolated Artefact |
|                                | 37-2-3552  | Isolated Artefact |
|                                | 37-2-3840  | Isolated Artefact |
|                                | 37-2-4060  | Isolated Artefact |
|                                | 37-2-4061  | Artefact Scatter  |
|                                | 37-2-4062  | Artefact Scatter  |
|                                | 37-2-4063  | Artefact Scatter  |
|                                | BM-AS01-12 | Artefact Scatter  |
|                                | BM-AS02-12 | Artefact Scatter  |
|                                | BM-AS03-12 | Artefact Scatter  |
|                                | BM-AS04-12 | Artefact Scatter  |
|                                | BM-AS05-12 | Artefact Scatter  |
|                                | BM-AS06-12 | Artefact Scatter  |
|                                | BM-AS07-12 | Artefact Scatter  |
|                                | BM-AS11-12 | Artefact Scatter  |
|                                | BM-AS12-12 | Artefact Scatter  |
|                                | BM-AS13-12 | Artefact Scatter  |
|                                | BM-AS14-12 | Artefact Scatter  |
|                                | BM-AS16-12 | Artefact Scatter  |
|                                | BM-AS17-12 | Artefact Scatter  |
|                                | BM-AS18-12 | Artefact Scatter  |
|                                | BM-AS19-12 | Artefact Scatter  |
|                                | BM-AS24-12 | Artefact Scatter  |
|                                | BM-AS25-12 | Artefact Scatter  |
|                                | BM-IA01-12 | Isolated Artefact |
|                                | BM-IA02-12 | Isolated Artefact |
|                                | BM-IA03-12 | Isolated Artefact |
|                                | BM-IA04-12 | Isolated Artefact |
|                                | BM-IA05-12 | Isolated Artefact |
|                                | BM-IA07-12 | Isolated Artefact |
|                                | BM-IA08-12 | Isolated Artefact |
|                                | BM-IA09-12 | Isolated Artefact |
|                                | BM-IA11-12 | Isolated Artefact |
|                                | BM-IA12-12 | Isolated Artefact |
|                                | BM-IA13-12 | Isolated Artefact |
|                                | BM-IA16-12 | Isolated Artefact |
|                                | BM-IA17-12 | Isolated Artefact |
|                                | BM-IA18-12 | Isolated Artefact |
|                                | BM-IA20-12 | Isolated Artefact |
|                                | BM-IA21-12 | Isolated Artefact |
|                                | BM-IA22-12 | Isolated Artefact |
|                                | MTP-1403   | Artefact Scatter  |
|                                | MTP-1404   | Isolated Artefact |
|                                | MTP-1405   | Isolated Artefact |
|                                | MTP-1406   | Isolated Artefact |
|                                | MTP-1407   | Isolated Artefact |
|                                | MTP-1408   | Isolated Artefact |
|                                | MTP-1409   | Isolated Artefact |
|                                | MTP-1411   | Isolated Artefact |

| Management Mitigation Measures  | Site ID     | Site Type         |
|---------------------------------|-------------|-------------------|
|                                 | MTP-1412    | Artefact Scatter  |
|                                 | MTP-1415    | Isolated Artefact |
|                                 | MTP-1416    | Isolated Artefact |
|                                 | MTP-1417    | Isolated Artefact |
|                                 | MTP-1418    | Isolated Artefact |
|                                 | MTP-1420    | Isolated Artefact |
|                                 | MTP-1428    | Isolated Artefact |
|                                 | MTP-1429    | Isolated Artefact |
|                                 | MTP-1432    | Isolated Artefact |
|                                 | MTP-1433    | Isolated Artefact |
|                                 | MTP-1437    | Isolated Artefact |
|                                 | MTP-1438    | Isolated Artefact |
|                                 | MTP-1439    | Isolated Artefact |
|                                 | MTP-1440    | Isolated Artefact |
|                                 | MTP-1442    | Isolated Artefact |
|                                 | MTP-1443    | Isolated Artefact |
|                                 | MTP-1444    | Isolated Artefact |
|                                 | MTP-1445    | Isolated Artefact |
|                                 | MTP-1447    | Isolated Artefact |
|                                 | MTP-1448    | Isolated Artefact |
|                                 | MTP-1449    | Isolated Artefact |
|                                 | MTP-1450    | Isolated Artefact |
|                                 | MTP-1451    | Isolated Artefact |
|                                 | MTP-1452    | Isolated Artefact |
|                                 | MTP-1455    | Artefact Scatter  |
|                                 | MTP-1456    | Artefact Scatter  |
|                                 | MTP-1458    | Isolated Artefact |
|                                 | MTP-1459    | Isolated Artefact |
|                                 | MTP-AS01-12 | Artefact Scatter  |
|                                 | MTP-AS02-12 | Artefact Scatter  |
|                                 | MTP-AS03-12 | Artefact Scatter  |
|                                 | MTP-IA01-12 | Isolated Artefact |
|                                 | MTP-IA02-12 | Isolated Artefact |
| <b>Scarred Tree Removal</b>     | 37-2-3064   | Scarred Tree      |
|                                 | 37-2-3095   | Scarred Tree      |
|                                 | 37-2-3107   | Scarred Tree      |
| <b>No Impact - Fencing</b>      | 37-2-2561   | Artefact Scatter  |
|                                 | 37-2-2916   | Isolated Artefact |
|                                 | 37-2-3285   | Isolated Artefact |
|                                 | 37-2-3286   | Isolated Artefact |
|                                 | BM-AS08-12  | Artefact Scatter  |
|                                 | BM-AS09-12  | Artefact Scatter  |
|                                 | BM-AS10-12  | Artefact Scatter  |
|                                 | BM-AS20-12  | Artefact Scatter  |
|                                 | BM-AS21-12  | Artefact Scatter  |
|                                 | BM-IA06-12  | Isolated Artefact |
|                                 | BM-IA10-12  | Isolated Artefact |
|                                 | BM-IA14-12  | Isolated Artefact |
|                                 | BM-IA15-12  | Isolated Artefact |
|                                 | BM-IA23-12  | Isolated Artefact |
|                                 | MTP-1401    | Isolated Artefact |
|                                 | MTP-1402    | Isolated Artefact |
|                                 | MTP-1410    | Isolated Artefact |
| <b>No Impact - Conservation</b> | 37-2-2896   | Isolated Artefact |
|                                 | 37-2-2565   | Isolated Artefact |
|                                 | 37-2-2892   | Isolated Artefact |
|                                 | 37-2-2903   | Scarred Tree      |
|                                 | BM-AS15-12  | Artefact Scatter  |

| Management Mitigation Measures                                             | Site ID    | Site Type         |
|----------------------------------------------------------------------------|------------|-------------------|
|                                                                            | BM-AS22-12 | Artefact Scatter  |
|                                                                            | BM-AS23-12 | Artefact Scatter  |
|                                                                            | BM-AS26-12 | Artefact Scatter  |
|                                                                            | BM-IA19-12 | Isolated Artefact |
| <b><i>Impacted – No further mitigation measures (northern section)</i></b> | 37-2-0579  | Quarry (northern) |
| <b><i>No Impact – Conservation (southern section)</i></b>                  | 37-2-0579  | Quarry (southern) |

## 15.0 References

- AECOM Australia Pty Ltd. 2011. *Drayton South Coal Project: Aboriginal Archaeological and Cultural Heritage Impact Assessment*. Unpublished report for Hansen Bailey.
- Andrefsky, W. 2005. *Lithics: Macroscopic Approaches to Analysis*. Cambridge University Press.
- Archer, C., & Laffan, J. 2004. *Aboriginal Land Use at Tocal: the Wonnarua Story*. Tocal: NSW Agriculture Tocal.
- Attienbrow, V. 2010. *Sydney's Aboriginal Past: Investigating the archaeological and historical records*. Sydney: University of New South Wales Press Ltd.
- Baker, N. 1992. Stone artefact assessment and analysis - Recording techniques and methodology.
- Baker, N. 1994. *Moffats Swamp Dune Final Report on Archaeological Site Salvage, Testing & Artefact Analysis*. Unpublished report for RZM Pty Ltd.
- Baker, N., & Gorman, A. 1992. *Narama Salvage Project, Lower Bayswater Creek, Hunter Valley, NSW. Vol. 4: Technological Studies*. Unpublished report for Envirosiences & Narama Joint Venture.
- Berndt, R. 1947. Wuradjuri Magic and Clever Men. *Oceania* 18(1): p.60–86.
- Bowler, J., Jones, R., Allen, H., & Thorne, A. 1970. Pleistocene Human Remains From Australia: A Living Site and Human Cremation from Lake Mungo, Western New South Wales. *World Archaeology* 2: p.29–60.
- Brayshaw, H., & Haglund, L. 1984. *Archaeological Investigations Associated with Ravensworth No.2 Southern Extension*. Unpublished report for Croft & Associates Pty Ltd.
- Brayshaw, Helen. 1966. *Some Aspects of the Material Culture of the Aborigines of the Hunter Valley at the Time of First White Settlement*. University of New England.
- Brayshaw, Helen. 1984. *The Hunter Valley and its Aboriginal Inhabitants: An Ethno-historical Study*. Unpublished report to Anutech Pty Ltd.
- Brayshaw, Helen. 1987. *Aborigines of the Hunter Valley: A Study of Colonial Records*. Scone and Upper Hunter Historical Society.
- Bureau of Meteorology. 2012. Climate Statistics for Australian Locations - Jerrys Plains Post Office. Available at: [http://www.bom.gov.au/climate/averages/tables/cw\\_061086.shtml](http://www.bom.gov.au/climate/averages/tables/cw_061086.shtml) [Accessed January 22, 2011].
- Burke, H., & Smith, C. 2004. *The Archaeologist's Field Handbook*. Sydney: Allen & Unwin.
- Central Queensland Cultural Heritage Management. 2010. *Mount Pleasant Project Modification Aboriginal Cultural Heritage Assessment Report*. Unpublished report to Coal and Allied Operations Pty Ltd.
- Cumberland Ecology. 2012. *Continuation of Bengalla Mine Ecological Impact Assessment*. Unpublished report to Hansen Bailey.
- Curr, E. 1886. *The Australian Race. Its Origins, Languages, Customs, Places of Landing in Australia and the Routes by which it Spread Itself Over that Continent*. John Ferris, Melbourne.
- Dean-Jones, P., & Mitchell, P. 1993. *Environmental Modelling for Archaeological Site Potential in the Central Lowlands of the Hunter Valley. Hunter Valley Aboriginal Sites Assessment Project*. Report to unknown.
- Donlon, D., & Kuskie, P. 2003. *Traditional Aboriginal Burial at Mount Arthur North, Hunter Valley, New South Wales*. Hughes, ACT.

- Dyall, L. 1980. *Mt. Arthur Coal Lease: Report on Aboriginal Relics - Draft*. Report to National Parks and Wildlife Service.
- Ebert, J.I. 1992. *Distributional Archaeology*. Albuquerque: University of New Mexico Press.
- Enright, J. 1901. Aboriginal Districts and Notes. *Science of Man* 4(5): p.80–81.
- ENSR Australia Pty Limited (HLA ENSR). 2008. *Bengalla Link Road Stage Two Archaeological Salvage Bengalla Mine*. Unpublished report for Hansen Bailey.
- Environmental Resources Management Australia Pty Ltd (ERM). 2004. *Gap Analysis - Upper Hunter Valley Aboriginal Heritage Baseline Study*. Unpublished report for Upper Hunter Valley Aboriginal Heritage Trust.
- Environmental Resources Management Australia Pty Ltd (ERM). 2007. *Bengalla Mine Section 90 # 2621 Aboriginal Heritage Salvage Collection Report*. Unpublished report for Bengalla Mining Company.
- Esteves, V. 1998. *Unravel the Gravel: a Study of Hunter River Mudstone and Silcrete Gravels, an Archaeological Perspective*. University of New England.
- Fanning, P.C., & Holdaway, S.J. 2004. Artifact Visibility at Open Sites in Western New South Wales, Australia. *Journal of Field Archaeology* 29: p.255–271.
- Fanning, P.C., Holdaway, S.J., Rhodes, E.J., & Bryant, T.G. 2009. The Surface Archaeological Record in Arid Australia: Geomorphic Controls on Preservation, Exposure, and Visibility. *Geoarchaeology* 24(2): p.121–146.
- Fawcett, J.. 1898. Notes on the Customs and dialect of the Wonnah-Ruah Tribe. *Science of Man* 1(7): p.152–154.
- Foley, R. 1981. A Model of Regional Archaeological Structure. *Proceedings of Prehistoric Society* 47.
- Gould, R. 1969. Puntutjarpa Rockshelter: A Reply to Messrs Glover and Lampert. *Archaeology and Physical Anthropology in Oceania* 4: p.229–237.
- GSS Environmental. 2012. *Soil and Land Capability Impact Assessment: Continuation of Bengalla Mine*. Unpublished report to Hansen Bailey.
- Gunson, N. 1974. *Australian Reminiscences and Papers of L.E. Threlkeld, Missionary to the Aborigines - 1824-1859*. Canberra: Australian Institute of Aboriginal Studies, AIAS.
- Haglund, L. 1992. *Archaeological Investigations At Doctors Creek, Warkworth, NSW: Salvage Excavation and Surface Collection in Compliance with NPWS Salvage Requirements*. Unpublished report for Warkworth Mining Ltd.
- Haglund, Laila. 1989. Technological Change: a comparison of developments in the Goulburn and Hunter River Valleys.
- Hamm, G. 2010. *Cultural Heritage Management Report On Drayton Mine Extension Project Open Cut & Services Corridor Areas*. Report to Anglo Coal Pty Ltd.
- Hansen Bailey. 2012. *Bengalla Mining Company Continuation of Bengalla Mine*. Unpublished report to Bengalla Mining Company Pty Limited.
- Hiscock, P. 1986a. *A Technological Analysis of Stone Artefact Assemblages from the Hunter River Valley Region. NSW National Parks and Wildlife Service Hunter Valley Region Archaeology Project: Stage 1. Vol 4a*. Unpublished report for the NSW National Parks and Wildlife Service.
- Hiscock, P. 1986b. Technological Change in the Hunter River Valley and the Interpretation of Late Holocene Change in Australia. *Archaeology in Oceania* 21: p.29–39.

- Hiscock, P. 1993. Bondian Technology in the Hunter Valley, New South Wales. *Archaeology in Oceania* 28: p.65–76.
- Hiscock, P. 1994. Technological Responses to risk in Holocene Australia. *Journal of World Prehistory* 8(3): p.267–292.
- Hiscock, P. 2006. Blunt to the Point: Changing Technological Strategies in Holocene Australia.
- Hiscock, P., Hughes, P., Shawcross, W., & Paton, R. 2000. *Report of a Salvage Excavation at Site 37-5-63 Hunter Valley, New South Wales*. Unpublished report to Coal & Allied.
- HLA-Envirosciences Pty Ltd. 1993. *Environmental Impact Statement for Bengalla Opencut Coal Mine*. Report to Bengalla Mining Company Pty Ltd.
- Holdaway, S. 1993. *Hunter Valley Aboriginal Sites Assessment Project Archaeological Assessment Standards and Methodological Design*. Unpublished report for NSW National Parks and Wildlife service.
- Holdaway, S., Fanning, P., & Witter, D.C. 2000. Prehistoric Aboriginal Occupation of the Rangelands-Interpreting the Surface Archaeological Record of Far Western NSW. *The Rangeland Journal* 22(1): p.44–57.
- Holdaway, S., & Stern, N. 2004. *A record in stone: the study of Australia's flaked stone artefacts*. Canberra: Museum Victoria and Aboriginal Studies Press, Australian Institute of Aboriginal and Torres Strait Islander Studies.
- Hughes, P. 1984a. *An Overview of the Archaeology of the Hunter Valley, its Environmental Setting and the Impact of Development, NPWS Hunter Valley Region Archaeology Project Stage 1, Vol 1*. Anutech Pty Ltd.
- Hughes, P. 1984b. *Hunter Valley Region Archaeology Project Stage 1, Volume 1: An overview of the archaeology of the Hunter Valley, its environmental setting and the impact of development*. Report to National Parks and Wildlife Service.
- Hughes, P., & Hiscock, P. 2000. *Archaeological and Geomorphological Excavations at the Proposed Carrington Mine Site, Hunter Valley, NSW*. Unpublished report to Environmental Resource Management.
- Koettig, M. 1986a. *Assessment of archaeological sites along the proposed Singleton to Glennies Creek water pipeline route and the reservoir site at Apex lookout, Hunter Valley, NSW*. Report to the Public Works Department.
- Koettig, M. 1986b. *Test Excavations at Six Locations along the Proposed Pipeline Route between Singleton and Glennies Creek Dam, Hunter Valley Region, NSW*. Report to the Public Works Department by Margrit Koettig.
- Koettig, M. 1990. Regional Study of Heritage Significance, Central Lowlands, Hunter Valley.
- Koettig, M. 1992. *Salvage Excavations of Aboriginal Sites on the Camberwell Lease*. Report to Camberwell Coal Pty Ltd.
- Koettig, M. 1994a. *Bulga Lease Authorisation 219 Salvage Excavations. Volume 1: Overview of Results*. Bulga: Unpublished report for Saxonvale Coal Pty Ltd.
- Koettig, M. 1994b. *Bulga Lease Authorisation 219 Salvage Excavations. Volume 1: Overview of Results DONT USE*. Bulga: Report to Saxonvale Coal Pty Ltd.
- Koettig, M., & Hughes, P. 1983. Archaeological Investigations on the United Collieries Coal Lease, Warkworth, Hunter Valley, NSW.

- Koettig, M., & Hughes, P. 1985. *Archaeological Investigations at Plashett Dam, Mount Arthur North and Mount Arthur South in the Hunter Valley, NSW - Volume 2: The archaeological survey*. Report to Electricity Commission of NSW.
- Kovac, M., & Lawrie, J.W. 1991. *Soil Landscapes of the Singleton 1:250 000 Sheet*. Sydney: Soil Conservation Service of NSW.
- Kuskie, P. 1999. An Aboriginal Archaeological assessment of a proposed extension to the South Leminton Coal Mine Lease.
- Kuskie, P. 2000a. *An Aboriginal Assessment of the Proposed Mount Arthur North Coal Mine, Near Muswellbrook, Hunter Valley, New South Wales* HLA-Envirosciences Pty. Ltd. (ed). Canberra: Report prepared by South Eastern Archaeology to Umwelt (Australia) Pty. Ltd.
- Kuskie, P. 2000b. *An Aboriginal Assessment of the Proposed Mount Arthur North Coal Mine, Near Muswellbrook, Hunter Valley, New South Wales*. Report to Dames and Moore.
- Kuskie, P., & Clarke, E. 2004a. *Salvage of Aboriginal Heritage Sites in the Mount Arthur North Coal Mine Lease. Volume B Figure, Tables, Plates & Appendices*. Report to BHP Billiton-Hunter Valley Energy Coal.
- Kuskie, P., & Clarke, E. 2004b. *Salvage of Aboriginal Heritage Sites in the Mount Arthur North Coal Mine Lease: Volume A*. Report to BHP Billiton-Hunter Valley Energy Coal.
- Lourandos, H. 1977. Aboriginal Spatial Organisation and Population: South-west Victoria Reconsidered. *Archaeology and Physical Anthropology in Oceania* 12(3): p.202–225.
- MacDonald, K., & Davidson, I. 1998a. Bayswater Archaeological Research Project: Volume 1.
- MacDonald, K., & Davidson, I. 1998b. *The Bayswater Archaeological Research Project: Volume 2*.
- Mathews, R.H. 1898. Initiation Ceremonies of Australian Tribes. *Proceeding of the American Philosophical Society* 37(157): p.54–73.
- Mathews, R.H. 1903. Languages of the Kamilaroi and other Aboriginal tribes of New South Wales. *Journal of the Anthropological Institute of Great Britain and Ireland* 33(2): p.259–283.
- McCarthy, F.D. 1948. The Lapstone Creek Excavation. Two Culture Periods Revealed in Eastern New South Wales. *Records of the Australian Museum* 22(1): p.1–34.
- McCarthy, F.D. 1964. The Archaeology of the Capertee Valley, New South Wales. *Records of the Australian Museum* 26(6): p.197–264.
- McCarthy, F.D. 1967. *Australian Aboriginal Stone Implements* 2nd Ed. Sydney: The Australian Museum Trust.
- McCarthy, F.D., & Davidson, F. 1943. The Elouera Industry of Singleton, Hunter River, New South Wales. *Records of the Australian Museum* 21(4): p.210–230.
- McNiven, I. 1992. Shell Middens and Mobility: The Use of Off-site Faunal Remains, Queensland, Australia. *Journal of Field Archaeology* 19(4): p.495–508.
- Miller, R. 1887. The Hunter River: The Wonnarua Tribe and Language. *Australian Race* 3: p.353–355.
- Moore, D.R. 1967. Archaeological field survey of the Hunter Valley, NSW, by the Australian Museum: a preliminary report. *Australian Institute of Aboriginal Studies Newsletter* 2(5): p.34–41.
- Moore, D.R. 1969. The Prehistory of the Hunter Valley. *Australian Natural History* 16(5): p.166–171.

- Moore, D.R. 1970. Results of an Archaeological Survey of the Hunter River Valley, New South Wales, Australia. Part I: The Bondaian Industry of the Upper Hunter and Goulburn River Valleys. *Records of the Australian Museum* 28(2): p.25–64. Available at: <http://www.australianmuseum.net.au/journal/Moore-1970-Rec-Aust-Mus-282-2564> [Accessed November 17, 2011].
- Moore, D.R. 1981. Results of an archaeological survey of the Hunter River Valley, New South Wales, Australia. Part II: Problems of the lower Hunter and contacts with the Hawkesbury Valley. *Records of the Australian Museum* 33(9): p.388–442.
- Moore, M. 1997. *Further Technological Descriptions of Artefacts Excavated at Bettys Creek, Mt Owen Mine, Hunter Valley, NSW. Archaeological Test Excavations of Aboriginal Sites at Bettys Creek, Mt Owen Mine, Hunter Valley, NSW. Vol. 2.* Unpublished report for Mt Owen Mine, BHP Coal Australia.
- Moore, M.W. 2000. Technology of Hunter Valley microlith assemblages, New South Wales. *Australian Archaeology* 51: p.28–39.
- Moore, M.W. 2011. Simple Stone Flaking in Australasia: Patterns and Implications. *Quaternary International* 1(10).
- Myall Coast Archaeological Services. 2007. *Myall Coast Archaeological Services Aboriginal Cultural Survey Stage 3 Mount Pleasant.* Unpublished report to Coal & Allied.
- NSW Department of Environment & Conservation. 2005. *Guidelines for Aboriginal Cultural Heritage Impact Assessment and Community Consultation.* Sydney: Department of Environment and Conservation.
- NSW Department of Environment Climate Change & Water. 2010a. *Aboriginal Cultural Heritage Consultation Requirements for Proponents.* Department of Environment, Climate Change and Water.
- NSW Department of Environment Climate Change & Water. 2010b. *Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales.* Department of Environment, Climate Change and Water.
- NSW OEH. 2011. *Guide to Investigating, Assessing and Reporting on Aboriginal Cultural Heritage in NSW.* Office of Environment and Heritage.
- O'Rourke, M.J. 1997. *The Kamilaroi Lands: North-central New South Wales in the Early 19th Century.* Published by the Author.
- Raggatt, H.G. 1938. Note on Some Silicified Sands ('Grey Billy') in the Hunter Valley (N.S.W.). *Journal and Proceedings of the Royal Society of NSW* 72: p.318–324.
- Rich, E. 1992. *Narama Salvage Project, Lower Bayswater Creek, Hunter Valley, NSW. Vol 1: Overview.* Unpublished report for Envirosciences Pty Ltd & Narama Joint Venture.
- Rich, E. 1993. *Proposed Bengalla Coal Mine, Muswellbrook NSW: Archaeological Survey for Aboriginal Sites.* Unpublished report for Wayne Perry & Associates.
- Rich, E. 1995a. *Mount Pleasant Mine EIS - Arch Survey Appendices E to Sup Reports.* Report to Coal and Allied Operations Pty Ltd.
- Rich, E. 1995b. *Mt Pleasant Coal Lease, Near Muswellbrook, NSW Archaeological Survey for Aboriginal Sites.* Muswellbrook: Report to ERM and Coal & Allied.
- Scarp Archaeology. 2009. *Technical Advisor Report : Cultural Heritage Investigations Stage 5 Mt Pleasant Mine , Hunter Valley Prepared for Rio Tinto Coal Australia.* Unpublished report to Rio Tinto Coal Australia.
- Shiner, J. 2008. *Place as Occupational Histories. An Investigation of the Deflated Surface Archaeological Record of Pine Point and Langwell Stations, Western New South Wales, Australia* BAR Intern. Oxford: British Archaeological Reports.

Story, R., Galloway, R.W., van de Graaf, R.H.M., & Tweedie, A.D. 1963. *General Report on the Lands of the Hunter Valley*. Melbourne: CSIRO.

Tindale, N.B. 1974. *Aboriginal Tribes of Australia: Their Terrain, Environmental Controls, Distribution, Limits and Proper Names*. Canberra: Australian University Press.

Umwelt (Australia) Pty Ltd. 2007. *Mount Arthur Coal Proposed South Pit Extension Project Environmental Assessment Appendix 6: Aboriginal Archaeological and Cultural Heritage Assessment*. Toronto, NSW.

Umwelt (Australia) Pty Ltd. 2008. *Proposed Mount Arthur Underground Project*. Report to Mount Arthur Coal.

Vinnicombe, P. 1980. *Predilection and Prediction: A study of Aboriginal sites in the Gosford-Wyong region*.

White, E. 1998. *Archaeological Salvage of Site B10 & B33 Bengalla Mine, Hunter Valley, NSW*. Unpublished report for Bengalla Mining Company.

White, E. 1999. *From Artefacts to the Actions of People in Prehistory: a Behavioural Study of the W2 Stone Artefact Assemblage, Hunter Valley, NSW*. University of Sydney.

White, E., & McDonald, J. 2010. Lithic Artefact Distribution in the Rouse Hill Development Area, Cumberland Plain, New South Wales. *Australian Archaeology* (70): p.29–38.

Witter, D.C. 1995. *Guidelines: Minimum Requirements and Standards for Archaeological Survey Methodology and Significance Assessment to be used for Cultural Resource Impact Statements*.

## Appendix A

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## Bengalla Coal Mine – Continuation of Mining: Aboriginal Heritage Impact Assessment Draft Methodology

### 1.0 Introduction

AECOM has been commissioned by Hansen Bailey, on behalf of Bengalla Mining Company Pty Limited (BMC), to undertake an Aboriginal archaeological and cultural heritage impact assessment for the Bengalla Coal Mine Continuation of Mining Project (the Project). BMC is seeking a Development Consent under Part 4 Division 4.1 of the *Environmental Planning & Assessment Act 1979* (EP&A Act) to enable mining to continue to the west for a 24 year period at a rate of up to 15 Million tonnes per annum (Mtpa) of Run of Mine (ROM) coal. The Project is located approximately four kilometres west of Muswellbrook in the Upper Hunter Valley of NSW.

The objectives of the Aboriginal archaeological and cultural heritage impact assessment are to identify Aboriginal heritage values, both archaeological and cultural, of lands within the Project Boundary and to determine appropriate mitigation and/or management measures. The assessment will involve background research, Aboriginal community consultation and archaeological field survey.

This draft methodology provides some background information about the Project Area and describes the proposed assessment methodology.

***Aboriginal stakeholders are invited to comment on this draft. Comments from Aboriginal stakeholders will be reviewed and addressed in the final methodology. Aboriginal stakeholders are also invited to provide comments regarding the Aboriginal heritage cultural values of the Project Area.***

### 2.0 Project Overview

The Project consists of the following:

- Open cut coal mining at up to 15 Mtpa ROM for 24 years continuing to utilising a dragline and truck / excavator fleet;
- Continue mining to the west of current operations;
- An additional Overburden Emplacement Area (OEA) to the west of Dry Creek which may be utilised for excess spoil material until it is intercepted by mining;
- Processing, handling and transportation of coal via the existing CHPP (to be upgraded) and rail loop for export and domestic sale;
- An additional Coal Handling & Preparation Plant (CHPP) coal stockpile and ROM coal stockpile;
- Continued use, expansion and upgrades to existing site infrastructure;
- The construction of a radio tower;
- Relocation of the Explosives Magazine and Reload Facility;
- Relocation of a section of Bengalla Link Road near the existing mine access road to enable coal extraction;
- The diversion of Dry Creek via dams and pipe work with a later permanent alignment of Dry Creek through rehabilitation areas once stability is established;
- Re-location of water storage infrastructure as mining progresses through existing dams (including the staged discharge dam);
- The construction of raw water dams and a clean water dam;
- A workforce of approximately 900 full time equivalent personnel (plus contractors) at peak production; and
- Supporting power reticulation infrastructure.



### 3.0 Background

#### 3.1 AHIMS Search

A search of the Aboriginal Heritage Information Management System (AHIMS) database for previously recorded Aboriginal sites within the Project Boundary (as shown on **Figure 1**) was lodged with the Office of Environment & Heritage (OEH) on 28 September 2011. Results of the search found 211 AHIMS sites occur within the Project Boundary. **Table 1** provides a summary of these. All previously recorded AHIMS sites within the Project Boundary will be re-assessed during the assessment.

**Table 1: Summary of Site Types**

| Site Type                                         | Count      | %          |
|---------------------------------------------------|------------|------------|
| Isolated Find                                     | 3          | 1.4        |
| Scarred Tree                                      | 3          | 1.4        |
| Artefact Scatter                                  | 15         | 7.1        |
| Isolated Find or Artefact Scatter (not specified) | 190        | 90.1       |
| <b>Total</b>                                      | <b>211</b> | <b>100</b> |

#### 3.2 Archaeological Context

A number of Aboriginal archaeological assessments have been undertaken within the Project Boundary. A summary of these is provided below.

**Rich, E. R. (1993). *Archaeological Survey for Aboriginal Sites, Proposed Bengalla Coal Mine.***

Rich undertook an archaeological survey within the disturbance area of the Project, extending from Wybong Road in the north, to the Muswellbrook-Merriwa Railway line in the south, and from Bengalla Road in the east in 1993 for the Bengalla EIS (Existing Project Area). A total of 56 Aboriginal sites were recorded, comprising 39 artefact scatters and 17 isolated finds. Artefacts were found to occur on all landforms, including Dry Creek, gullies, flats, rises, slopes and ridge tops. The most significant site recorded was a silcrete quarry (B10) associated with tertiary ridge gravels.

Rich hypothesises that three stone industries were present in the area: a microblade (i.e. backed blade) industry, a small flake tool industry, and a large tool industry that included large retouched flakes, unifacial and bifacial pebble tools, axes, hammerstones and a grindstone. Interestingly, Rich found that the various stone industries tended to be found on different landform units. Microblade industries were concentrated along the main creek and around the confluence of minor gullies. Small flake tool assemblages tended to occur along minor gullies and on hill slopes and ridges while artefacts of the large tool industry were found on most land units, but most frequently on land units close the Hunter flats and on slopes and ridges away from the flats. Silcrete was the predominant raw material recorded, accounting for 60% of all artefacts. Much of this material was found naturally occurring at the quarry site B10 and likely procured there. Indurated mudstone/tuff was the next most commonly recorded raw material (26%).

The majority of recorded artefacts comprised flake and non-flake debitage (82%) with cores and tools reasonably well represented at 8.5% and 8.2% respectively. Cores and tools were also reasonably well represented at 8.5% and 8.2% respectively.

Rich concluded that most of the Bengalla coal lease had been substantially disturbed by previous land uses such as clearing, ploughing, grazing, construction of dams, contour drains, fences, transmission lines, track and general erosion. Most recorded sites were extensively damaged.

All artefacts recorded were left *in-situ* and were not subject to collection or salvage.

**White, E. (1998). *Archaeological Salvage of Sites B10 & B33, Bengalla Mine, Hunter Valley, NSW.***

White undertook salvage excavation of the previously identified quarry site B10 and artefact scatter B33 at Bengalla in 1998. The works constituted the first large scale excavation of a quarry in the Hunter Valley. The quarry site was located on an elevated ridge roughly 600 m from the Hunter River and comprised of cobbles of silcrete, petrified wood, quartz, and other fine-grained siliceous and igneous materials. Two large pits, B10-1 and B10-2, measuring 5 x 10 m were excavated. B10-1 was excavated within the outcrop of silcrete cobbles and



recovered 4,454 artefacts. Results found that the most commonly utilised material were the sub-angular silcrete boulders embedded in the stony deposit and showing above the ground. White observed that the tops of these boulders were battered to remove large flakes that were subsequently used as cores for flaking. Heat treatment of some of these larger flakes/cores prior to flaking was noted. Artefact densities at the site were up to 1,200 artefacts per metre squared. Excavations at B10-2, located approximately 2 km upstream from B10, recovered 222 artefacts. White concludes from the low artefact density at excavations site B10-2 that use of the site was episodic and related to foraging and hunting activities.

Excavations at B33, located 2.8 km north of B10, included another 5 x 10 m trench. A total of 142 artefacts was recorded during excavation. In addition to the 5 x 10 m pit, the remains of a partly eroded knapping floor, referred to as B33-2 was also excavated employing a 3 x 5 m pit. A total of 523 heat shattered and flaked artefacts were recovered. No backed artefacts were identified, leading White to argue that the sites were used for stone processing, rather than tool production.

All excavated artefactual material was analysed and is currently housed within the Australian Museum.

**ERM. (2007). *Bengalla Mine Section 90 #2621.***

ERM undertook a surface collection and excavation for Section 90 application #2621 for Aboriginal quarry site B10 at Bengalla in 2007. A total of 166 stone artefacts was collected during the surface collection and 39 during the excavation. Excavations consisted of grader scrapes across the site. Analysis of artefactual material recovered found the dominant raw material utilised was silcrete, accounting for 90% of all artefacts. Far fewer artefacts were recovered from the excavations than the surface collection. Artefacts recovered from subsurface contexts were found to be larger on average and comprising of a greater number of cores. From this result, it is concluded that core reduction, in the context of the subsurface deposit was being undertaken elsewhere.

All excavated artefactual material has been subject to analysis and attempts are currently being made to house the material within the Australian Museum.

**ENSR AECOM. (2008). *Bengalla Link Road Stage Two Archaeological Salvage Bengalla Mine.***

ENSR AECOM undertook a program of surface collection grader scrapes of Aboriginal sites identified along the route of the Bengalla Link Road Stage 2 in 2008. Nine Aboriginal sites were salvaged, resulting in the recovery of 56 artefacts. All sites were considered low density artefact scatters, with the low numbers of artefacts attributed to the great distance of the sites from permanent water sources. Silcrete was the most commonly identified raw material, accounting for 66% of all artefacts. The remaining raw materials comprised indurated mudstone/tuff (20%), quartz (7%) porcellanite (2%) and other igneous (2%).

All excavated artefactual material has been subject to analysis and attempts are currently being made to house the material within the Australian Museum

**Central Queensland Cultural Heritage Management (CQCHM). (2010). *Mount Pleasant Project Modification Aboriginal Cultural Heritage Assessment Report.***

CQCHM undertook archaeological survey for the Mount Pleasant lease area and adjoining Coal & Allied lands including an area at Bengalla. Within the Bengalla area approximately 130 isolated finds, four artefact scatters, three scarred trees, and three potential scarred trees were identified. All sites were attributed low or moderate archaeological significance.

All artefacts recorded were left *in-situ* and were not subject to collection or salvage.

### 3.3 Environmental Context

Environmental factors such as topography, geology, hydrology, flora and fauna would have been key influences on past Aboriginal occupation and land use, as well as archaeological site patterning and distribution, site survival over time, and the likelihood of detecting any extant archaeological sites. Any attempt to predict or interpret the character and distribution of Aboriginal sites in a given landscape must consider these environmental factors, along with historic and current land use practices, to enable predictions to be made concerning the likely presence or absence of sites in a given area, and, where appropriate, their archaeological integrity.

#### 3.3.1 Topography

The land on which Bengalla is located is generally undulating and generally slopes southward towards the Hunter River. Within the eastern and southern margins of the Project Boundary are the Hunter River alluvial flats. In the eastern part of the Project Boundary, the Overton Ridge is situated and reaches 188 m AHD. South of the



Overton Ridge are lower hillslopes of the Hunter Valley which rise from 134 m AHD at the Hunter River to 250 m AHD (HLA-Envirosciences Pty Ltd 1993). Land within the Project Boundary is dominated by slopes of less than 5 degrees, with the gullies in the lower reaches of ephemeral streams draining into the Hunter River along with the ridge tops generally sloping at no more than 2.5 degrees. The Hunter River alluvial floodplain generally slopes at no more than 1 degree (HLA-Envirosciences Pty Ltd 1993).

### 3.3.2 Geology

The Project is situated within the Hunter Coalfield, close to the north-eastern boundary of the Sydney Basin. The geology of the Hunter Valley is characterised by late Permian sediments, early Permian marine sediments, and Quaternary alluvium.

Coal seams at Bengalla comprise those of the lower Jerrys Plains and Vane Subgroups of the Late Permian Wittingham Coal Measures. Seams from the Bowfield (uppermost) to the Ramrod Creek are represented. The sequence of interest at Bengalla comprises eight economically viable seams from the Warkworth to Edderton seams forming part of the Wittingham Coal Measures. The Wittingham Coal measures are up to 800 m thick and consist of sandstone, siltstone, claystone, conglomerate and tuff within which intermittent coal seams lie (HLA-Envirosciences Pty Ltd 1993). One of the characteristics of the Wittingham Coal Measures is the occurrence of fine grained siliceous raw materials such as silcrete and indurated mudstone is of particular importance, as these two raw materials dominate artefactual assemblages in the Hunter Valley. These raw materials are known to occur in the alluvial gravels of the Hunter River and its associated terraces.

### 3.3.3 Soils

The Project is located in the Central Lowlands topographic zone within the Sydney Basin geological province. Three soil landscape units underpin the area within the Project Area. These are the Hunter, Bayswater and Roxburgh (occurring west of Dry Creek) soil landscape units as delineated by the Soil Landscapes of the Singleton 1:250,000 Sheet (Kovac et al. 1991).

The Hunter unit describes soils formed from the deposition of Hunter River alluvium and its tributaries. The main soils formed from these alluvial deposits relate to their position in time and space relative to the fluvial channels. Soils developed on: (i) prior stream channels and on tributary flats are typically brown and black clays (Brown / Black Vertosols); (ii) levees and flats adjacent to the present river are typically alluvial soils (Rudosols), specifically uniform loams and uniform sands; and (iii) old terraced areas have typically developed red podzolic soils and lateritic podzolic soils (Red Chromosols) (Hansen Bailey 2012).

The Bayswater unit describes soils that have formed from the underlying Permian Singleton Coal Measures. These measures are composed of sandstone, shale, mudstone, conglomerate and coal parent and have been derived from ancient marine sediments. Due to the sediments origin, salt levels are usually high and soils are often dispersive and highly erodible with sheet and gully erosion common landscape features. Soils are primarily yellow solodic soils (Yellow Sodosols) on slopes, with red, yellow and brown podzolic soils (Chromosols) also common across the Project Boundary.

### 3.3.4 Hydrology

The Project Boundary is located within the Hunter-Central River catchment. Bengalla is located on the northern side of the Hunter River, and is situated adjacent to the Hunter River floodplain. The Hunter River flows in a south-westerly direction through a channel approximately 50-100 m wide and approximately 3-6 m deep. It cuts across a well-developed floodplain, which is approximately 3 km wide at its widest point. Within the Project Boundary, natural surface water flows south along several minor tributaries and unnamed drainage lines south towards the Hunter River. Dry Creek is the most significant gully line within the Project Boundary. Within the Project Boundary, Dry Creek commences north of Wybong Road and flows south through the central portion of the Project Boundary through paddocks and farmland which have been largely modified by previous agricultural activities (and now owned by BMC). For the vast majority of the year, Dry Creek remains dry and only occasionally hold small pools of water for a few days following significant rainfall events (Hansen Bailey 2012).

### 3.3.5 Flora and Fauna

Historically, the land within the Project Boundary has been impacted by agriculture associated with grazing and land clearing. As such, the land within the Project Boundary primarily contains grassland and grassy woodland communities. The south eastern portions of the Project Boundary, where the topography slopes towards the Hunter River floodplain consist of cleared land that has essentially lost the native vegetation cover and had the original grassy ground stratum largely replaced by exotic grasses and herbs (Hansen Bailey 2012).



### 3.3.6 Land Use and Disturbance

The Upper Hunter region has a long history of rural land use for a variety of agricultural and industrial activities, predominantly grazing and coal mining. The current dominant land uses within and adjacent to the Project Boundary include open cut coal mining and industrial activities, agriculture and rural residential. In addition to these uses, land surrounding the Project Boundary has also sustained disturbances from a range of other activities, including the establishment of the Muswellbrook-Ulan Railway line (and other associated infrastructure) which runs on an east-west alignment adjacent to the northern boundary of the Project Boundary, and culverts and roads. The close proximity of the land to the Railway Line indicates that the area may well have sustained indirect impacts from its construction, including vehicular action and erosion. Farm roads, dams and fences have also been constructed and erected in the area (Hansen Bailey 2012).

## 4.0 Approach

This section provides information on the approach AECOM intends to use for undertaking this Aboriginal heritage impact assessment. The assessment process has been divided into three broad sets of tasks:

- Desktop study;
- Archaeological field survey of the area within the Project Boundary however outside the Approved Bengalla Mine (see **Figure 1**); and
- Consultation with Aboriginal stakeholder groups in order to define the cultural heritage values of the Project Boundary.

### 4.1 Desktop Study

The desktop survey methodology comprises:

- A search of OEH's AHIMS database prior to archaeological survey;
- A review of the landscape (i.e. environmental) context of the Project Boundary;
- A review of relevant archaeological and ethnohistoric information for the Project Boundary and surrounding environment; and
- Preparation of a predictive model for Aboriginal archaeological site type and distribution within the Project Boundary.

### 4.2 Planning Meeting

A Planning meeting will be held with all registered Aboriginal stakeholder groups prior to commencement of the archaeological survey. The aim of the meeting will be to provide registered Aboriginal parties with information about the scope of the Project and the proposed cultural heritage assessment process. In particular, the meeting will:

- Present the Project and outline details relevant to the nature, scope, methodology, environmental and other impacts;
- Outline the environmental impact assessment process including the input points into the investigation and assessment activities;
- Specify critical timelines and milestones for the completion of assessment activities and delivery of reports;
- Clearly define agreed roles, functions, and responsibilities;
- Identify, raise and discuss the Aboriginal group's cultural concerns, perspectives and assessment requirements (if any); and
- Provide an opportunity whereby cultural knowledge may wish to be shared.

### 4.3 Archaeological Survey

An archaeological field survey will be conducted to identify Aboriginal archaeological sites. Full survey coverage of the Survey Area (which is the Project Boundary excluding the Approved Bengalla Mine) will be undertaken. The entire survey is expected to take three weeks. The Survey Area will be walked by AECOM archaeologists and registered stakeholder representatives spaced appropriately to ensure adequate coverage.

A daily survey team consisting of two AECOM archaeologists and a maximum of six Aboriginal community representatives (as organised by Hansen Bailey) will be required to complete the survey. **Given the hill slopes**



***in parts of the survey area survey participants will be expected to possess adequate fitness for such survey work and be able to provide for themselves all appropriate personal protective equipment (PPE).***

Relevant safety inductions will be required prior to the commencement of survey and these will be coordinated by BMC personnel. Each day of survey will begin with a safety tool box meeting to discuss the proposed survey areas for the day and any potential safety and health hazards. Toolbox meeting minutes will be provided to BMC personnel at completion of survey work for documentation.

All previously registered and/or recorded sites located within the Project Boundary will be ground-truthed and their nature, extent and significance re-assessed. All Aboriginal archaeological sites identified during the survey will be recorded with reference to OEH's *Code of Practice for Archaeological Investigation of Aboriginal Objects in NSW* (2010). For each site located or re-recorded, individual artefact locations will be captured by differential GPS. Associated site data (e.g. type, content, and surrounding environment) will be documented using AECOM's standard open site recording form. Photographic records of each site will also be taken. AHIMS site cards will be produced for all newly identified sites.

#### **4.4 Recording of Transects**

For each survey transect walked, the following information will be recorded:

- Landform element(s);
- Ground Surface Visibility (GSV) estimated to the nearest 10%;
- Exposure estimated to the nearest 10%;
- Factors responsible for identified ground surface exposures;
- The character and depth of any exposed soil profiles; and
- Presence or absence of Aboriginal heritage material.

#### **4.5 Stone Artefact Recording**

Information recorded for identified stone artefacts will, as a minimum, include raw material type, technological type and maximum linear dimension (mm). Where more than 50 artefacts are identified within a site, recording will be limited to a sample of 50 artefacts.

#### **4.6 Scarred Tree Recording**

The following attributes will be recorded for all potential Aboriginal scarred tree identified during field survey:

- Tree location;
- Tree species;
- Tree condition;
- Girth of the tree (at 1.5m);
- Scar dimensions;
- Overgrowth
- Scar orientation;
- Origin of scar;
- Type of scar;
- Scar preservation;
- Toe holds (presence/absence);
- Tool marks (presence/absence);
- Type of tool marks; and
- Epicormic stem(s) (presence/absence).



#### 4.7 Deposit, Potential Archaeological Deposit (PAD), and Archaeological Sensitivity

As demonstrated by numerous Aboriginal archaeological excavations in the Upper Hunter Valley, surface artefacts at most open artefact scatter sites represent only a portion of the total number of artefacts present within and surrounding these sites, with the majority occurring in subsurface contexts. At the same time, many excavations have demonstrated a more-or-less continuous subsurface distribution of artefacts across assessed landscapes, albeit with highly variable densities that are linked to environmental factors such as proximity to water and stream order.

Together with the view that ground surface visibility, as a result of soil erosion, represent a major bias in Aboriginal archaeological site location in the Hunter Valley, such evidence requires an assessment of the potential of identified surface sites to contain subsurface archaeological deposit.

Subsurface archaeological potential is addressed in the context of this assessment by the concept of 'archaeological sensitivity'. For the purposes of this assessment, archaeologically sensitive areas are those that are deemed to have the potential for archaeological deposit. Archaeological assessments of subsurface archaeological potential are based on analysis of three key factors including the nature and extent of visible surface artefacts at the site, a review of the findings of previous archaeological excavations in analogous landforms in the surrounding area, and on-site observations of post-depositional processes affecting artefact exposure and burial. For the archaeological field survey, it is anticipated that the archaeological sensitivity of the Project Boundary, including all previously and newly recorded Aboriginal archaeological sites, will be assessed.

#### 4.8 Other Site Types

If other site types are identified during survey then site recording will be conducted to a degree comparable to that required by the *Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales* (DECCW 2010).

### 5.0 Social/Cultural Values Assessment

Aboriginal stakeholders are in the best position to provide information on the Aboriginal social/cultural heritage values of a given area. During the archaeological assessment process, Hansen Bailey will consult with Aboriginal stakeholders regarding the cultural heritage values of the Project Boundary. This will include as a minimum:

- A request (in this draft methodology) for any initial comments regarding the Aboriginal cultural heritage values of the Project Boundary;
- The provision of this draft assessment methodology to all registered stakeholders for comment prior to fieldwork;
- A planning meeting to provide registered Aboriginal parties with information about the scope of the Project, and the proposed cultural heritage assessment process as discussed in **Section 4.2**.
- Discussion of cultural heritage values during field survey with either AECOM or Hansen Bailey;
- Opportunity for further personal meetings with knowledge holders who wish to share cultural heritage knowledge; and
- The provision of a draft Aboriginal heritage impact assessment to all registered stakeholders for comment prior to finalisation.

**Consultation in relating to the above will be undertaken in accordance with OEH's *Aboriginal Cultural Heritage Consultation Requirements for Proponents* (OEH 2010).**

### 6.0 References

- Central Queensland Cultural Heritage Management. 2010. *Mount Pleasant Project Modification Aboriginal Cultural Heritage Assessment Report*. Unpublished report to Coal and Allied Operations Pty Ltd.
- ENSR Australia Pty Limited (HLA ENSR). 2008. *Bengalla Link Road Stage Two Archaeological Salvage Bengalla Mine*. Unpublished report for Hansen Bailey.
- Environmental Resources Management Australia Pty Ltd (ERM). 2007. *Bengalla Mine Section 90 # 2621 Aboriginal Heritage Salvage Collection Report*. Unpublished report for Bengalla Mining Company.



HLA-Envirosciences Pty Ltd. 1993. *Environmental Impact Statement for Bengalla Opencut Coal Mine*. Report to Bengalla Mining Company Pty Ltd. Available at: <http://www.ncbi.nlm.nih.gov/pubmed/17999137>.

Hansen Bailey. 2012. *Bengalla Mining Company Continuation of Bengalla Mine*. Unpublished report to Bengalla Mining Company Pty Limited.

Kovac, M., & Lawrie, J.W. 1991. *Soil Landscapes of the Singleton 1:250 000 Sheet*. Sydney: Soil Conservation Service of NSW.

NSW Department of Environment Climate Change and Water. 2010. *Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales*. Department of Environment, Climate Change and Water.

NSW Office of Environment and Heritage, & NSW Department of Environment, C.C.& W. 2010. *Aboriginal Cultural Heritage Consultation Requirements for Proponents*. Office of Environment and Heritage.

Rich, E. 1993. *Proposed Bengalla Coal Mine, Muswellbrook NSW: Archaeological Survey for Aboriginal Sites*. Unpublished report for Wayne Perry & Associates.

White, E. 1998. *Archaeological Salvage of Site b10 & B33 Bengalla Mine, Hunter Valley, NSW*. Unpublished report for Bengalla Mining Company.

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## Hansen Bailey

ENVIRONMENTAL CONSULTANTS

30 April 2012

Aboriginal Heritage Planning Officer  
Planning and Aboriginal Heritage Section – North East  
Office of Environment and Heritage  
Locked Bag 914  
COFFS HARBOUR NSW 2450

Attention: Rosalie Neve

Dear Rosalie

### **Continuation of Bengalla Mine Project Aboriginal Archaeology and Cultural Heritage Impact Assessment**

On 27 February 2012, the Office of Environment and Heritage (OEH) was mailed a letter seeking assistance in identifying Aboriginal stakeholders that should be consulted as part of the Aboriginal Archaeology and Cultural Heritage Impact Assessment (AACHIA) for the Continuation of Bengalla Mine Project (the Project). Bengalla Mining Company Pty Ltd and Hansen Bailey would like to thank you for the list of stakeholders provided on 29 February 2012.

On 19 March 2012, all listed Aboriginal groups were mailed a letter inviting them to register an interest in the AACHIA for the Project. The closing date for Expressions of Interest was 2 April 2012. The Aboriginal groups were advised that they should notify Hansen Bailey if they did not wish for their details to be forwarded to OEH.

Clause 4.1.3 of the *Aboriginal cultural heritage consultation requirements for proponents 2010* states that within 28 days of the closing date for Expressions of Interest, OEH must be provided with details of the Aboriginal groups that have registered an interest, as well as the notifications inviting an expression of interest. In accordance with this clause, please find attached to this letter: a list of all registered Aboriginal stakeholders, an example of the letter seeking expressions of interest (dated 19 March 2012), and the public notices advertised in the local newspapers.

If you have any questions with regard to this letter, please do not hesitate to contact me on (02) 6575 2010 or [jmartin@hansenbailey.com.au](mailto:jmartin@hansenbailey.com.au).

Yours faithfully  
**HANSEN BAILEY**



Jason Martin  
Environmental Scientist

*Attached: List of registered Aboriginal stakeholders*

*Letter sent to all Aboriginal stakeholder groups on 19 March 2012*

*Advertisement placed in the "Muswellbrook Chronicle"*

*Advertisement placed in the "Hunter Valley News"*

## Hansen Bailey

30 April 2012

Chief Executive Officer  
Wanaruah Local Aboriginal Land Council  
PO Box 127  
MUSWELLBROOK NSW 2333

Attention: Noel Downs

Dear Noel

### **Continuation of Bengalla Mine Project Aboriginal Archaeology and Cultural Heritage Impact Assessment**

On 27 February 2012, the Wanaruah Local Aboriginal Land Council (WLALC) was mailed a letter seeking assistance in identifying Aboriginal stakeholders that should be consulted as part of the Aboriginal Archaeology and Cultural Heritage Impact Assessment (AACHIA) for the Continuation of Bengalla Mine Project (the Project). Bengalla Mining Company Pty Ltd and Hansen Bailey would like to thank you for the list of stakeholders provided on 6 March 2012.

On 19 March 2012, all listed Aboriginal groups were mailed a letter inviting them to register an interest in the AACHIA for the Project. The closing date for Expressions of Interest was 2 April 2012. The Aboriginal groups were advised that they should notify Hansen Bailey if they did not wish for their details to be forwarded to the WLALC.

Clause 4.1.3 of the *Aboriginal cultural heritage consultation requirements for proponents 2010* states that within 28 days of the closing date for Expressions of Interest, the Local Aboriginal Land Council must be provided with details of the Aboriginal groups that have registered an interest, as well as the notifications inviting an expression of interest. In accordance with this clause, please find attached to this letter: a list of all registered Aboriginal stakeholders, an example of the letter seeking expressions of interest (dated 19 March 2012), and the public notices advertised in the local newspapers.

Hansen Bailey Pty Ltd (ABN 17 093 597 510)

**BRISBANE**

Phone: (07) 3226 0900 Fax: (07) 3226 0901

Address: Level 15, 215 Adelaide Street Brisbane Qld 4000 Postal: GPO Box 3285 Brisbane Qld 4001

**HUNTER VALLEY**

Phone: (02) 6575 2000 Fax: (02) 6575 2001

Address: 6/127-129 John Street Singleton NSW 2330 Postal: PO Box 473 Singleton NSW

If you have any questions with regard to this letter, please do not hesitate to contact me on (02) 6575 2010 or [jmartin@hansenbailey.com.au](mailto:jmartin@hansenbailey.com.au).

Yours faithfully  
**HANSEN BAILEY**



Jason Martin  
Environmental Scientist

*Attached: List of registered Aboriginal stakeholders*

*Letter sent to all Aboriginal stakeholder groups on 19 March 2012*

*Advertisement placed in the "Muswellbrook Chronicle"*

*Advertisement placed in the "Hunter Valley News"*

Continuation of Bengalla Mine – Aboriginal Stakeholder Consultation Records

| Date                     | Method of Consultation                                                                                                                                                                                                                                                                                                                                     | Aboriginal Stakeholder Groups Contacted                                                                                                                                                                                                                                                                                   |
|--------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 17 February 2012         | Public notice in the <i>Muswellbrook Chronicle</i> inviting Aboriginal stakeholders to register an interest in being consulted as part of the Aboriginal Archaeological and Cultural Heritage Impact Assessment for the Continuation of Bengalla Mine Project (the Project). Interested persons were invited to register an interest by 7 March 2012.      | N/A                                                                                                                                                                                                                                                                                                                       |
| 22 February 2012         | Public notice in the <i>Hunter Valley News</i> inviting Aboriginal stakeholders to register an interest in being consulted as part of the Aboriginal Archaeological and Cultural Heritage Impact Assessment for the Project. Interested persons were invited to register an interest by 7 March 2012.                                                      | N/A                                                                                                                                                                                                                                                                                                                       |
| 27 February 2012         | Letter to regulatory stakeholders seeking assistance with identifying Aboriginal stakeholders to be consulted during the Aboriginal Archaeological and Cultural Heritage Impact Assessment. Regulators were asked to provide a list of relevant Aboriginal stakeholders by 12 March 2012.                                                                  | Office of Environment and Heritage (OEH), NSW Department of Aboriginal Affairs (DAA), Native Title Services Corporation (NTSCorp), National Native Title Tribunal (NNTT), Muswellbrook Shire Council (MSC), Hunter-Central Rivers Catchment Management Authority (HCRCMA), Wanaruah Local Aboriginal Land Council (WLALC) |
| 19 February 2012         | Letter from Deslee Matthews of Deslee Talbott Consultants (DTC) registering an expression of interest in the Project.                                                                                                                                                                                                                                      | DTC                                                                                                                                                                                                                                                                                                                       |
| 19 February 2012         | Letter from Terry Matthews of Breeza Plains Culture and Heritage Consultants (BPCHC) registering an expression of interest in the Project.                                                                                                                                                                                                                 | BPCHC                                                                                                                                                                                                                                                                                                                     |
| 20 February 2012         | Letter received from Roger Noel Matthews (RNM) registering an expression of interest in the Project (dated 13 February 2012).                                                                                                                                                                                                                              | RNM                                                                                                                                                                                                                                                                                                                       |
| 24 February 2012         | Letter from Elaine Freihaut of Hunter Valley Aboriginal Corporation (HVAC) registering an expression of interest in the Project.                                                                                                                                                                                                                           | HVAC                                                                                                                                                                                                                                                                                                                      |
| 29 February 2012         | Letter from Kathleen Kinchela of Yinarr Cultural Services (YCS) registering an expression of interest in the Project.                                                                                                                                                                                                                                      | YCS                                                                                                                                                                                                                                                                                                                       |
| 29 February 2012         | Letter from Donna Sampson of Cacatua Culture Consultants (CCC) registering an expression of interest in the Project.                                                                                                                                                                                                                                       | CCC                                                                                                                                                                                                                                                                                                                       |
| 29 February 2012         | Letter from OEH providing a list of Aboriginal stakeholders that need to be consulted as part of the Aboriginal Heritage Impact Assessment.                                                                                                                                                                                                                | OEH                                                                                                                                                                                                                                                                                                                       |
| 5 March 2012 (Received)  | Letter from the Office of the Registrar (Department of Aboriginal Affairs) advising that the land within the Project Boundary does not have any Registered Aboriginal Owners (letter dated 28 February 2012).                                                                                                                                              | DAA                                                                                                                                                                                                                                                                                                                       |
| 9 March 2012 (Received)  | Letter from the WLALC providing a list of Aboriginal Stakeholders that should be consulted during the Aboriginal Archaeological and Cultural Heritage Impact Assessment (letter dated 6 March 2012). WLALC also registered an interest itself.                                                                                                             | WLALC                                                                                                                                                                                                                                                                                                                     |
| 12 March 2012 (Received) | Letter from Alieria French of Alieria French Trading (AFT) expressing an interest in the Project (letter dated 9 March 2012).                                                                                                                                                                                                                              | AFT                                                                                                                                                                                                                                                                                                                       |
| 19 March 2012            | Letter to all Aboriginal groups identified by regulators as potentially having an interest in the Project. Letter invited the groups to register an interest in the Project and provided a copy of <i>Bengalla Coal Mine – Continuation of Mining: Aboriginal Heritage Impact Assessment Draft Methodology</i> (AECOM, 2012). The letter included a return | Aboriginal Native Title Consultants, Aboriginal Native Title Elders Consultants, AFT, Awabakal Traditional Owners Aboriginal                                                                                                                                                                                              |

| Date          | Method of Consultation                                                                                                                                                          | Aboriginal Stakeholder Groups Contacted                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|---------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|               | fax form for the registered parties to provide comments on the draft methodology. The letter also invited the parties to attend a Planning Meeting at Bengalla on 4 April 2012. | Corporation, Bawurra, Black Creek Aboriginal Corporation, BPCHC, Bullen Bullen Consultants, Bunda, Carrawonga Consultants, CCC, Culturally Aware, DTC, DFTVE, GWCHC, Giwirr Consultants, Hunter Traditional Owners, HVAC, Hunter Valley Cultural Consultants, HVCS, Hunter Valley Natural and Cultural Resources Management, IO, Jarban + Mugreba, Jeff Matthews, Kauwul, KCS, Kayaway, Lower Hunter Wonnarua Council, Lower Wonnaruah Tribal Consultancy, Mingga Consultants, Mooki Plains Management, Muswellbrook Cultural Consultants, MCHG, NKACHG, RNM, St Clair Singleton Aboriginal Corporation, TGCC, UAC, Ungooroo Cultural and Community Services, UHHC, UHWC, Valley Culture, WGCC, WalCS, Wanaruah Aboriginal Custodians Corporation, Wanaruah Custodians, WLALC, Wonnarua Nation Aboriginal Corporation, Wonnaruah Elders Council, WarCS, WC, WWCC, WIG, WCH, Yarrawalk and YCS. |
| 21 March 2012 | Email from Robert Smith of Indigenous Outcomes (IO) registering an expression of interest in the Project.                                                                       | IO                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| 21 March 2012 | Email from Abie Wright of Ngarramung-Kuri Aboriginal Culture and Heritage Group (NKACHG) registering an expression of interest in the Project.                                  | NKACHG                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| 22 March 2012 | Letter from Aaron Slater of Warragil Cultural Services (WarCS) registering an expression of interest in the Project.                                                            | WarCS                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| 22 March 2012 | Telephone call from Gordon Griffiths of Wonnarua Culture Heritage (WCH) registering an expression of interest in the Project                                                    | WCH                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| 22 March 2012 | Letter from Jessica Garland of Ungooroo Aboriginal Corporation (UAC) registering an expression of interest in the Project                                                       | UAC                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| 22 March 2012 | Email from Warren Schillings of Myland Cultural and Heritage Group (MCHG) registering an expression of interest in the Project                                                  | MCHG                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| 22 March 2012 | Fax from Terry Matthews of BPCHC to express agreement with the proposed survey methodology.                                                                                     | BPCHC                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| 23 March 2012 | Email from Steven Hickey of Widescope Indigenous Group (WIG) registering an expression of interest in the Project                                                               | WIG                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| 26 March 2012 | Telephone call and email from Elizabeth Howard of Waabi Gabinya Cultural Consultancy (WGCC) to register an expression of interest in the Project                                | WGCC                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| 27 March 2012 | Phone conversation with Alier French of AFT, confirming that she will be attending the Planning Meeting.                                                                        | AFT                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |

| Date          | Method of Consultation                                                                                                                                                                                                                                                                                                                                                                                                                         | Aboriginal Stakeholder Groups Contacted |
|---------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------|
| 27 March 2012 | Phone conversation with Terry Matthews of BPCHC, confirming that he and Corey Matthews will be attending the Planning Meeting.                                                                                                                                                                                                                                                                                                                 | BPCHC                                   |
| 27 March 2012 | Phone conversation with Donna Sampson of CCC, confirming that a representative of CCC will be attending the Planning Meeting.                                                                                                                                                                                                                                                                                                                  | CCC                                     |
| 27 March 2012 | Phone conversation with Deslee Matthews of DTC, confirming that she will be attending the Planning Meeting.                                                                                                                                                                                                                                                                                                                                    | DTC                                     |
| 27 March 2012 | Phone conversation with Warren Schillings of MCHG, confirming that he will be attending the Planning Meeting.                                                                                                                                                                                                                                                                                                                                  | MCHG                                    |
| 27 March 2012 | Phone conversation with Roger Matthews, confirming that he will be attending the Planning Meeting.                                                                                                                                                                                                                                                                                                                                             | RNM                                     |
| 27 March 2012 | Phone conversation with Jessica Garland of UAC, confirming that a representative from UAC will be attending the Planning Meeting.                                                                                                                                                                                                                                                                                                              | UAC                                     |
| 27 March 2012 | Phone conversation with Aaron Slater of WarCS, confirming that he will be attending the Planning Meeting.                                                                                                                                                                                                                                                                                                                                      | WarCS                                   |
| 27 March 2012 | Phone conversation with Steven Hickey of WIG, confirming that he will be attending the Planning Meeting.                                                                                                                                                                                                                                                                                                                                       | WIG                                     |
| 27 March 2012 | Phone conversation with Abie Wright of NKACHG to ask whether he will be attending the Planning Meeting. Abie requested further details of the meeting, and will confirm attendance later. Follow up email containing details of the planning meeting was sent.                                                                                                                                                                                 | NKACHG                                  |
| 27 March 2012 | Phone conversation with Noel Downs of WLALC to ask whether any representatives of WLALC will be attending the Planning Meeting. Noel stated that he had not received the letter advising of the Planning Meeting. A copy of the letter was provided to Noel by email. Noel was still undecided about attending the meeting.                                                                                                                    | WLALC                                   |
| 27 March 2012 | Phone conversation with Gordon Griffiths of WCH to check if any representatives of WCH will be attending the Planning Meeting. Gordon stated that he had not received the letter advising of the Planning Meeting, and was undecided about attending.                                                                                                                                                                                          | WCH                                     |
| 27 March 2012 | Email asking whether any of these groups will be attending the Planning Meeting. These groups did not respond to the attempts to contact them by phone.                                                                                                                                                                                                                                                                                        | WGCC, HVAC and YCS.                     |
| 27 March 2012 | Email from Kathie Kinchela of YCS confirming that she will be attending the Planning Meeting.                                                                                                                                                                                                                                                                                                                                                  | YCS                                     |
| 28 March 2012 | Telephone call from Derrick Vale of DFTV Enterprises (DFTVE), registering an interest in the Project. Derrick advised that he and one other representative of his group will be attending the Planning Meeting.                                                                                                                                                                                                                                | DFTVE                                   |
| 28 March 2012 | Fax from Derrick Vale of DFTV indicating that he agrees with the content in the proposed methodology.                                                                                                                                                                                                                                                                                                                                          | DFTVE                                   |
| 29 March 2012 | Letter from Ann Hickey of Gidawaa Walang Cultural Heritage Consultancy (GWCHC) registering an interest in the Project. Ann confirmed over the phone that she would be attending the Planning Meeting.                                                                                                                                                                                                                                          | GWCHC                                   |
| 29 March 2012 | Telephone conversation with Cara Coles, formerly of Hunter Traditional Owners Environmental Management (HTOEM). Cara noted that she had now sold the business to her sister, who is currently interstate and therefore unable to attend the Planning Meeting. Cara was not interested in taking part in the Project personally.                                                                                                                | HTOEM                                   |
| 29 March 2012 | Telephone conversation with George Tonna of NTSCorp to check whether NTSCorp would be responding to the letter requesting assistance in identifying stakeholders (dated 27 February 2012). George advised that NTSCorp cannot provide details of groups but ordinarily supplies details of the Project to known stakeholder groups. NTSCorp will need to check whether this has been done. Sent email to NTSCorp to confirm this conversation. | NTSCorp                                 |

| Date          | Method of Consultation                                                                                                                                                                                                                                                                       | Aboriginal Stakeholder Groups Contacted |
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| 29 March 2012 | Telephone conversation with Darryl Fitzgerald to check whether MSC will provide a list of stakeholders that will be consulted. Darryl will try to track down this letter.                                                                                                                    | MSC                                     |
| 29 March 2012 | Email from Ben Oliver of MSC providing a list of stakeholders that should be consulted. MSC did not identify any additional stakeholders that were not already being consulted.                                                                                                              | MSC                                     |
| 29 March 2012 | Telephone call from Rhonda Griffiths of HVAC, confirming that she will be attending the planning meeting.                                                                                                                                                                                    | HVAC                                    |
| 29 March 2012 | Attempted to follow up with HCRCMA and NNTT regarding the letter seeking assistance in identifying stakeholders (dated 27 February 2012). Unable to contact both parties. Left an answering machine message for Joe Thompson of HCRCMA.                                                      | HCRCMA and NNTT                         |
| 30 March 2012 | Telephone call from Steve Eccles of HCRCMA, acknowledging receipt of the letter seeking assistance in identifying Aboriginal stakeholders. Steve will attempt to provide a list of Aboriginal groups by the end of the day.                                                                  | HCRCMA                                  |
| 30 March 2012 | Email to Gordon Griffiths of WCH providing a copy of the letter regarding the planning meeting and methodology. Requested that Gordon confirm whether any representatives of his group will be attending the meeting.                                                                        | WCH                                     |
| 30 March 2012 | Fax to Gordon Griffiths providing the letter regarding the planning meeting and methodology.                                                                                                                                                                                                 | WCH                                     |
| 30 March 2012 | Telephone conversation with Kimberley Wilson of NNTT. Kimberley indicated that NNTT had sent an email on 29 February 2012 which provided the results of a native title claims search. Kimberley re-sent this email, which was subsequently received.                                         | NNTT                                    |
| 2 April 2012  | Letter from Rhoda Perry of Upper Hunter Wonnarua Council (UHCW) expressing an interest in the Project. Rhoda advised that Georgina Berry will be attending the Planning Meeting on behalf of the group.                                                                                      | UHCW                                    |
| 2 April 2012  | Telephone call from Maree Waugh of Wallangan Cultural Services (WalCS) to register an expression of interest in the Project. She advised that a representative of her group will be attending the Planning Meeting.                                                                          | WalCS                                   |
| 2 April 2012  | Email from Abie Wright of NKACHG advising that one representative of his group will be attending the Planning Meeting.                                                                                                                                                                       | NKACHG                                  |
| 3 April 2012  | Telephone call from Gordon Griffiths of WCH advising that he will be attending the Planning Meeting. Also indicated that he knew another stakeholder, Kevin Sampson, who was interested in attending the Planning Meeting.                                                                   | WCH                                     |
| 3 April 2012  | Attempted to contact Elizabeth Howard of WGCC to check attendance for the Planning Meeting, but did not receive an answer.                                                                                                                                                                   | WGCC                                    |
| 3 April 2012  | Telephone call from Arthur Fletcher registering an expression of interest in the Project. Arthur indicated that he would be attending the Planning Meeting. He advised that he has incorporated his group, formerly known as Wonn1 Contracting, and is now known as Kauwul Pty Ltd (Kauwul). | Kauwul                                  |
| 3 April 2012  | Email from Susan Rowland of HCRCMA (on behalf of Steve Eccles) providing a response to the letter dated 27 February 2012, which sought assistance in identifying interested Aboriginal stakeholders. The HCRCMA did not identify any potentially interested Aboriginal stakeholders.         | HCRCMA                                  |
| 3 April 2012  | Telephone call from Scott Smith of Warul Consultants (WC) registering an interest in the Project. Rosylyn Smith will be attending the planning meeting on the group's behalf.                                                                                                                | WC                                      |
| 3 April 2012  | Telephone call from Donna Sampson of CCC, advising that Kevin Sampson would like to register an interest in the Project. Kevin will provide a written expression of interest                                                                                                                 | CCC                                     |

| Date          | Method of Consultation                                                                                                                                                                                                                                                                                                                                                 | Aboriginal Stakeholder Groups Contacted                                                                                                                                      |
|---------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|               | at the Planning Meeting.                                                                                                                                                                                                                                                                                                                                               |                                                                                                                                                                              |
| 3 April 2012  | Email from Kevin Sampson of Bawurra Consultants (Bawurra) registering an expression of interest in the Project.                                                                                                                                                                                                                                                        | Bawurra                                                                                                                                                                      |
| 3 April 2012  | Email from Tammy Knox of Bunda Consultants (Bunda) registering an expression of interest in the Project.                                                                                                                                                                                                                                                               | Bunda                                                                                                                                                                        |
| 3 April 2012  | Telephone call from Noel Downs of WLALC, indicating that he will be attending the Planning Meeting.                                                                                                                                                                                                                                                                    | WLALC                                                                                                                                                                        |
| 4 April 2012  | Email from Arthur Fletcher of Kauwul to confirm his interest in the Project.                                                                                                                                                                                                                                                                                           | Kauwul                                                                                                                                                                       |
| 4 April 2012  | Melissa Matthews of Upper Hunter Heritage Consultants (UHHHC) attended the Planning Meeting and registered an interest in person.                                                                                                                                                                                                                                      | UHHHC                                                                                                                                                                        |
| 4 April 2012  | Des Hickey of Wattaka Wonnarua Culture Consultants (WWCC) attended the Planning Meeting and registered an interest in person.                                                                                                                                                                                                                                          | WWCC                                                                                                                                                                         |
| 4 April 2012  | Luke Hickey of Hunter Valley Cultural Surveying (HVCS) attended the Planning Meeting and registered an interest in person.                                                                                                                                                                                                                                             | HVCS                                                                                                                                                                         |
| 4 April 2012  | Rod Hickey of Kawul Cultural Services (KCS) attended the Planning Meeting and registered an interest in person.                                                                                                                                                                                                                                                        | KCS                                                                                                                                                                          |
| 4 April 2012  | Fax from Ann Hickey of GWCHC indicating that she agreed with the proposed survey methodology.                                                                                                                                                                                                                                                                          | GWCHC                                                                                                                                                                        |
| 4 April 2012  | Planning Meeting held at Bengalla to discuss the upcoming field survey.                                                                                                                                                                                                                                                                                                | AFT, Bawurra, BPCHC, Bunda, CCC, DTC, DFTVE, GWCHC, HVAC, HVCS, Kauwul, KCS, MCHG, NKACHG, RNM, UAC, UHHHC, WalCS, WLALC, WarCS, WC, WWCC and YCS.                           |
| 5 April 2012  | Email from Taasha Layer of UAC indicating agreement with the proposed survey methodology.                                                                                                                                                                                                                                                                              | UAC                                                                                                                                                                          |
| 10 April 2012 | Telephone conversation with Peter Schultz of NTSCorp to check whether NTSCorp will be responding to the letter dated 27 February 2012. Peter indicated that he may not have received this letter. This letter was provided to NTSCorp again via email.                                                                                                                 | NTSCorp                                                                                                                                                                      |
| 10 April 2012 | Email from Peter Schultz of NTSCorp advising that NTSCorp will not be providing the contact details of stakeholders due to privacy reasons.                                                                                                                                                                                                                            | NTSCorp                                                                                                                                                                      |
| 10 April 2012 | Email from Donna Sampson of CCC expressing agreement with the proposed survey methodology.                                                                                                                                                                                                                                                                             | CCC                                                                                                                                                                          |
| 11 April 2012 | Telephone call from Greg Griffiths to individually register an interest in the Project. Greg also advised that Tony Griffiths of T & G Culture Consultants (TGCC) wanted to register an interest. Greg was advised that registrations for field work had now closed, but that he could still be consulted regarding other aspects of the cultural heritage assessment. | Greg Griffiths                                                                                                                                                               |
| 12 April 2012 | Letter from Kerrie Brauer of Awabakal Traditional Owners Aboriginal Corporation (ATOAC) advising that her group was not interested in being involved with the Project.                                                                                                                                                                                                 | ATOAC                                                                                                                                                                        |
| 26 April 2012 | Letter sent to all Aboriginal groups that have registered for the field work, advising them that the field work will be conducted from 14 May 2012 to 1 June 2012. Stakeholders were asked to nominate a field work representative and to provide their certificates of currency by 8 May 2012.                                                                        | AFT, Bawurra, BPCHC, Bunda, CCC, DTC, DFTVE, GWCHC, HVAC, HVCS, IO, Kauwul, KCS, MCHG, NKACHG, RNM, UAC, UHHHC, UHWC, WGCC, WalCS, WLALC, WarCS, WC, WWCC, WIG, WCH and YCS. |
| 27 April 2012 | Email from Vicky Slater of KCS indicating her group's availability for the second week of the field work.                                                                                                                                                                                                                                                              | KCS                                                                                                                                                                          |

| Date          | Method of Consultation                                                                                                                                                                                                                                                                                                                                  | Aboriginal Stakeholder Groups Contacted |
|---------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------|
| 27 April 2012 | Email from Aaron Slater of WarCS indicating his group's availability for the second week of field work.                                                                                                                                                                                                                                                 | WarCS                                   |
| 29 April 2012 | Fax from Derrick Vale of DFTV indicating his group's availability for all three weeks of field work.                                                                                                                                                                                                                                                    | DFTV                                    |
| 30 April 2012 | Letter to OEH and WLALC providing a list of Aboriginal stakeholders that have registered an interest in the Project, as required by Clause 4.1.6 of the <i>Aboriginal cultural heritage consultation requirements for proponents 2010</i> .                                                                                                             | OEH and WLALC                           |
| 30 April 2012 | Fax from Terry Matthews of BPCHC indicating that he will be available for the second and third week of field work.                                                                                                                                                                                                                                      | BPCHC                                   |
| 1 May 2012    | Email from Tammy Knox on behalf of Kevin Sampson of Bawurra, indicating that Kevin will be available for the second week of field work.                                                                                                                                                                                                                 | Bawurra                                 |
| 1 May 2012    | Fax from Warren Schillings of MCHG indicating his group's availability for the first and second week of field work.                                                                                                                                                                                                                                     | MCHG                                    |
| 2 May 2012    | Email from Tammy Knox of Bunda indicating her group's availability for the second week of field work.                                                                                                                                                                                                                                                   | Bunda                                   |
| 2 May 2012    | Email from Ann Hickey of GWCHC indicating her availability for the second week of field work.                                                                                                                                                                                                                                                           | GWCHC                                   |
| 2 May 2012    | Fax and email from Jessica Garland of UAC indicating her group's availability for the first and third weeks of the field survey.                                                                                                                                                                                                                        | UAC                                     |
| 2 May 2012    | Email from Darrel Matthews of UHHC indicating his group's availability for the first week of field work.                                                                                                                                                                                                                                                | UHHC                                    |
| 2 May 2012    | Telephone call from Donna Sampson asking whether CCC would be involved in the field survey. Confirmed that CCC was eligible for the field survey. Donna indicated that CCC would be available for all three weeks of the survey. Since Donna had indicated that she had not received the letter sent on 26 April 2012. Another copy was emailed to her. | CCC                                     |
| 2 May 2012    | Email from Donna Sampson of CCC to indicate that her group will be available for all three weeks of the field survey.                                                                                                                                                                                                                                   | CCC                                     |
| 2 May 2012    | Fax from Roger Matthews of RNM indicating his availability for the second week of field work.                                                                                                                                                                                                                                                           | RNM                                     |
| 2 May 2012    | Fax from Michael Stair of DTC indicating that he will be available for the second week of field work.                                                                                                                                                                                                                                                   | DTC                                     |
| 3 May 2012    | Fax from Maree Waugh of WalCS indicating her availability for the second week of field work.                                                                                                                                                                                                                                                            | WalCS                                   |
| 3 May 2012    | Fax from Arthur Fletcher of Kauwul indicating that he will be available for all three weeks of the field work.                                                                                                                                                                                                                                          | Kauwul                                  |
| 3 May 2012    | Fax from Rhonda Griffiths of HVAC indicating her group's availability for the second week of field work.                                                                                                                                                                                                                                                | HVAC                                    |
| 4 May 2012    | Email from Shannon Griffiths of WCH indicating his availability for the second week of field work.                                                                                                                                                                                                                                                      | WCH                                     |
| 5 May 2012    | Fax from Rhoda Perry of UHWC indicating her group's availability for the second week of field work.                                                                                                                                                                                                                                                     | UHWC                                    |
| 7 May 2012    | Telephone call from Tammy Knox of Bunda advising that she wanted to change her field work availability from the second week to the first week. She advised that Kevin Sampson of Bawurra also wanted to change his availability to the first week.                                                                                                      | Bunda and Bawurra                       |
| 7 May 2012    | Telephone call from Rhonda Griffiths of HVAC to change her group's availability for the field work. HVAC's field work representative, Michelle Saunders, will only be available to participate in the third week of field work.                                                                                                                         | HVAC                                    |
| 7 May 2012    | Email from Jessica Garland of UAC to advise that Annette Dunstan will only be available to participate in the third week of field work. UAC had previously stated that their representative would be available in the first and third weeks.                                                                                                            | UAC                                     |
| 7 May 2012    | Telephone conversation with Deslee Matthews of DTC to confirm her group's availability for the field work. The fax previously received from DTC was ambiguous. Deslee                                                                                                                                                                                   | DTC                                     |

| Date        | Method of Consultation                                                                                                                                                                                                                                                                              | Aboriginal Stakeholder Groups Contacted |
|-------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------|
|             | advised that DTC's representative would prefer to be involved in week 2, but that week 3 was also amenable.                                                                                                                                                                                         |                                         |
| 8 May 2012  | Telephone conversation with Alieria French of AFT to check her availability for the field work. Alieria indicated that she would be available for the third week of field work. Alieria was provided with another copy of the field work letter by email.                                           | AFT                                     |
| 8 May 2012  | Telephone conversation with Luke Hickey of HVCS to check his group's availability for the field work. Luke indicated that he would be available for the second week of field work.                                                                                                                  | HVCS                                    |
| 8 May 2012  | Telephone conversation with Robert Smith of IO to check his group's availability for the field work. Robert indicated that he would be available to participate in any of the three weeks of field work.                                                                                            | IO                                      |
| 8 May 2012  | Telephone conversation with Abie Wright of NKACHG to check his group's availability for the field work. Abie indicated that he is available for the first week of field work.                                                                                                                       | NKACHG                                  |
| 8 May 2012  | Telephone conversation with Noel Downs of WLALC to check his group's availability for the field work. Noel tentatively expressed his availability for the third week of field work. Noel promised to confirm his availability on Thursday. WLALC was emailed another copy of the field work letter. | WLALC                                   |
| 8 May 2012  | Telephone conversation with Scott Smith of WC to check his group's availability for the field work. Scott tentatively indicated that he will be available for the third week of field work. Scott was emailed another copy of the field work letter.                                                | WC                                      |
| 8 May 2012  | Telephone conversation with Des Hickey of WWCC to check his group's availability for the field work. Des indicated that he would be available for the third week of field work.                                                                                                                     | WWCC                                    |
| 8 May 2012  | Telephone conversation with Kathleen Kinchela of YCS to check her group's availability for the field work. Kathleen indicated that she will be available for all three weeks of the field work.                                                                                                     | YCS                                     |
| 8 May 2012  | Telephone conversation with Steven Hickey of WIG to check his group's availability for the field work. Steven had not had an opportunity to read the letter, and needed to confirm his availability at a later date. Steven was emailed another copy of the field work letter.                      | WIG                                     |
| 8 May 2012  | Attempted to contact Elizabeth Howard of WGCC but was unable to reach her.                                                                                                                                                                                                                          | WGCC                                    |
| 8 May 2012  | Email from Elizabeth Howard of WGCC, indicating her availability for week 3 of the field work.                                                                                                                                                                                                      | WGCC                                    |
| 9 May 2012  | Fax from Alieria French of AFT confirming that she is available for the third week of field work.                                                                                                                                                                                                   | AFT                                     |
| 10 May 2012 | Email from Steven Hickey of WIG confirming that he is available for the third week of field work.                                                                                                                                                                                                   | WIG                                     |
| 10 May 2012 | Fax from Abie Wright of NKACHG confirming that his representative, Lenny Wright, is available for the first week of field work.                                                                                                                                                                     | NKACHG                                  |
| 10 May 2012 | Called all groups allocated to Week 1 of the field work to advise them of their allocation. Since no contact details are available for Bawurra, Tammy Knox of Bunda has offered to inform Bawurra of its allocation.                                                                                | DFTVE, IO, MCHG, Bunda, NKACHG and CCC  |
| 10 May 2012 | Attempted to contact the following groups to advise them of their allocation but was unable to reach them. Left a message asking for them to return the call.                                                                                                                                       | Kauwul and UHHC                         |
| 10 May 2012 | Telephone call from Tammy Knox of Bunda to confirm that she has notified Kevin Sampson (Bawurra) of his allocation for the field work. Tammy advised that Bawurra's representative will be Barega Knox.                                                                                             | Bunda (on behalf of Bawurra)            |

| Date        | Method of Consultation                                                                                                                                                                                                                                                                                                                                                       | Aboriginal Stakeholder Groups Contacted    |
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| 10 May 2012 | Telephone conversation with Arthur Fletcher of Kauwul to advise that he had been allocated to the first week of field work. Arthur indicated that he would not be able to attend all of week 1, and asked if he could be re-allocated to week 3. Advised that Kauwul's allocation could be changed if another group was willing to be re-allocated.                          | Kauwul                                     |
| 10 May 2012 | Telephone conversation with Kathie Kinchela of YCS to ask if she was available to participate in the first week of field work. Kathie confirmed that her group will be available for that week. YCS was re-allocated to Week 1, and Kauwul was re-allocated to Week 3 to take YCS' original place. Kathie will confirm tomorrow who YCS's field work representative will be. | YCS                                        |
| 10 May 2012 | Called all groups allocated to the second week of field work to notify them of their allocation. Gordon Griffiths of WCH and Roger Matthews of RNM asked if they could be re-allocated to the first week.                                                                                                                                                                    | DTC, GWCHC, WCH, WalCS, UHWC, RNM and HVCS |
| 10 May 2012 | Attempted to contact the following groups to advise them of their field work allocation but was unable to make contact.                                                                                                                                                                                                                                                      | WarCS and KCS                              |
| 10 May 2012 | Telephone call from Robin Matthews, the wife of Terry Matthews (BPCHC), responding to the message left on their phone. Advised Robin that BPCHC has been allocated to the second week of field work. Robin promised to pass the message onto Terry and will ask Terry to call tomorrow to confirm.                                                                           | BPCHC                                      |
| 10 May 2012 | Email to Arthur Fletcher of Kauwul indicating that he has been re-allocated to the third week of field work.                                                                                                                                                                                                                                                                 | Kauwul                                     |
| 10 May 2012 | Email to Luke Hickey of HVCS to provide another copy of the field work letter, as requested by Luke.                                                                                                                                                                                                                                                                         | HVCS                                       |
| 10 May 2012 | Telephone conversation with Darrel Matthews of UHHC to advise that his group has been allocated to the first week of field work. Darrel changed his group's field work representative from Melissa Matthews to Michael Stair. Darrel advised that Michael will be absent from the field work on Wednesday, 16 May 2012.                                                      | UHHC                                       |
| 11 May 2012 | Telephone call from Kathie Kinchela of YCS to nominate a field work representative for YCS. Kathie changed her group's representative from herself to Gordon McKenney.                                                                                                                                                                                                       | YCS                                        |
| 11 May 2012 | Telephone conversation with Robert Smith of IO to confirm a field work representative for IO. Robert nominated Timothy Smith as his group's representative.                                                                                                                                                                                                                  | IO                                         |
| 11 May 2012 | Telephone conversation with Derrick Vale of DFTVE. Derrick advising that he has been unable to contact his nominated field work representative (Susan Cutmore). Derrick asked if he could be re-allocated to week 2 of field work. Confirmed that DFTVE would be re-allocated to the second week of field work.                                                              | DFTVE                                      |
| 11 May 2012 | Telephone conversation with Warren Schillings of MCHG to confirm a field work representative for MCHG. Warren advised that David Ahoy was no longer available to attend the field work and would be replaced by Ted Maley. Confirmed Ted Maley as the field work representative for MCHG.                                                                                    | MCHG                                       |
| 11 May 2012 | Telephone conversation with Gordon Griffiths of WCH to advise that his group has been re-allocated to the first week of field work, as per his request on 10 May 2012.                                                                                                                                                                                                       | WCH                                        |
| 11 May 2012 | Telephone conversation with Roger Matthews of RNM to advise that his group has been re-allocated to the first week of field work, as per his request on 10 May 2012.                                                                                                                                                                                                         | RNM                                        |
| 11 May 2012 | Telephone conversation with Vicky Slater of Kawul. Vicky was advised that Kawul had been allocated to the second week of field work. Vicky changed her field work representative to Rod Hickey. Vicky asked if WarCS has been notified of its allocation. Advised that WarCS has                                                                                             | KCS                                        |

| Date                      | Method of Consultation                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Aboriginal Stakeholder Groups Contacted                  |
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|                           | also been allocated to week 2. Vicky promised to inform Aaron Slater (WarCS) of his allocation. Vicky advised that Robert Slater will be field work representative for WarCS.                                                                                                                                                                                                                                                                                          |                                                          |
| 11 May 2012               | Telephone call from Robin Matthews of BPCHC to advise that she has notified Terry Matthews of his allocation to week 2 of field work.                                                                                                                                                                                                                                                                                                                                  | BPCHC                                                    |
| 14 May 2012 – 18 May 2012 | Archaeological field survey (week 1)                                                                                                                                                                                                                                                                                                                                                                                                                                   | Bawurra, Bunda, IO, MCHG, NKACHG, RNM, UHHC, WCH and YCS |
| 16 May 2012               | Telephone call from Derrick Vale of DFTVE to confirm that he will be the field work representative for his group.                                                                                                                                                                                                                                                                                                                                                      | DFTVE                                                    |
| 16 May 2012               | Fax from Krystal Saunders of WLALC (on behalf of Noel Downs) nominating Taine Davison as WLALC's field work representative.                                                                                                                                                                                                                                                                                                                                            | WLALC                                                    |
| 16 May 2012               | Telephone from Des Hickey of WWCC asking about his allocation for the field work. Advised that WWCC was allocated to the third week of field work. Des asked if he could be re-allocated to the second week. Informed Des that all groups allocated to the second week had already been advised of their allocation. Suggested to Des that he could be re-allocated to week 2 if he could come to an arrangement with one of the groups currently allocated to week 2. | WWCC                                                     |
| 16 May 2012               | Attempted to contact the following groups to notify them of their field work allocation but was unable to make contact: WarCS, HVCS.                                                                                                                                                                                                                                                                                                                                   | HVCS and WarCS                                           |
| 17 May 2012               | Attempted to contact the following groups to notify them of their field work allocation but was unable to make contact: WarCS, HVCS.                                                                                                                                                                                                                                                                                                                                   | HVCS and WarCS                                           |
| 17 May 2012               | Telephone conversation with Jessica Garland of UAC to advise that Annette Dunstan has been allocated to the third week of field work.                                                                                                                                                                                                                                                                                                                                  | UAC                                                      |
| 17 May 2012               | Telephone conversation with Ellaine Freihaut to advise that Michelle Saunders has been allocated to the third week of field work.                                                                                                                                                                                                                                                                                                                                      | HVAC                                                     |
| 17 May 2012               | Telephone conversation with Noel Downs of WLALC to confirm a representative for his group. Noel confirmed that Taine Davison will be undertaking the field work on behalf of WLALC. Advised that Taine has been allocated to the third week of field work.                                                                                                                                                                                                             | WLALC                                                    |
| 17 May 2012               | Telephone conversation with Alieria French of AFT to advise that she has been allocated to the third week of field work.                                                                                                                                                                                                                                                                                                                                               | AFT                                                      |
| 17 May 2012               | Telephone conversation with Steven Hickey of WIG to advise that he has been allocated to the third week of field work. Steven requested an email reminder of this allocation.                                                                                                                                                                                                                                                                                          | WIG                                                      |
| 17 May 2012               | Email to Steven Hickey of WIG to confirm that he has been allocated to the third week of field work.                                                                                                                                                                                                                                                                                                                                                                   | WIG                                                      |
| 17 May 2012               | Attempted to contact Elizabeth Howard of WWCC to notify her of WWCC's allocation for the field work. Was unable to reach Elizabeth but left a message on her phone.                                                                                                                                                                                                                                                                                                    | WWCC                                                     |
| 17 May 2012               | Telephone conversation with Arthur Fletcher of Kauwul to advise that he has been allocated to the third week of field work.                                                                                                                                                                                                                                                                                                                                            | Kauwul                                                   |
| 17 May 2012               | Email to Aaron Slater of WarCS to notify him of his group's allocation to the second week of field work.                                                                                                                                                                                                                                                                                                                                                               | WarCS                                                    |
| 17 May 2012               | Email to Luke Hickey of HVCS to advise that his group is currently allocated to the second week of field work. Requested that insurance details be provided to Hansen Bailey before the end of the week (i.e. prior to the field work commencing the following Monday). Advised Luke that if insurance details were not provided by the end of the week, HVCS would need to be re-allocated to the third week of                                                       | HVCS                                                     |

| Date                      | Method of Consultation                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | Aboriginal Stakeholder Groups Contacted                          |
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|                           | field work.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                  |
| 17 May 2012               | Email from Kathie Kinchela of YCS to confirm her availability for all three weeks of field work. Kathie had previously indicated her availability over the phone. Kathie was advised on 10 May 2012 that she was allocated to the first week of field work.                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | YCS                                                              |
| 18 May 2012               | Robert Smith of IO mailed a return fax form confirming his availability for week 1 of the field work. Robert had previously indicating his availability over the phone. On 10 May 2012, Robert was informed that his group was allocated to the first week of field work.                                                                                                                                                                                                                                                                                                                                                                                                                                                               | IO                                                               |
| 18 May 2012               | Attempted to contact Luke Hickey of HVCS to confirm his allocation for week 2 of the field work.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | HVCS                                                             |
| 18 May 2012               | Telephone conversation with Des Hickey of WWCC. Advised Des that his brother, Luke Hickey, was currently allocated to week 2 of the field work. However, Luke has not been able to be contacted to confirm this allocation. Advised Des that he could replace Luke in week 3, if he and Luke come to an agreement.                                                                                                                                                                                                                                                                                                                                                                                                                      | WWCC                                                             |
| 18 May 2012               | Telephone call from Maree Waugh of WalCS to change her group's field work representative from herself to Anthony Waugh.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | WalCS                                                            |
| 18 May 2012               | Email to Luke Hickey of HVCS to remind that his group is allocated to field work next week. Advised Luke that he must bring copies of his group's insurance to the field work. Explained that if the insurance details are not provided, his group will not be allowed to undertake field work next week, and will be automatically re-allocated to the third week of field work.                                                                                                                                                                                                                                                                                                                                                       | HVCS                                                             |
| 20 May 2012               | Email from Vicky Slater of KCS to change her field work representative from Rod Hickey to Richard Slater.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | KCS                                                              |
| 20 May 2012               | Email from Aaron Slater of WarCS to acknowledge his allocation to the second week of field work. Aaron confirmed that Robert Slater will be his group's field work representative.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | WarCS                                                            |
| 21 May 2012 – 25 May 2012 | Archaeological field survey (week 2)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | BPCHC, CCC, DTC, DFTVE, GWCHC, HVCS, KCS, UHWC, WalCS and WarCS. |
| 21 May 2012               | Telephone conversation with Luke Hickey of HVCS to advise that his field work representative, Gordon McKenny, was not allowed to participate in the field work today. Advised that HVCS did not provide insurance details far enough in advance of the field work. Luke provided his group's insurance on Sunday, 20 May 2012. This email was not sighted until after the field work had commenced on Monday morning. Advised Luke that his group can participate in the field work from this point onwards, now that his insurance details have been sighted. Offered Luke the option of either working the remaining 4 days this week or being re-allocated to next week. Luke opted to remain allocated to week 2 of the field work. | HVCS                                                             |
| 23 May 2012               | Telephone conversation with Luke Hickey of HVCS to advise that his group can be allocated one day of field work in week 3. This is to compensate for the day in week 2 that HVCS was disallowed from participating in the survey (due to failure to provide insurance details).                                                                                                                                                                                                                                                                                                                                                                                                                                                         | HVCS                                                             |
| 23 May 2012               | Telephone conversation with Scott Smith of WC to remind him that his group is allocated to the third week of field work. Requested that Scott nominate a field work representative and provide his group's insurance details. Sent an email with the same reminder.                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | WC                                                               |
| 23 May 2012               | Telephone conversation with Elizabeth Howard of WGCC to advise that she is allocated to the third week of field                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | WGCC                                                             |

| Date                      | Method of Consultation                                                                                                                                                                                                                                                                                                                                                                           | Aboriginal Stakeholder Groups Contacted      |
|---------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------|
|                           | work.                                                                                                                                                                                                                                                                                                                                                                                            |                                              |
| 23 May 2012               | Attempted to contact Des Hickey of WWCC but was unsuccessful. Left a message for Des to return the call.                                                                                                                                                                                                                                                                                         | WWCC                                         |
| 23 May 2012               | Telephone call from Donna Sampson of CCC to advise that Arthur Fletcher of Kauwul was no longer able to participate in the field work next week. Arthur has asked CCC to provide a replacement for him. Donna nominated George Sampson as the field work representative for Kauwul.                                                                                                              | CCC                                          |
| 23 May 2012               | Telephone conversation with Arthur Fletcher of Kauwul to confirm the arrangement whereby CCC will provide a representative for Kauwul in Arthur's absence. Arthur indicated that he gave permission for CCC to provide a replacement.                                                                                                                                                            | Kauwul                                       |
| 23 May 2012               | Email to Des Hickey of WWCC asking for a field work representative to be nominated.                                                                                                                                                                                                                                                                                                              | WWCC                                         |
| 24 May 2012               | Telephone conversation with Des Hickey of WWCC to advise that his group is allocated to the third week of field work.                                                                                                                                                                                                                                                                            | WWCC                                         |
| 25 May 2012               | Fax from Des Hickey of WWCC confirming his availability for the third week of field work.                                                                                                                                                                                                                                                                                                        | WWCC                                         |
| 28 May 2012 – 29 May 2012 | Archaeological field survey (week 3). Field work was originally scheduled for 28 May 2012 to 01 June 2012. Due to poor weather, the field work was suspended after the field work on 29 May 2012. The remaining three days were postponed until the following week.                                                                                                                              | AFT, HVAC, HVCS, Kauwul, WGCC, WLALC and WIG |
| 29 May 2012               | Telephone conversation with Luke Hickey of HVCS to inform Luke that he has been nominated as the field work representative for WWCC by Des Hickey. Luke indicated that he was unaware of this arrangement. Advised Luke that the remainder of field work in week 3 has been postponed until the following week. Luke will contact Des to make arrangements for field work on the following week. | HVCS                                         |
| 29 May 2012               | Advised the following stakeholders that the remaining three days in the third week of field work will be postponed to the following week (4 – 6 June 2012).                                                                                                                                                                                                                                      | Kauwul, WIG, HVAC, WGCC, WWCC and WLALC      |
| 29 May 2012               | Attempted to contact the following stakeholders but was unable to reach them. Left a message asking them to return the call.                                                                                                                                                                                                                                                                     | AFT and WC                                   |
| 29 May 2012               | Telephone conversation with Scott Smith of WC. Scott advised that he is still in the process of taking out insurance for his group. Informed Scott that the field work has been postponed until the beginning of next week. Advised Scott that he could participate in the field work next week provided that valid insurance details were supplied before the end of the week.                  | WC                                           |
| 29 May 2012               | Email to Noel Downs of WLALC asking Noel to notify Taine Davison, WLALC's field work representative, that the Bengalla field work has been postponed. Attempted to contact Taine by telephone but did not receive a response.                                                                                                                                                                    | WLALC                                        |
| 29 May 2012               | Email to Alera French of AFT to advise that the Bengalla field work for the remainder of week 3 has been postponed to the following week. Alera was unable to be contacted by phone earlier.                                                                                                                                                                                                     | AFT                                          |
| 31 May 2012               | Telephone call from Scott Smith's mother to advise that WC will not be able to obtain the necessary insurance before next week, and will consequently be unable to participate in the field work.                                                                                                                                                                                                | WC                                           |
| 1 June 2012               | Telephone conversation with Donna Sampson of CCC to offer the opportunity to participate in an additional 3 days of field work. Donna accepted the offer and nominated Adam Sampson as CCC's representative. Donna also advised that George Sampson will be undertaking field work on behalf of Kauwul.                                                                                          | CCC                                          |
| 1 June 2012               | Telephone conversation with Rhoda Perry of UHWC to                                                                                                                                                                                                                                                                                                                                               | UHWC                                         |

| Date                      | Method of Consultation                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Aboriginal Stakeholder Groups Contacted                                                                                                                                                           |
|---------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                           | offer the opportunity to participate in an additional 3 days of field work. Rhoda accepted the offer and indicated that Georgina Berry will be interested in undertaking the field work.                                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                                                                                                                                   |
| 1 June 2012               | Contacted the following groups by telephone to advise that field work will be undertaken next week, regardless of wet weather. Was unable to contact Elizabeth Howard of WGCC and left a message on her voicemail. Unable to contact Taine Davison of WLALC and Alieria French of AFT and sent an email with this message.                                                                                                                                                                                                                                                               | WIG, UAC, CCC, UHWC, HVAC, WWCC, WGCC, WLALC and AFT                                                                                                                                              |
| 4 June 2012 – 6 June 2012 | Archaeological field survey (remainder of week 3). Three days of field work were undertaken to compensate for the suspension of field work on the previous week.                                                                                                                                                                                                                                                                                                                                                                                                                         | AFT, CCC, HVAC, GWCHC, Kauwul, UHWC, WalCS, WGCC, WLALC and WIG                                                                                                                                   |
| 4 June 2012               | Telephone conversation with Ann Hickey of GWCHC to offer the opportunity to participate in an additional 2 days of field work. Ann accepted the offer.                                                                                                                                                                                                                                                                                                                                                                                                                                   | GWCHC                                                                                                                                                                                             |
| 4 June 2012               | Telephone conversation with Maree Waugh of WalCS to offer the opportunity to participate in an additional 2 days of field work. Maree accepted the offer.                                                                                                                                                                                                                                                                                                                                                                                                                                | WalCS                                                                                                                                                                                             |
| 9 August 2012             | Telephone conversation with Ann Hickey of GWCHC to offer the opportunity to participate in the scar tree assessment on 15 August 2012. Ann accepted the offer.                                                                                                                                                                                                                                                                                                                                                                                                                           | GWCHC                                                                                                                                                                                             |
| 9 August 2012             | Telephone conversation with Maree Waugh of WalCS to offer the opportunity to participate in the scar tree assessment on 15 August 2012. Maree accepted the offer.                                                                                                                                                                                                                                                                                                                                                                                                                        | WalCS                                                                                                                                                                                             |
| 15 August 2012            | Assessment of potential scar trees identified during the archaeological field survey. The assessment was conducted by an arborist (Mark Burns, Global Soil Systems), archaeologists from AECOM, and representatives of the Aboriginal community (Ann Hickey and Maree Waugh).                                                                                                                                                                                                                                                                                                            | GWCHC and WalCS                                                                                                                                                                                   |
| 5 October 2012            | Letter to all registered Aboriginal parties inviting comments on the Draft Aboriginal Archaeology and Cultural Heritage Impact Assessment (AACHIA). A return fax form was provided for the recipients to make comments on the draft report. The accompanying letter also offered registered Aboriginal parties the opportunity to share their cultural knowledge of the area. Interested parties can share cultural knowledge by requisitioning a personal meeting with Hansen Bailey or AECOM. Registered parties were informed that the due date for the comments was 6 November 2012. | AFT, Bawurra, BPCHC, Bunda, CCC, DTC, DFTVE, GWCHC, Greg Griffiths, HVAC, HVCS, IO, Kauwul, KCS, MCHG, NKACHG, RNM, TGCC, UAC, UHHC, UHWC, WGCC, WalCS, WLALC, WarCS, WC, WWCC, WIG, WCH and YCS. |
| 16 October 2012           | Fax received from Terry Matthews of BPCHC providing a response to the draft AACHIA. BPCHC agreed with the content in the report and had no further comments.                                                                                                                                                                                                                                                                                                                                                                                                                             | BPCHC                                                                                                                                                                                             |
| 16 October 2012           | Fax received from Vicky Slater of KCS providing a response to the draft AACHIA. KCS agreed with the content in the report and had no further comments.                                                                                                                                                                                                                                                                                                                                                                                                                                   | KCS                                                                                                                                                                                               |
| 24 October 2012           | Telephone call received from Deslee Matthews of DTC providing a response to the draft AACHIA. DTC agreed with the content in the report and had no further comments.                                                                                                                                                                                                                                                                                                                                                                                                                     | DTC                                                                                                                                                                                               |
| 29 October 2012           | Letter received from Noel Downs of WLALC providing a response to the draft AACHIA. WLALC provided cultural knowledge of the area and made a number of recommendations.                                                                                                                                                                                                                                                                                                                                                                                                                   | WLALC                                                                                                                                                                                             |
| 2 November 2012           | Contacted registered Aboriginal stakeholders by telephone to provide a reminder about the due date for responses to the AACHIA. Stakeholders were advised that the closing date for comments was 6 November 2012.<br><br>Scott Smith of WC and Tony Griffiths of TGCC advised that their respective groups would not be providing a response to the draft AACHIA.                                                                                                                                                                                                                        | AFT, CCC, DFTVE, GWCHC, IO, MCHG, NKACHG, RNM, TGCC, WC, WGCC, WCS, WWCC, WIG, WalCH and YCS.                                                                                                     |

| Date             | Method of Consultation                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | Aboriginal Stakeholder Groups Contacted                          |
|------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------|
|                  | The following groups were unable to be contacted: Bawurra, Bunda, HVAC, HVCS, Kauwul, UAC, UHHC, UHWC, WarCS and Greg Griffiths.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                                  |
| 2 November 2012  | Emailed the registered Aboriginal stakeholders that could not be contacted by telephone. These stakeholders were advised that the closing date for responses to the draft AACHIA was 6 November 2012.                                                                                                                                                                                                                                                                                                                                                                                                                                   | Bunda, HVAC, HVCS, Kauwul, UAC, UHHC, UHWC and WarCS.            |
| 6 November 2012  | Email from Tammy Knox of Bunda providing a response to the draft AACHIA. Tammy also provided a response on behalf of Bawurra. Bunda and Bawurra agreed with the content in the report and had no additional comments.                                                                                                                                                                                                                                                                                                                                                                                                                   | Bunda                                                            |
| 6 November 2012  | Fax from Suzie Worth of Kauwul providing a response to the draft AACHIA. Kauwul agreed with the content in the report and expressed an interest in being involved in future salvage work and scarred tree inspections.                                                                                                                                                                                                                                                                                                                                                                                                                  | Kauwul                                                           |
| 8 November 2012  | Telephone call from Rhoda Perry of UHWC asking about the closing date for responses to the AACHIA. Advised Rhoda that although the closing date had passed, all responses received before the end of the week would be considered.                                                                                                                                                                                                                                                                                                                                                                                                      | UHWC                                                             |
| 9 November 2012  | <p>Contacted registered Aboriginal stakeholders by telephone to give a final reminder of the closing date for responses to the AACHIA. Stakeholders were advised that although the closing date for responses had passed, responses would be accepted until the end of the week.</p> <p>Donna Sampson advised that CCC agreed with the content in the report and had no further comments.</p> <p>Melissa Matthews advised that UHHC would not be providing a response.</p> <p>The following stakeholders were unable to be contacted by telephone: AFT, HVAC, HVCS, IO, UAC, WGCC, WalCS, WarCS, WWCC, WCH, YCS and Greg Griffiths.</p> | DFTVE, GWCHC, MCHG, NKACHG, RNM and WIG.                         |
| 9 November 2012  | Emailed the registered Aboriginal stakeholders that could not be contacted by telephone. These stakeholders were advised that responses to the draft AACHIA would be accepted until the end of the week.                                                                                                                                                                                                                                                                                                                                                                                                                                | AFT, HVAC, HVCS, IO, UAC, WGCC, WalCS, WarCS, WWCC, WCH and YCS. |
| 9 November 2012  | Fax from Rhonda Griffiths of HVAC providing a response to the draft AACHIA. HVAC indicated that it would support the views of WLALC.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | HVAC                                                             |
| 12 November 2012 | Email from Aaron Slater indicating that WarCS agreed with the content in the draft AACHIA.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | WarCS                                                            |
| 12 November 2012 | Email from Derrick Vale of DFTVE providing a response to the draft report. DFTVE agreed with the content in the report and commented that dense grass cover limited the ability to identify surface archaeological materials.                                                                                                                                                                                                                                                                                                                                                                                                           | DFTVE                                                            |

## Hansen Bailey

19 March 2012

Aboriginal Native Title Consultants  
16A Mahogany Drive  
MUSWELLBROOK NSW 2333

Attention: Mr & Mrs John & Margaret Matthews

Dear Sir / Madam

### Continuation of Bengalla Mine Aboriginal Archaeology and Cultural Heritage Impact Assessment

#### 1. INTRODUCTION

Bengalla Mining Company Pty Ltd (BMC) placed an advertisement in both the *Muswellbrook Chronicle* on 17 February 2012 and the *Hunter Valley News* on 22 February 2012. The advertisement invited Aboriginal stakeholders to provide an Expression of Interest if they wished to be consulted in relation to the Aboriginal Archaeology and Cultural Heritage Impact Assessment (AACHIA) for the Continuation of Bengalla Mine Project (the Project).

#### 2. REGISTRATION

BMC and Hansen Bailey would like to thank your group for registering an interest in the AACHIA. This letter provides information relating to the Project and the upcoming consultation process associated with the AACHIA.

If you have yet to register in the Project AACHIA your group has been identified as a stakeholder that may have an interest and wish to be consulted. As such, your group is invited to register an interest in the AACHIA. Only groups that have registered an interest will be consulted during the AACHIA process. If you are interested in participating in the AACHIA, and would like to register, we ask that you provide a written Expression of Interest by **2 April 2012**.

Please be aware that we have a responsibility to notify the Office of Environment and Heritage (OEH) and the Local Aboriginal Land Council of your registered interest and to forward on your contact details. If you would prefer not to have your contact details provided to these authorities, please notify Hansen Bailey.

Hansen Bailey Pty Ltd (ABN 17 093 597 810)

#### BRISBANE

Phone: (07) 3226 0900 Fax: (07) 3226 0901

Address: Level 15, 215 Adelaide Street Brisbane Qld 4000 Postal: GPO Box 3285 Brisbane Qld 4001

#### HUNTER VALLEY

Phone: (02) 6575 2000 Fax: (02) 6575 2001

Address: 6/127, 129 John Street Singleton NSW 2330 Postal: PO Box 473 Singleton NSW

### 3. PROJECT INFORMATION

The Bengalla Coal Mine (Bengalla) is situated approximately 4 km west of Muswellbrook in the Upper Hunter Valley of NSW. Bengalla is currently approved to operate until 2017.

BMC is seeking a new Development Consent under Division 4.1 of Part 4 of the *Environmental Planning and Assessment Act 1979* to enable mining at Bengalla to continue for up to 24 years. The Project will involve open cut mining, extracting up to 15 million tonnes of Run of Mine coal per year. Mining will continue to progress to the west of current operations, moving further away from Muswellbrook. The Project will utilise the existing infrastructure (with some upgrades) and provide employment for 900 full time personnel. **Figure 1** shows the indicative layout of the Project.

BMC and Hansen Bailey have commenced preparing an Environmental Impact Statement (EIS) for the Project. The AACHIA will be included in the EIS.

### 4. METHODOLOGY

A copy of the proposed methodology for the AACHIA has been attached to this letter for your review and comment. If you wish to comment on the draft methodology, could you please provide comment by **Monday, 16 April 2012**. To assist in this process a return fax form has been included in this letter, should you wish to utilise it.

Prior to this date, a planning meeting will be held to discuss the methodology, provide a more detailed briefing about the Project, and to explain the logistics of the field work. All comments on the draft methodology will be considered, and where appropriate, the methodology will be amended to incorporate these recommendations.

### 5. PLANNING MEETING

A planning meeting must be conducted as part of the cultural heritage assessment, as required by Section 4.2 of the *Aboriginal cultural heritage consultation requirements for proponents 2010*.

As such, you are invited to attend the planning meeting for the Bengalla AACHIA. The details for the planning meeting include:

Date: **Wednesday, 4 April 2012**  
Time: **10:00 am**  
Venue: **Bengalla Mine, Bengalla Link Road, Muswellbrook**

The objectives of the planning meeting will be to:

- Present a detailed briefing about the Project and its potential impacts;
- Discuss the methodology and the nature and scope of the AACHIA;

- Outline the environmental impact assessment process, including the input points into the investigation and assessment activities;
- Specify critical timelines and milestones for the completion of assessment activities and delivery of reports;
- Clearly define agreed roles, functions, and responsibilities;
- Identify, raise and discuss the Aboriginal groups' cultural concerns, perspectives and assessment requirements (if any) and provide contact details should any individual discussions be required; and
- Provide a forum in which cultural knowledge of the land within the Project Boundary can be discussed.

The planning meeting will be attended by representatives from BMC, Hansen Bailey and AECOM. Upon arrival at Bengalla for the planning meeting all participants will be required to sign in as a visitor. The planning meeting will consist of a presentation followed by a light lunch.

If your group wishes to participate in the archaeological survey, a representative of your group must be present at the planning meeting.

## 6. ARCHAEOLOGICAL SURVEY

### 6.1. FIELD WORK

The AACHIA will include an archaeological survey of the Survey Area to identify Aboriginal archaeological sites. The Survey Area consists of the area within the Project Boundary excluding the area associated with the Approved Bengalla Mine. The area will be walked by representatives from registered Aboriginal groups and AECOM archaeologists. Persons will be spaced appropriately to ensure that full coverage of the Survey Area is achieved.

Prior to the field work, AECOM will conduct a search of the AHIMS database to ascertain details for registered Aboriginal sites located in the survey area. During the field work, the nature, extent and significance of these sites will be re-assessed. The survey will be conducted in accordance with OEH's *Code of Practice for Archaeological Investigation of Aboriginal Objects in NSW* (DECCW 2010).

The archaeological survey is expected to take three weeks. The study team will consist of two archaeologists from AECOM and a maximum of six representatives from the registered Aboriginal groups. If more than six representatives are nominated by the community, Hansen Bailey will organise a roster to accommodate the needs of interested groups.

Due to some challenging areas of terrain within the Survey Area, representatives must possess a reasonable level of physical fitness and must supply their own personal protective equipment (PPE).

The rate of pay for the field work will be **\$550 per person** per day, plus daily travel expenses (maximum reimbursement of \$50). Invoices are to be provided in accordance with this to Jason Martin of Hansen Bailey at the completion of the field work.

## 6.2. FIELDWORK PARTICIPANTS

All representatives taking part in the archaeological survey will be required to undertake the relevant Coal & Allied (C&A) Health and Safety Inductions. In order to complete the inductions, registered groups will be required to nominate a single representative to complete the archaeological survey.

At the beginning of each day of field work, a safety toolbox meeting will be conducted by BMC staff. The purpose of these meetings is to address the potential health and safety hazards present in the areas to be surveyed on that day.

All participants are required to supply their own PPE, which must include the following:

- Protective clothing (long sleeved shirt and long trousers);
- High visibility vest with reflective stripes;
- Steel capped boots (lace up);
- Sunglasses;
- Gloves; and
- Hard hat.

Due to the rugged environment in which the field survey will be conducted, it is essential that the following guidelines are adhered to:

- Participants must possess a reasonable level of fitness – must be able to negotiate steep terrain and must not have any pre-existing medical conditions that will inhibit their participation; and
- Participants must be able to stay overnight in one of the towns within the Muswellbrook or Singleton Shires, in order to eliminate the need to drive long distances after a day of field work.

Aboriginal groups must provide their current public liability insurance and work cover details at least 1 week before a representative will be allowed to participate in field work.

## 7. SUMMARY

A summary of the key dates discussed in this letter regarding the AACHIA are provided below:

- Register an Interest in the Project – **Monday, 2 April 2012;**
- Onsite Planning Meeting – **Wednesday, 4 April 2012;** and
- Comments due on draft methodology – **Monday, 16 April 2012.**

Thank you again for registering an interest in this Project. We look forward to working with you in the near future.

If you have any questions with regard to this letter, please do not hesitate to contact me on (02) 6575 2010 or [jmartin@hansenbailey.com.au](mailto:jmartin@hansenbailey.com.au).

Yours faithfully

**HANSEN BAILEY**



Jason Martin  
*Environmental Scientist*

22/03/2012 12:36 67462358

QUIRINDI LIBRARY

PAGE 01/04

**Return Fax: (02) 6575 2001****Attention: Jason Martin****RE: CONTINUATION OF BENGALLA MINE – ABORIGINAL ARCHAEOLOGY  
CULTURAL HERITAGE IMPACT ASSESSMENT METHODOLOGY****Aboriginal Stakeholder Group:** Breeza Plains Culture and Heritage consultants

I have read and have understood the Continuation of Bengalla Mine – Aboriginal archaeology and cultural heritage impact assessment methodology, which has been prepared by AECOM. I agree that this survey methodology is adequate and consistent with the views and wishes of the local Aboriginal community. With regard to the survey methodology, I would like to confirm that our group:

☒ Agrees with the content☐ Disagrees with the content

We would like to make the following comments on the survey methodology:

.....  
.....  
.....  
.....

Further, in regard to the field work to be undertaken in April 2012, a representative from our group:

☒ Would like to attend☐ Does not wish to attend

Our nominated representative attending the field work for the Continuation of Bengalla Mine Aboriginal cultural heritage impact assessment will be:

Tern Matthews  
Cory Matthews

Additionally, we support Hansen Bailey's application to access data from the AHIMS database.

Signed in support: T. Matthews

On behalf of (Group): Breeza plains culture and heritage consults

Date: 22.3.2012

28/03/2012 21:02 0249320720

DFTU ENTERPRISES

PAGE 01

**Return Fax: (02) 6575 2001****Attention: Jason Martin****RE: CONTINUATION OF BENGALLA MINE – ABORIGINAL ARCHAEOLOGY  
CULTURAL HERITAGE IMPACT ASSESSMENT METHODOLOGY****Aboriginal Stakeholder Group:** DFTU ENTERPRISES

I have read and have understood the Continuation of Bengalla Mine – Aboriginal archaeology and cultural heritage impact assessment methodology, which has been prepared by AECOM. I agree that this survey methodology is adequate and consistent with the views and wishes of the local Aboriginal community. With regard to the survey methodology, I would like to confirm that our group:

☒ Agrees with the content☐ Disagrees with the content

We would like to make the following comments on the survey methodology:

.....  
.....  
.....  
.....

Further, in regard to the field work to be undertaken in **April 2012**, a representative from our group:

☒ Would like to attend☐ Does not wish to attend

Our nominated representative attending the field work for the Continuation of Bengalla Mine Aboriginal cultural heritage impact assessment will be:

DERRICK VALE

Additionally, we support Hansen Bailey's application to access data from the AHIMS database.

Signed in support: Derrick Vale

On behalf of (Group): DFTU ENTERPRISES

Date: .....

04-APR-2012 16:39 From: BARKUNA

49364449

To: 65752001

P.1/1

**Return Fax: (02) 6575 2001****Attention: Jason Martin****RE: CONTINUATION OF BENGALLA MINE – ABORIGINAL ARCHAEOLOGY  
CULTURAL HERITAGE IMPACT ASSESSMENT METHODOLOGY****Aboriginal Stakeholder Group**GIDAWNA WAUNG CULTURAL  
HERITAGE CONSULTANCY

I have read and have understood the Continuation of Bengalla Mine – Aboriginal archaeology and cultural heritage impact assessment methodology, which has been prepared by AECOM. I agree that this survey methodology is adequate and consistent with the views and wishes of the local Aboriginal community. With regard to the survey methodology, I would like to confirm that our group:

☒ Agrees with the content☐ Disagrees with the content

We would like to make the following comments on the survey methodology:

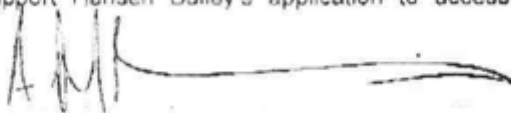
Further, in regard to the field work to be undertaken in April 2012, a representative from our group:

☒ Would like to attend☐ Does not wish to attend

Our nominated representative attending the field work for the Continuation of Bengalla Mine Aboriginal cultural heritage impact assessment will be:

Additionally, we support Hansen Bailey's application to access data from the AHIMS database

Signed in support



On behalf of (Group)

Gidawna Waung

Date

4.4.2012

**Return Fax: (02) 6575 2001**

**Attention: Jason Martin**

**RE: CONTINUATION OF BENGALLA MINE – ABORIGINAL ARCHAEOLOGY  
CULTURAL HERITAGE IMPACT ASSESSMENT METHODOLOGY**

**Aboriginal Stakeholder Group:** UNGGOOROO ABORIGINAL CORPORATION

I have read and have understood the Continuation of Bengalla Mine – Aboriginal archaeology and cultural heritage impact assessment methodology, which has been prepared by AECOM. I agree that this survey methodology is adequate and consistent with the views and wishes of the local Aboriginal community. With regard to the survey methodology, I would like to confirm that our group:

☒ Agrees with the content

☐ Disagrees with the content

We would like to make the following comments on the survey methodology:

.....  
.....  
.....  
.....

Further, in regard to the field work to be undertaken in April 2012, a representative from our group:

☒ Would like to attend

☐ Does not wish to attend

Our nominated representative attending the field work for the Continuation of Bengalla Mine Aboriginal cultural heritage impact assessment will be:

MS ANNETTE DUNSTAN  
.....  
.....

Additionally, we support Hansen Bailey's application to access data from the AHIMS database.

Signed in support: [Signature]

On behalf of (Group): UNGGOOROO ABORIGINAL CORPORATION

Date: 5/04/2012

**Andrew Wu**

---

**From:** Jason Martin  
**Sent:** Tuesday, April 10, 2012 4:48 PM  
**To:** Andrew Wu  
**Subject:** FW: Bengalla Mine

**Categories:** Orange Category

-----Original Message-----

**From:** [cacatua@resetsdsl.net.au](mailto:cacatua@resetsdsl.net.au) [<mailto:cacatua@resetsdsl.net.au>]  
**Sent:** Tuesday, 10 April 2012 4:46 PM  
**To:** Jason Martin  
**Subject:** Re: Bengalla Mine

Jason,

Cacatua has read and understood the Continuation of Bengalla Mine - Aboriginal archaeology and cultural heritage impact assessment methodology, which has been prepared by AECOM. we agree to this survey methodology is adequate and consistent with the views and wishes of the local Aboriginal community if the requests that were stated at the meeting on Thursday 5th April 2012 are added to the methodology.

Further, in regards to the field work to be undertaken in April 2012, a representative from our group would like to attend. Below are a list of workers that we may send out to represent Cacatua.

George Sampson  
Adam Sampson  
Tegan McCormack  
Shane Willinson

Depending on our roster and the day of your work will depend on the representative that we send.

I do apologise if you have already recieved this by fax. the paperwork shows it was faxed on the 20th March 2012, however the fax log print out is not showing it as being sent.

Thank you  
Donna Sampson  
Reports manager

## Appendix B

# Aboriginal Stakeholder Responses to Draft Assessment Report

15/10/2012 11:50 67462350

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PAGE 01/01

**Return Fax: (02) 6575 2001**

**Attention: Andrew Wu**

RE: CONTINUATION OF BENGALLA MINE PROJECT – DRAFT ABORIGINAL  
ARCHAEOLOGY AND CULTURAL HERITAGE IMPACT ASSESSMENT  
REPORT

Aboriginal Stakeholder Group: Breeza Plains Culture and Heritage Consults

I have read and have understood the Draft Continuation of Bengalla Mine Project – Aboriginal Archaeology and Cultural Heritage Impact Assessment Report which has been prepared by AECOM. With regard to the Report, I would like to confirm that our group:

☒ Agrees with the content☐ Disagrees with the content

We would like to make the following comments on the Report:

[illegible]

Signed in support: K. Mulla

On behalf of (Group): Breeza plants, culture and heritage consultants.  
Date: 16-10-17

Date: 16.10.12

JAKILA PTY LTD

PAGE 01/01

**Attention: Andrew Wu**

RE: CONTINUATION OF BENGALLA MINE PROJECT – DRAFT ABORIGINAL  
ARCHAEOLOGY AND CULTURAL HERITAGE IMPACT ASSESSMENT  
REPORT

Aboriginal Stakeholder Group: Kawul Cultural Services

I have read and have understood the Draft Continuation of Bengalla Mine Project – Aboriginal Archaeology and Cultural Heritage Impact Assessment Report which has been prepared by AECOM. With regard to the Report, I would like to confirm that our group:

☒ Agrees with the content☐ Disagrees with the content

We would like to make the following comments on the Report:

[illegible]

Signed in support: Vicky Adams

On behalf of (Group): K.C.S

Date: 16/10/12

**Hansen Bailey**

ENVIRONMENTAL CONSULTANTS

**RECORD OF CONVERSATION**

|           |                            |              |              |
|-----------|----------------------------|--------------|--------------|
| Name:     | Deslee Matthews            | Date/Time:   | 29/10/12 5pm |
| Company:  | Deslee Talbott Consultants | Job No:      | 984          |
| Phone No: | 0431 205 336               | Recorded by: | AW           |
| Subject:  | Response to report         |              |              |

**Details:**

Deslee called to say that she agreed with the content in the report and had no further comments.

**Action:**



Andrew Wu  
Environmental Engineer,  
Hansen Bailey  
P.O. Box 473  
Singleton NSW 2330

Re: Continuation of Bengalla Mine Project, Draft Aboriginal ACHIA.

Thank you for this opportunity to comment on the Draft Aboriginal ACHIA for the continuation of Bengalla Mine Project. Like all areas in the Hunter Valley the land, vegetation and water ways hold cultural significance to the Aboriginal community. Both oral and European written history tells us that the area was resource rich, the land being very fertile, the flats open and grassy the hills well treed.

This area is in close proximity to the song line, Mount Arthur being one of the guiding markers, and a cross roads between the routes to the coast, the Sydney basin, Western Plains, the Northern Tablelands and possibly the Lithgow region. It is also in easy walking distance to a number of known ceremonial areas. Yes the area around here is very significant, perhaps even more so by this being near the area of the last stand of the local inhabitants against the invading whites' occupation, theft, kidnappings, rapes, murders and domination. In 1826 after fighting broke out there between Wonnarua and Kamilaroi people and settlers. The local tribes retreated into the swampy scrubland around Mount Arthur to conduct guerrilla warfare against the settlers in one of Australian's many frontier wars. When the white settlers found they were unable to combat the resistance, the government of the day was contacted for aid and assistance. The settlers received arms ammunition and military support which led to the destruction of the Aboriginal resistance. Some of the elders tell of being taken by their parents and grandparents and having much of their early traditional teaching done here. There was at the time many of the traditional food sources and resources to be found within easy walking distance of the town of Muswellbrook, still very much as it was before European settlement.

We spend much of our time learning about our past, trying to reconnect with our culture. Yet as quickly as we begin to understand something about how our people lived, (the activities they partook in and the time lines showing when, "history" that was not passed on because of the savage impact of European settlement), it is lost because of development. Many of the people still living in this area cannot speak the language of their tribe, we cannot sing the songs, we cannot tell our children the



stories of all creation. This was lost because these things were considered "Evil" by the missionaries. What little is still known is closely guarded by those entrusted with it who pass it on as "need to know" on those occasions when something vital to the dreamtime is endangered. All that is left is to the majority is the few markers that remain of a once full and harmonious society and culture. These markers along with the snippets allowed to us by those entrusted, is all we have to link us to our mother the earth. Culturally, these places give us an insight to our forbearers. The level of occupation and the length of occupation give us insight to what the landscape was like and the activities the conducted. With no culture of writing, history has been passed by word of mouth. To aid the telling, many of the creation stories incorporated the land forms. This included how they came to be. No amount of written language can adequately describe or replace the value and meaning of being in touch with the living remnants of our dreamtime. On a social level these remnants and markers give hope to a displaced people. No longer is it "Shame" to be Aboriginal. We have for many years been told that our culture was "Bad, Heathen, Satanical, Backward, Uncivilised and generally unacceptable". Employment, education, and health issues can be directly linked to ones vision of ones self and community. We still suffer from stereotyping and bigotry. We need something that is ours to take pride in. All we have is tied to the land in the remnants and markers.

Loss and destruction of these areas by all forms of development means there are fewer and fewer teaching places remaining for Aboriginal people to pass on their knowledge and culture to the newer generations, as Koettig and Thorp (1990) identified, "There are no reserves or National Parks in the Central Lowlands within which some sites would be preserved, there is urgent need to address the problem of site destruction and preservation before more of the resource is eroded." At the time of writing in 1990, 77% of all known sites had already been destroyed in the Central Lowlands area.

When researching this current development proposal I was surprised the original development and mine approval that the proponent was not required to set aside any area or sites for protection for future generations nor were any mitigation measures imposed to offset social impacts created by the destruction of culture.

To that end, in line with the DGR's in section 1.2 of the report we make the following recommendations for mitigation and offsets for Cultural and Social impacts caused by destruction of Cultural Sites in the continuation of Bengalla Mine project:

1. That the "Management recommendations" in the draft report be correctly titled "Consultant's Management Recommendations" to define the difference between those measures the Consultant wishes to see implemented and those of the Aboriginal Community.
2. That the recommendations here in are included in the report under Aboriginal Community Recommendations and not as part of an annex to be ignored,
3. An Aboriginal Cultural surface and subsurface investigation be conducted by the Aboriginal community and that the Aboriginal community be consulted over the scope of the Cultural sub surface investigation,

4. The artefact analysis, of salvaged objects, include participation from the Aboriginal community, and it be expedited to be completed in such a way as to help inform the Cultural investigation.
5. That any research and salvage works be rostered among the stakeholders so all get a fair go at being involved if they choose to be.
6. That the Aboriginal Community be given employment opportunities in all areas of the mining process through Aboriginal specific traineeships and employment programs. The target numbers and time frames to be agreed mutually between mining company and stakeholders before they start the destruction of cultural sites and areas.
7. That proponent assist building capacity in Aboriginal Companies to meet the compliance needs to become contractors to the proponent in areas other than Culture and Heritage.
8. That the proponent funds the building of a Keeping Place and learning centre for the Aboriginal Community.
9. That an area of land of not less than 50 Ha be set aside in perpetuity as a Cultural offset for the Aboriginal Community. The offset land is to be in an area freely accessible to the Aboriginal community and preferably with access directly to the Hunter River or other permanent water source. This will enable Elders to conduct cultural activities in a culturally appropriate manner.
10. That the offset land is not part of any other offset (e.g. part of a biodiversity offset) without the unanimous support of the Aboriginal Stakeholders or the support of Wanaruah LALC.
11. That the proponent gives \$500,000.00 per year for the life of the mine to a Trust for Aboriginal Employment and education programs in the Upper Hunter, and that Wanaruah LALC be on the board of said trust/s with the power to veto projects they deem not worthy.
12. That the proponent gives \$200,000.00 per year for the life of the mine to a Trust for Delivery of Aboriginal Health Services in the Upper Hunter, and that Wanaruah LALC be on the board of said trust/s with the power to veto projects they deem not worthy.

Thank you for this opportunity to input

Yours Truly



29 Oct 2012

Noel Downs  
CEO

Hansen Bailey

ENVIRONMENTAL CONSULTANTS

## RECORD OF CONVERSATION

|           |                          |              |                |
|-----------|--------------------------|--------------|----------------|
| Name:     | Tony Griffiths           | Date/Time:   | 2/11/12 3:30pm |
| Company:  | T & G Consultants        | Job No:      | 989            |
| Phone No: | 0928 147 417             | Recorded by: | AW             |
| Subject:  | Response to draft report |              |                |

## Details:

Called Tony to remind him of the due date for comments on the draft report.

Tony stated that he had no comments on the report.

## Action:

Hansen Bailey

ENVIRONMENTAL CONSULTANTS

## RECORD OF CONVERSATION

|           |                                   |              |                 |
|-----------|-----------------------------------|--------------|-----------------|
| Name:     | Scott Smith                       | Date/Time:   | 2/11/12 3:15 pm |
| Company:  | Ward <del>Smith</del> Consultants | Job No:      | 984             |
| Phone No: | 0401 167 950                      | Recorded by: | AW              |
| Subject:  | Response to draft report          |              |                 |

## Details:

Called Scott to remind him of the due date for response to the draft Report.

Scott advised that he had no comments on the report.

## Action:





06.11.2012 04:29 PM Kauwul Pty Ltd T/A Wonn1 0249547751

PAGE. 1/ 1

**Return Fax: (02) 6575 2001****Attention: Andrew Wu****RE: CONTINUATION OF BENGALLA MINE PROJECT – DRAFT ABORIGINAL  
ARCHAEOLOGY AND CULTURAL HERITAGE IMPACT ASSESSMENT  
REPORT****Aboriginal Stakeholder Group:** KAUWUL T/A WONN1

I have read and have understood the Draft Continuation of Bengalla Mine Project –  
Aboriginal Archaeology and Cultural Heritage Impact Assessment Report which has been  
prepared by AECOM. With regard to the Report, I would like to confirm that our group:

☒ Agrees with the content☐ Disagrees with the content

We would like to make the following comments on the Report:

ARTHUR FLETCHER WOULD LIKE TO BE  
CONSULTED AND TO PARTICIPATE IN THE SITES'  
PROPOSED SALVAGE WORK; AND INSPECTION  
AND DECISION-MAKING PROCESS WITH REGARD  
TO THE SCARRED TREES.

Signed in support: [Signature]

On behalf of (Group): KAUWUL T/A WONN1

Date: 6/11/12.

Hansen Bailey

ENVIRONMENTAL CONSULTANTS

## RECORD OF CONVERSATION

|           |                             |              |                 |
|-----------|-----------------------------|--------------|-----------------|
| Name:     | Donna Sampson               | Date/Time:   | 9/11/12 2:40 pm |
| Company:  | Cacatua Culture Consultants | Job No:      | 984             |
| Phone No: | 0903 765 019                | Recorded by: | AW              |
| Subject:  | Response to draft report    |              |                 |

## Details:

Called Donna to remind about the closing date for comments on the draft report.

Donna indicated that Cacatua agreed with the content in the report.

## Action:

**Return Fax: (02) 6575 2001**

**Attention: Andrew Wu**

**RE: CONTINUATION OF BENGALLA MINE PROJECT – DRAFT ABORIGINAL  
ARCHAEOLOGY AND CULTURAL HERITAGE IMPACT ASSESSMENT  
REPORT**

**Aboriginal Stakeholder Group:** Hunter Valley Aboriginal Corporation

I have read and have understood the Draft Continuation of Bengalla Mine Project – Aboriginal Archaeology and Cultural Heritage Impact Assessment Report which has been prepared by AECOM. With regard to the Report, I would like to confirm that our group:

☐ Agrees with the content

☐ Disagrees with the content

We would like to make the following comments on the Report:

has indicated  
^ ^ The Board of Hunter Valley Aboriginal Corporation  
that in relation to providing comments on projects  
and reports, the Corporation supports the views  
and wishes of the local Land Council, in this  
case the Warrumbungle Local Aboriginal Land  
Council. If the Land Council raise any issues  
with the report the Corporation would prefer  
that you could consider their comments.

Signed in ~~support~~ Rhonda J. Griffiths

On behalf of (Group): Hunter Valley Aboriginal Corporation

Date: 9. 11. 12

Hansen Bailey

ENVIRONMENTAL CONSULTANTS

## RECORD OF CONVERSATION

|           |                                               |              |                |
|-----------|-----------------------------------------------|--------------|----------------|
| Name:     | Melissa Matthews                              | Date/Time:   | 9/11/12 3:10pm |
| Company:  | Upper Hunter Heritage Consultants             | Job No:      | 989            |
| Phone No: | 0439 556 641                                  | Recorded by: | AW             |
| Subject:  | Response to Aboriginal Archaeology assessment |              |                |

## Details:

Called Melisa to remind her of the closing date for comments.

Melisa advised that Upper Hunter Heritage Consultants would not be providing a response.

## Action:

**Return Fax: (02) 6575 2001**

**Attention: Andrew Wu**

**RE: CONTINUATION OF BENGALLA MINE PROJECT – DRAFT ABORIGINAL  
ARCHAEOLOGY AND CULTURAL HERITAGE IMPACT ASSESSMENT  
REPORT**

**Aboriginal Stakeholder Group:** DFTV Enterprises

I have read and have understood the Draft Continuation of Bengalla Mine Project – Aboriginal Archaeology and Cultural Heritage Impact Assessment Report which has been prepared by AECOM. With regard to the Report, I would like to confirm that our group:

☒ Agrees with the content

☐ Disagrees with the content

We would like to make the following comments on the Report:

Areas surveyed in the second week were densely covered with pasture grass which lowered surface visibility and limited the potential to identify evidence of surface archaeological materials.

Signed in support: Dominic Vale

On behalf of (Group): DFTV Enterprises

Date: 11/11/2012

**Andrew Wu**

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**From:** Aaron Slater [warragil\_c.s@hotmail.com]  
**Sent:** Monday, November 12, 2012 10:16 AM  
**To:** Andrew Wu  
**Subject:** RE: Bengalla Aboriginal Cultural Heritage Assessment

Hi Andrew,

Sorry for the delay. will send fax back to you as we agree with the Content.

New Mobile Contact Details: [REDACTED]

And can you Address any Documents to [REDACTED]

Regards

Aaron Slater -Manager

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Subject: Bengalla Aboriginal Cultural Heritage Assessment  
Date: Fri, 9 Nov 2012 16:07:45 +1100  
From: [awu@hansenbailey.com.au](mailto:awu@hansenbailey.com.au)  
To: [warragil\\_c.s@hotmail.com](mailto:warragil_c.s@hotmail.com)

Hi Aaron,

Just a final reminder about comments for the Bengalla Aboriginal Cultural Heritage Assessment. Although the closing date for responses was Tuesday (6<sup>th</sup> November), I am prepared to accept all responses received before the end of the week.

I have attached a return fax form for your convenience.

Thank you again for your assistance in this assessment.

**Andrew Wu**  
*Environmental Engineer*

**HANSEN BAILEY**  
Tel: (02) 6575 2017  
Fax: (02) 6575 2001  
Email : [awu@hansenbailey.com.au](mailto:awu@hansenbailey.com.au)

## Appendix C

# AHIMS Search Results

Your Ref Number : 60224819

Client Service ID : 52287

## AHIMS Web Services (AWS)

### Extensive search - Site list report

| <u>SiteID</u> | <u>SiteName</u>    | <u>Datum</u> | <u>Zone</u> | <u>Easting</u> | <u>Northing</u> | <u>Context</u> | <u>Site Status</u> | <u>SiteFeatures</u> | <u>SiteTypes</u> | <u>Reports</u> |
|---------------|--------------------|--------------|-------------|----------------|-----------------|----------------|--------------------|---------------------|------------------|----------------|
| 37-2-0563     | Denman Road        | AGD          | 56          | 297000         | 6429250         | Open site      | Valid              | Artefact : -        | Isolated Find    | 2576           |
|               | <u>Contact</u>     |              |             |                |                 |                |                    |                     |                  |                |
|               | <u>Recorders</u>   |              |             |                |                 |                |                    |                     |                  |                |
| 37-2-1463     | B36;               | AGD          | 56          | 294960         | 6429380         | Open site      | Valid              | Artefact : -        | Open Camp Site   |                |
|               | <u>Contact</u>     |              |             |                |                 |                |                    |                     |                  |                |
|               | <u>Recorders</u>   |              |             |                |                 |                |                    |                     |                  |                |
| 37-2-1465     | C5;                | AGD          | 56          | 296650         | 6429420         | Open site      | Valid              | Artefact : -        | Open Camp Site   | 4105           |
|               | <u>Contact</u>     |              |             |                |                 |                |                    |                     |                  |                |
|               | <u>Recorders</u>   |              |             |                |                 |                |                    |                     |                  |                |
| 37-2-2560     | Mount Pleasant 702 | AGD          | 56          | 295150         | 6429420         | Open site      | Valid              | Artefact : 2        |                  |                |
|               | <u>Contact</u>     |              |             |                |                 |                |                    |                     |                  |                |
|               | <u>Recorders</u>   |              |             |                |                 |                |                    |                     |                  |                |
| 37-2-3175     | MTP-596            | GDA          | 56          | 292864         | 6429476         | Open site      | Valid              | Artefact : -        |                  |                |
|               | <u>Contact</u>     |              |             |                |                 |                |                    |                     |                  |                |
|               | <u>Recorders</u>   |              |             |                |                 |                |                    |                     |                  |                |
| 37-2-3176     | MTP-597            | GDA          | 56          | 292805         | 6429527         | Open site      | Valid              | Artefact : -        |                  |                |
|               | <u>Contact</u>     |              |             |                |                 |                |                    |                     |                  |                |
|               | <u>Recorders</u>   |              |             |                |                 |                |                    |                     |                  |                |
| 37-2-3177     | MTP-598            | GDA          | 56          | 292786         | 6429443         | Open site      | Valid              | Artefact : -        |                  |                |
|               | <u>Contact</u>     |              |             |                |                 |                |                    |                     |                  |                |
|               | <u>Recorders</u>   |              |             |                |                 |                |                    |                     |                  |                |
| 37-2-3178     | MTP-599            | GDA          | 56          | 292759         | 6429451         | Open site      | Valid              | Artefact : -        |                  |                |
|               | <u>Contact</u>     |              |             |                |                 |                |                    |                     |                  |                |
|               | <u>Recorders</u>   |              |             |                |                 |                |                    |                     |                  |                |
| 37-2-3179     | MTP-600            | GDA          | 56          | 292696         | 6429465         | Open site      | Valid              | Artefact : -        |                  |                |
|               | <u>Contact</u>     |              |             |                |                 |                |                    |                     |                  |                |
|               | <u>Recorders</u>   |              |             |                |                 |                |                    |                     |                  |                |
| 37-2-3180     | MTP-601            | GDA          | 56          | 292651         | 6429452         | Open site      | Valid              | Artefact : -        |                  |                |
|               | <u>Contact</u>     |              |             |                |                 |                |                    |                     |                  |                |
|               | <u>Recorders</u>   |              |             |                |                 |                |                    |                     |                  |                |
| 37-2-3181     | MTP-602            | GDA          | 56          | 292585         | 6429519         | Open site      | Valid              | Artefact : -        |                  |                |
|               | <u>Contact</u>     |              |             |                |                 |                |                    |                     |                  |                |
|               | <u>Recorders</u>   |              |             |                |                 |                |                    |                     |                  |                |
| 37-2-3182     | MTP-603            | GDA          | 56          | 292508         | 6429508         | Open site      | Valid              | Artefact : -        |                  |                |
|               | <u>Contact</u>     |              |             |                |                 |                |                    |                     |                  |                |
|               | <u>Recorders</u>   |              |             |                |                 |                |                    |                     |                  |                |
| 37-2-3183     | MTP-604            | GDA          | 56          | 292438         | 6429489         | Open site      | Valid              | Artefact : -        |                  |                |
|               | <u>Contact</u>     |              |             |                |                 |                |                    |                     |                  |                |
|               | <u>Recorders</u>   |              |             |                |                 |                |                    |                     |                  |                |
| 37-2-3184     | MTP-605            | GDA          | 56          | 292130         | 6429523         | Open site      | Valid              | Artefact : -        |                  |                |
|               | <u>Contact</u>     |              |             |                |                 |                |                    |                     |                  |                |
|               | <u>Recorders</u>   |              |             |                |                 |                |                    |                     |                  |                |
| 37-2-3185     | MTP-606            | GDA          | 56          | 292141         | 6429579         | Open site      | Valid              | Artefact : -        |                  |                |
|               | <u>Contact</u>     |              |             |                |                 |                |                    |                     |                  |                |
|               | <u>Recorders</u>   |              |             |                |                 |                |                    |                     |                  |                |
| 37-2-3187     | MTP-608            | GDA          | 56          | 292065         | 6429549         | Open site      | Valid              | Artefact : -        |                  |                |
|               | <u>Contact</u>     |              |             |                |                 |                |                    |                     |                  |                |
|               | <u>Recorders</u>   |              |             |                |                 |                |                    |                     |                  |                |

Report generated by AHIMS Web Service on 28/09/2011 for Geordie Oakes for the following area at Datum :GDA, Zone : 56, Eastings : 291225 - 297873, Northings : 6429400 - 6429611 with a Buffer of 0 meters.Additional Info : Archaeological Assessment. Number of Aboriginal sites and Aboriginal objects found is 59

This information is not guaranteed to be free from error omission. Office of Environment and Heritage (NSW) and its employees disclaim liability for any act done or omission made on the information and consequences of such acts or omission.

# AHIMS Web Services (AWS)

## Extensive search - Site list report

Your Ref Number : 60224819

Client Service ID : 52287

| SiteID    | SiteName                | Datum                     | Zone               | Easting | Northing | Context   | Site Status | SiteFeatures | SiteTypes | Reports                 |
|-----------|-------------------------|---------------------------|--------------------|---------|----------|-----------|-------------|--------------|-----------|-------------------------|
| 37-2-3188 | MTP-609                 | GDA                       | 56                 | 291958  | 6429609  | Open site | Valid       | Artefact : - |           |                         |
|           | <a href="#">Contact</a> | <a href="#">Recorders</a> | Mr.Lennard Roberts |         |          |           |             |              |           | <a href="#">Permits</a> |
| 37-2-3189 | MTP-610                 | GDA                       | 56                 | 291923  | 6429589  | Open site | Valid       | Artefact : - |           |                         |
|           | <a href="#">Contact</a> | <a href="#">Recorders</a> | Mr.Lennard Roberts |         |          |           |             |              |           | <a href="#">Permits</a> |
| 37-2-3191 | MTP-612                 | GDA                       | 56                 | 291786  | 6429580  | Open site | Valid       | Artefact : - |           |                         |
|           | <a href="#">Contact</a> | <a href="#">Recorders</a> | Mr.Lennard Roberts |         |          |           |             |              |           | <a href="#">Permits</a> |
| 37-2-3194 | MTP-615                 | GDA                       | 56                 | 292020  | 6429503  | Open site | Valid       | Artefact : - |           |                         |
|           | <a href="#">Contact</a> | <a href="#">Recorders</a> | Mr.Lennard Roberts |         |          |           |             |              |           | <a href="#">Permits</a> |
| 37-2-2871 | MTP-67                  | GDA                       | 56                 | 296159  | 6429599  | Open site | Valid       | Artefact : - |           |                         |
|           | <a href="#">Contact</a> | <a href="#">Recorders</a> | Mr.Lennard Roberts |         |          |           |             |              |           | <a href="#">Permits</a> |
| 37-2-2872 | MTP-68                  | GDA                       | 56                 | 296345  | 6429580  | Open site | Valid       | Artefact : - |           |                         |
|           | <a href="#">Contact</a> | <a href="#">Recorders</a> | Mr.Lennard Roberts |         |          |           |             |              |           | <a href="#">Permits</a> |
| 37-2-2873 | MTP-69                  | GDA                       | 56                 | 296357  | 6429597  | Open site | Valid       | Artefact : - |           |                         |
|           | <a href="#">Contact</a> | <a href="#">Recorders</a> | Mr.Lennard Roberts |         |          |           |             |              |           | <a href="#">Permits</a> |
| 37-2-2874 | MTP-70                  | GDA                       | 56                 | 296441  | 6429423  | Open site | Valid       | Artefact : - |           |                         |
|           | <a href="#">Contact</a> | <a href="#">Recorders</a> | Mr.Lennard Roberts |         |          |           |             |              |           | <a href="#">Permits</a> |
| 37-2-2876 | MTP-72                  | GDA                       | 56                 | 296453  | 6429568  | Open site | Valid       | Artefact : - |           |                         |
|           | <a href="#">Contact</a> | <a href="#">Recorders</a> | Mr.Lennard Roberts |         |          |           |             |              |           | <a href="#">Permits</a> |
| 37-2-2877 | MTP-73                  | GDA                       | 56                 | 296419  | 6429493  | Open site | Valid       | Artefact : - |           |                         |
|           | <a href="#">Contact</a> | <a href="#">Recorders</a> | Mr.Lennard Roberts |         |          |           |             |              |           | <a href="#">Permits</a> |
| 37-2-2878 | MTP-74                  | GDA                       | 56                 | 296650  | 6429482  | Open site | Valid       | Artefact : - |           |                         |
|           | <a href="#">Contact</a> | <a href="#">Recorders</a> | Mr.Lennard Roberts |         |          |           |             |              |           | <a href="#">Permits</a> |
| 37-2-2883 | MTP-79                  | GDA                       | 56                 | 296812  | 6429575  | Open site | Valid       | Artefact : - |           |                         |
|           | <a href="#">Contact</a> | <a href="#">Recorders</a> | Mr.Lennard Roberts |         |          |           |             |              |           | <a href="#">Permits</a> |
| 37-2-2884 | MTP-80                  | GDA                       | 56                 | 296961  | 6429504  | Open site | Valid       | Artefact : - |           |                         |
|           | <a href="#">Contact</a> | <a href="#">Recorders</a> | Mr.Lennard Roberts |         |          |           |             |              |           | <a href="#">Permits</a> |
| 37-2-2886 | MTP-82                  | GDA                       | 56                 | 297087  | 6429413  | Open site | Valid       | Artefact : - |           |                         |
|           | <a href="#">Contact</a> | <a href="#">Recorders</a> | Mr.Lennard Roberts |         |          |           |             |              |           | <a href="#">Permits</a> |
| 37-2-2893 | MTP-89                  | GDA                       | 56                 | 293460  | 6429476  | Open site | Valid       | Artefact : - |           |                         |
|           | <a href="#">Contact</a> | <a href="#">Recorders</a> | Mr.Lennard Roberts |         |          |           |             |              |           | <a href="#">Permits</a> |
| 37-2-2894 | MTP-90                  | GDA                       | 56                 | 293859  | 6429582  | Open site | Valid       | Artefact : - |           |                         |
|           | <a href="#">Contact</a> | <a href="#">Recorders</a> | Mr.Lennard Roberts |         |          |           |             |              |           | <a href="#">Permits</a> |

Report generated by AHIMS Web Service on 28/09/2011 for Geordie Oakes for the following area at Datum :GDA, Zone : 56, Eastings : 291225 - 297873, Northings : 6429400 - 6429611 with a Buffer of 0 meters.Additional Info : Archaeological Assessment. Number of Aboriginal sites and Aboriginal objects found is 59

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Your Ref Number : 60224819

Client Service ID : 52287

## AHIMS Web Services (AWS)

### Extensive search - Site list report

| <u>SiteID</u> | <u>SiteName</u> | <u>Datum</u> | <u>Zone</u> | <u>Easting</u> | <u>Northing</u> | <u>Context</u> | <u>Site Status</u> | <u>SiteFeatures</u> | <u>SiteTypes</u> | <u>Reports</u> |
|---------------|-----------------|--------------|-------------|----------------|-----------------|----------------|--------------------|---------------------|------------------|----------------|
| 37-2-2896     | MTP-92          | GDA          | 56          | 294373         | 6429566         | Open site      | Valid              | Artefact : -        |                  |                |
|               | <u>Contact</u>  |              |             |                |                 |                |                    |                     |                  | <u>Permits</u> |
| 37-2-2897     | MTP-93          | GDA          | 56          | 294290         | 6429546         | Open site      | Valid              | Artefact : -        |                  |                |
|               | <u>Contact</u>  |              |             |                |                 |                |                    |                     |                  | <u>Permits</u> |
| 37-2-3281     | MTP-702         | GDA          | 56          | 295150         | 6429421         | Open site      | Valid              | Artefact : -        |                  |                |
|               | <u>Contact</u>  |              |             |                |                 |                |                    |                     |                  | <u>Permits</u> |
| 37-2-3283     | MTP-704         | GDA          | 56          | 295157         | 6429564         | Open site      | Valid              | Artefact : -        |                  |                |
|               | <u>Contact</u>  |              |             |                |                 |                |                    |                     |                  | <u>Permits</u> |
| 37-2-3482     | MTP-904         | GDA          | 56          | 297222         | 6429424         | Open site      | Valid              | Artefact : -        |                  |                |
|               | <u>Contact</u>  |              |             |                |                 |                |                    |                     |                  | <u>Permits</u> |
| 37-2-2813     | MTP-6           | GDA          | 56          | 296612         | 6429498         | Open site      | Valid              | Artefact : -        |                  |                |
|               | <u>Contact</u>  |              |             |                |                 |                |                    |                     |                  | <u>Permits</u> |
| 37-2-2814     | MTP-7           | GDA          | 56          | 296468         | 6429479         | Open site      | Valid              | Artefact : -        |                  |                |
|               | <u>Contact</u>  |              |             |                |                 |                |                    |                     |                  | <u>Permits</u> |
| 37-2-2815     | MTP-8           | GDA          | 56          | 296449         | 6429474         | Open site      | Valid              | Artefact : -        |                  |                |
|               | <u>Contact</u>  |              |             |                |                 |                |                    |                     |                  | <u>Permits</u> |
| 37-2-2816     | MTP-9           | GDA          | 56          | 296386         | 6429470         | Open site      | Valid              | Artefact : -        |                  |                |
|               | <u>Contact</u>  |              |             |                |                 |                |                    |                     |                  | <u>Permits</u> |
| 37-2-2857     | MTP-53          | GDA          | 56          | 297780         | 6429607         | Open site      | Valid              | Artefact : -        |                  |                |
|               | <u>Contact</u>  |              |             |                |                 |                |                    |                     |                  | <u>Permits</u> |
| 37-2-3195     | MTP-616         | GDA          | 56          | 292053         | 6429470         | Open site      | Valid              | Artefact : -        |                  |                |
|               | <u>Contact</u>  |              |             |                |                 |                |                    |                     |                  | <u>Permits</u> |
| 37-2-3196     | MTP-617         | GDA          | 56          | 292175         | 6429473         | Open site      | Valid              | Artefact : -        |                  |                |
|               | <u>Contact</u>  |              |             |                |                 |                |                    |                     |                  | <u>Permits</u> |
| 37-2-3197     | MTP-618         | GDA          | 56          | 292369         | 6429477         | Open site      | Valid              | Artefact : -        |                  |                |
|               | <u>Contact</u>  |              |             |                |                 |                |                    |                     |                  | <u>Permits</u> |
| 37-2-3199     | MTP-620         | GDA          | 56          | 292433         | 6429450         | Open site      | Valid              | Artefact : -        |                  |                |
|               | <u>Contact</u>  |              |             |                |                 |                |                    |                     |                  | <u>Permits</u> |
| 37-2-3200     | MTP-621         | GDA          | 56          | 292519         | 6429434         | Open site      | Valid              | Artefact : -        |                  |                |
|               | <u>Contact</u>  |              |             |                |                 |                |                    |                     |                  | <u>Permits</u> |
| 37-2-3201     | MTP-622         | GDA          | 56          | 292571         | 6429421         | Open site      | Valid              | Artefact : -        |                  |                |
|               | <u>Contact</u>  |              |             |                |                 |                |                    |                     |                  | <u>Permits</u> |

Report generated by AHIMS Web Service on 28/09/2011 for Geordie Oaks for the following area at Datum :GDA, Zone : 56, Eastings : 291225 - 297873, Northings : 6429400 - 6429611 with a Buffer of 0 meters.Additional Info : Archaeological Assessment. Number of Aboriginal sites and Aboriginal objects found is 59

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## AHIMS Web Services (AWS)

### Extensive search - Site list report

Your Ref Number : 60224819

Client Service ID : 52287

| <u>SiteID</u> | <u>SiteName</u> | <u>Datum</u>     | <u>Zone</u>        | <u>Easting</u> | <u>Northing</u> | <u>Context</u> | <u>Site Status</u> | <u>SiteFeatures</u> | <u>SiteTypes</u> | <u>Reports</u> |
|---------------|-----------------|------------------|--------------------|----------------|-----------------|----------------|--------------------|---------------------|------------------|----------------|
| 37-2-3202     | MTP-623         | GDA              | 56                 | 292727         | 6429410         | Open site      | Valid              | Artefact : -        |                  |                |
|               | <u>Contact</u>  | <u>Recorders</u> | Mr.Lennard Roberts |                |                 |                |                    |                     |                  | <u>Permits</u> |
| 37-2-3204     | MTP-625         | GDA              | 56                 | 292909         | 6429552         | Open site      | Valid              | Artefact : -        |                  |                |
|               | <u>Contact</u>  | <u>Recorders</u> | Mr.Lennard Roberts |                |                 |                |                    |                     |                  | <u>Permits</u> |
| 37-2-3205     | MTP-626         | GDA              | 56                 | 292940         | 6429553         | Open site      | Valid              | Artefact : -        |                  |                |
|               | <u>Contact</u>  | <u>Recorders</u> | Mr.Lennard Roberts |                |                 |                |                    |                     |                  | <u>Permits</u> |
| 37-2-3206     | MTP-627         | GDA              | 56                 | 292962         | 6429511         | Open site      | Valid              | Artefact : -        |                  |                |
|               | <u>Contact</u>  | <u>Recorders</u> | Mr.Lennard Roberts |                |                 |                |                    |                     |                  | <u>Permits</u> |
| 37-2-3207     | MTP-628         | GDA              | 56                 | 292983         | 6429552         | Open site      | Valid              | Artefact : -        |                  |                |
|               | <u>Contact</u>  | <u>Recorders</u> | Mr.Lennard Roberts |                |                 |                |                    |                     |                  | <u>Permits</u> |
| 37-2-3208     | MTP-629         | GDA              | 56                 | 293229         | 6429483         | Open site      | Valid              | Artefact : -        |                  |                |
|               | <u>Contact</u>  | <u>Recorders</u> | Mr.Lennard Roberts |                |                 |                |                    |                     |                  | <u>Permits</u> |
| 37-2-3209     | MTP-630         | GDA              | 56                 | 293294         | 6429611         | Open site      | Valid              | Artefact : -        |                  |                |
|               | <u>Contact</u>  | <u>Recorders</u> | Mr.Lennard Roberts |                |                 |                |                    |                     |                  | <u>Permits</u> |
| 37-2-3226     | MTP-647         | GDA              | 56                 | 292565         | 6429604         | Open site      | Valid              | Artefact : -        |                  |                |
|               | <u>Contact</u>  | <u>Recorders</u> | Mr.Lennard Roberts |                |                 |                |                    |                     |                  | <u>Permits</u> |
| 37-2-3186     | MTP-607         | GDA              | 56                 | 292095         | 6429548         | Open site      | Valid              | Artefact : -        |                  |                |
|               | <u>Contact</u>  | <u>Recorders</u> | Mr.Lennard Roberts |                |                 |                |                    |                     |                  | <u>Permits</u> |
| 37-2-3193     | MTP-614         | GDA              | 56                 | 291683         | 6429592         | Open site      | Valid              | Artefact : -        |                  |                |
|               | <u>Contact</u>  | <u>Recorders</u> | Mr.Lennard Roberts |                |                 |                |                    |                     |                  | <u>Permits</u> |
| 37-2-3282     | MTP-703         | GDA              | 56                 | 295102         | 6429565         | Open site      | Valid              | Artefact : -        |                  |                |
|               | <u>Contact</u>  | <u>Recorders</u> | Mr.Lennard Roberts |                |                 |                |                    |                     |                  | <u>Permits</u> |

Report generated by AHIMS Web Service on 28/09/2011 for Geordie Oakes for the following area at Datum :GDA, Zone : 56, Eastings : 291225 - 297873, Northings : 6429400 - 6429611 with a Buffer of 0 meters.Additional Info : Archaeological Assessment. Number of Aboriginal sites and Aboriginal objects found is 59

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Your Ref Number : 60224819

Client Service ID : 52286

## AHIMS Web Services (AWS)

### Extensive search - Site list report

| <u>SiteID</u> | <u>SiteName</u>       | <u>Datum</u>     | <u>Zone</u>                  | <u>Easting</u> | <u>Northing</u> | <u>Context</u> | <u>Site Status</u> | <u>SiteFeatures</u> | <u>SiteTypes</u> | <u>Reports</u>     |
|---------------|-----------------------|------------------|------------------------------|----------------|-----------------|----------------|--------------------|---------------------|------------------|--------------------|
| 37-2-0603     | B34;                  | AGD              | 56                           | 294850         | 6428550         | Open site      | Valid              | Artefact : -        | Open Camp Site   | 2687,100681,100765 |
|               | <u>Contact</u>        | <u>Recorders</u> | Ms.Laila Haglund             |                |                 |                |                    | <u>Permits</u>      | 851              |                    |
| 37-2-1464     | C1;                   | AGD              | 56                           | 297040         | 6429190         | Open site      | Valid              | Artefact : -        | Open Camp Site   |                    |
|               | <u>Contact</u>        | <u>Recorders</u> | P Saunders,R Stocks          |                |                 |                |                    | <u>Permits</u>      |                  |                    |
| 37-2-1466     | C20;                  | AGD              | 56                           | 296480         | 6428930         | Open site      | Valid              | Artefact : -        | Open Camp Site   | 4105               |
|               | <u>Contact</u>        | <u>Recorders</u> | Barry French,Ms.Jill Ruig    |                |                 |                |                    | <u>Permits</u>      |                  |                    |
| 37-2-1467     | A1-A4;                | AGD              | 56                           | 293500         | 6429110         | Open site      | Valid              | Artefact : -        | Open Camp Site   | 4105               |
|               | <u>Contact</u>        | <u>Recorders</u> | Elizabeth Rich,Barry French  |                |                 |                |                    | <u>Permits</u>      |                  |                    |
| 37-2-1468     | A7-A8;                | AGD              | 56                           | 293850         | 6428970         | Open site      | Valid              | Artefact : -        | Open Camp Site   | 4105               |
|               | <u>Contact</u>        | <u>Recorders</u> | Elizabeth Rich,Barry French  |                |                 |                |                    | <u>Permits</u>      |                  |                    |
| 37-2-1469     | A33-A34;              | AGD              | 56                           | 294040         | 6429070         | Open site      | Valid              | Artefact : -        | Open Camp Site   | 4105               |
|               | <u>Contact</u>        | <u>Recorders</u> | Elizabeth Rich,Barry French  |                |                 |                |                    | <u>Permits</u>      |                  |                    |
| 37-2-2564     | Mount Pleasant 706    | AGD              | 56                           | 295571         | 6429155         | Open site      | Valid              | Artefact : 1        |                  |                    |
|               | <u>Contact</u> Searle | <u>Recorders</u> | Mr.Leonard (Lennie) Anderson |                |                 |                |                    | <u>Permits</u>      |                  |                    |
| 37-2-2565     | Mount Pleasant 707    | AGD              | 56                           | 295549         | 6429171         | Open site      | Valid              | Artefact : 1        |                  |                    |
|               | <u>Contact</u> Searle | <u>Recorders</u> | Mr.Leonard (Lennie) Anderson |                |                 |                |                    | <u>Permits</u>      |                  |                    |
| 37-2-3173     | MTP-594               | GDA              | 56                           | 292951         | 6429358         | Open site      | Valid              | Artefact : -        |                  |                    |
|               | <u>Contact</u>        | <u>Recorders</u> | Mr.Lennard Roberts           |                |                 |                |                    | <u>Permits</u>      |                  |                    |
| 37-2-3174     | MTP-595               | GDA              | 56                           | 293298         | 6429308         | Open site      | Valid              | Artefact : -        |                  |                    |
|               | <u>Contact</u>        | <u>Recorders</u> | Mr.Lennard Roberts           |                |                 |                |                    | <u>Permits</u>      |                  |                    |
| 37-2-2870     | MTP-66                | GDA              | 56                           | 296169         | 6429242         | Open site      | Valid              | Artefact : -        |                  |                    |
|               | <u>Contact</u>        | <u>Recorders</u> | Mr.Lennard Roberts           |                |                 |                |                    | <u>Permits</u>      |                  |                    |
| 37-2-2875     | MTP-71                | GDA              | 56                           | 296511         | 6429398         | Open site      | Valid              | Artefact : -        |                  |                    |
|               | <u>Contact</u>        | <u>Recorders</u> | Mr.Lennard Roberts           |                |                 |                |                    | <u>Permits</u>      |                  |                    |
| 37-2-2889     | MTP-85                | GDA              | 56                           | 294214         | 6429182         | Open site      | Valid              | Artefact : -        |                  |                    |
|               | <u>Contact</u>        | <u>Recorders</u> | Mr.Lennard Roberts           |                |                 |                |                    | <u>Permits</u>      |                  |                    |
| 37-2-2890     | MTP-86                | GDA              | 56                           | 293713         | 6429340         | Open site      | Valid              | Artefact : -        |                  |                    |
|               | <u>Contact</u>        | <u>Recorders</u> | Mr.Lennard Roberts           |                |                 |                |                    | <u>Permits</u>      |                  |                    |
| 37-2-2891     | MTP-87                | GDA              | 56                           | 293983         | 6429150         | Open site      | Valid              | Artefact : -        |                  |                    |
|               | <u>Contact</u>        | <u>Recorders</u> | Mr.Lennard Roberts           |                |                 |                |                    | <u>Permits</u>      |                  |                    |
| 37-2-2892     | MTP-88                | GDA              | 56                           | 294420         | 6429359         | Open site      | Valid              | Artefact : -        |                  |                    |
|               | <u>Contact</u>        | <u>Recorders</u> | Mr.Lennard Roberts           |                |                 |                |                    | <u>Permits</u>      |                  |                    |

Report generated by AHIMS Web Service on 28/09/2011 for Geordie Oakes for the following area at Datum :GDA, Zone : 56, Eastings : 291225 - 297873, Northings : 6428732 - 6429400 with a Buffer of 0 meters.Additional Info : Archaeological Assessment. Number of Aboriginal sites and Aboriginal objects found is 97

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# AHIMS Web Services (AWS)

## Extensive search - Site list report

Your Ref Number : 60224819

Client Service ID : 52286

| SiteID    | SiteName                | Datum                     | Zone               | Easting | Northing | Context   | Site Status | SiteFeatures | SiteTypes | Reports                 |
|-----------|-------------------------|---------------------------|--------------------|---------|----------|-----------|-------------|--------------|-----------|-------------------------|
| 37-2-3034 | MTP-453                 | GDA                       | 56                 | 297686  | 6429275  | Open site | Valid       | Artefact : - |           |                         |
|           | <a href="#">Contact</a> | <a href="#">Recorders</a> | Mr.Lennard Roberts |         |          |           |             |              |           |                         |
| 37-2-3037 | MTP-456                 | GDA                       | 56                 | 297744  | 6429040  | Open site | Valid       | Artefact : - |           | <a href="#">Permits</a> |
|           | <a href="#">Contact</a> | <a href="#">Recorders</a> | Mr.Lennard Roberts |         |          |           |             |              |           |                         |
| 37-2-3038 | MTP-458                 | GDA                       | 56                 | 297797  | 6428926  | Open site | Valid       | Artefact : - |           |                         |
|           | <a href="#">Contact</a> | <a href="#">Recorders</a> | Mr.Lennard Roberts |         |          |           |             |              |           |                         |
| 37-2-3039 | MTP-459                 | GDA                       | 56                 | 297810  | 6428940  | Open site | Valid       | Artefact : - |           | <a href="#">Permits</a> |
|           | <a href="#">Contact</a> | <a href="#">Recorders</a> | Mr.Lennard Roberts |         |          |           |             |              |           |                         |
| 37-2-3040 | MTP-460                 | GDA                       | 56                 | 297725  | 6428964  | Open site | Valid       | Artefact : - |           | <a href="#">Permits</a> |
|           | <a href="#">Contact</a> | <a href="#">Recorders</a> | Mr.Lennard Roberts |         |          |           |             |              |           |                         |
| 37-2-3041 | MTP-461                 | GDA                       | 56                 | 294096  | 6429036  | Open site | Valid       | Artefact : - |           | <a href="#">Permits</a> |
|           | <a href="#">Contact</a> | <a href="#">Recorders</a> | Mr.Lennard Roberts |         |          |           |             |              |           |                         |
| 37-2-3043 | MTP-463                 | GDA                       | 56                 | 293969  | 6429005  | Open site | Valid       | Artefact : - |           | <a href="#">Permits</a> |
|           | <a href="#">Contact</a> | <a href="#">Recorders</a> | Mr.Lennard Roberts |         |          |           |             |              |           |                         |
| 37-2-3044 | MTP-464                 | GDA                       | 56                 | 293949  | 6429016  | Open site | Valid       | Artefact : - |           | <a href="#">Permits</a> |
|           | <a href="#">Contact</a> | <a href="#">Recorders</a> | Mr.Lennard Roberts |         |          |           |             |              |           |                         |
| 37-2-3045 | MTP-465                 | GDA                       | 56                 | 293726  | 6429086  | Open site | Valid       | Artefact : - |           | <a href="#">Permits</a> |
|           | <a href="#">Contact</a> | <a href="#">Recorders</a> | Mr.Lennard Roberts |         |          |           |             |              |           |                         |
| 37-2-3046 | MTP-466                 | GDA                       | 56                 | 293646  | 6429056  | Open site | Valid       | Artefact : - |           | <a href="#">Permits</a> |
|           | <a href="#">Contact</a> | <a href="#">Recorders</a> | Mr.Lennard Roberts |         |          |           |             |              |           |                         |
| 37-2-3047 | MTP-467                 | GDA                       | 56                 | 293659  | 6428976  | Open site | Valid       | Artefact : - |           | <a href="#">Permits</a> |
|           | <a href="#">Contact</a> | <a href="#">Recorders</a> | Mr.Lennard Roberts |         |          |           |             |              |           |                         |
| 37-2-3048 | MTP-468                 | GDA                       | 56                 | 293911  | 6428929  | Open site | Valid       | Artefact : - |           | <a href="#">Permits</a> |
|           | <a href="#">Contact</a> | <a href="#">Recorders</a> | Mr.Lennard Roberts |         |          |           |             |              |           |                         |
| 37-2-3050 | MTP-470                 | GDA                       | 56                 | 294110  | 6428934  | Open site | Valid       | Artefact : - |           | <a href="#">Permits</a> |
|           | <a href="#">Contact</a> | <a href="#">Recorders</a> | Mr.Lennard Roberts |         |          |           |             |              |           |                         |
| 37-2-3466 | MTP-888                 | GDA                       | 56                 | 296754  | 6429043  | Open site | Valid       | Artefact : - |           | <a href="#">Permits</a> |
|           | <a href="#">Contact</a> | <a href="#">Recorders</a> | Mr.Lennard Roberts |         |          |           |             |              |           |                         |
| 37-2-3467 | MTP-889                 | GDA                       | 56                 | 296710  | 6429072  | Open site | Valid       | Artefact : - |           | <a href="#">Permits</a> |
|           | <a href="#">Contact</a> | <a href="#">Recorders</a> | Mr.Lennard Roberts |         |          |           |             |              |           |                         |
| 37-2-3468 | MTP-890                 | GDA                       | 56                 | 296691  | 6429109  | Open site | Valid       | Artefact : - |           | <a href="#">Permits</a> |
|           | <a href="#">Contact</a> | <a href="#">Recorders</a> | Mr.Lennard Roberts |         |          |           |             |              |           |                         |

Report generated by AHIMS Web Service on 28/09/2011 for Geordie Oakes for the following area at Datum :GDA, Zone : 56, Eastings : 291225 - 297873, Northings : 6428732 - 6429400 with a Buffer of 0 meters.Additional Info : Archaeological Assessment. Number of Aboriginal sites and Aboriginal objects found is 97

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Your Ref Number : 60224819

Client Service ID : 52286

## AHIMS Web Services (AWS)

### Extensive search - Site list report

| <u>SiteID</u> | <u>SiteName</u> | <u>Datum</u> | <u>Zone</u> | <u>Easting</u> | <u>Northing</u> | <u>Context</u> | <u>Site Status</u> | <u>SiteFeatures</u>                         | <u>SiteTypes</u> | <u>Reports</u> |
|---------------|-----------------|--------------|-------------|----------------|-----------------|----------------|--------------------|---------------------------------------------|------------------|----------------|
| 37-2-3469     | MTP-891         | GDA          | 56          | 296663         | 6429106         | Open site      | Valid              | Artefact : -                                |                  |                |
|               | <u>Contact</u>  |              |             |                |                 |                |                    |                                             |                  | <u>Permits</u> |
| 37-2-3470     | MTP-892         | GDA          | 56          | 296670         | 6429067         | Open site      | Valid              | Artefact : -                                |                  |                |
|               | <u>Contact</u>  |              |             |                |                 |                |                    |                                             |                  | <u>Permits</u> |
| 37-2-3471     | MTP-893         | GDA          | 56          | 296637         | 6429073         | Open site      | Valid              | Artefact : -                                |                  |                |
|               | <u>Contact</u>  |              |             |                |                 |                |                    |                                             |                  | <u>Permits</u> |
| 37-2-3472     | MTP-894         | GDA          | 56          | 296620         | 6429121         | Open site      | Valid              | Artefact : -                                |                  |                |
|               | <u>Contact</u>  |              |             |                |                 |                |                    |                                             |                  | <u>Permits</u> |
| 37-2-3473     | MTP-895         | GDA          | 56          | 296596         | 6429115         | Open site      | Valid              | Artefact : -                                |                  |                |
|               | <u>Contact</u>  |              |             |                |                 |                |                    |                                             |                  | <u>Permits</u> |
| 37-2-3474     | MTP-896         | GDA          | 56          | 296548         | 6429089         | Open site      | Valid              | Artefact : -                                |                  |                |
|               | <u>Contact</u>  |              |             |                |                 |                |                    |                                             |                  | <u>Permits</u> |
| 37-2-3284     | MTP-705         | GDA          | 56          | 295733         | 6429159         | Open site      | Valid              | Artefact : -                                |                  |                |
|               | <u>Contact</u>  |              |             |                |                 |                |                    |                                             |                  | <u>Permits</u> |
| 37-2-3285     | MTP-706         | GDA          | 56          | 295572         | 6429156         | Open site      | Valid              | Artefact : -                                |                  |                |
|               | <u>Contact</u>  |              |             |                |                 |                |                    |                                             |                  | <u>Permits</u> |
| 37-2-3286     | MTP-707         | GDA          | 56          | 295549         | 6429172         | Open site      | Valid              | Artefact : -                                |                  |                |
|               | <u>Contact</u>  |              |             |                |                 |                |                    |                                             |                  | <u>Permits</u> |
| 37-2-3475     | MTP-897         | GDA          | 56          | 296491         | 6429086         | Open site      | Valid              | Artefact : -                                |                  |                |
|               | <u>Contact</u>  |              |             |                |                 |                |                    |                                             |                  | <u>Permits</u> |
| 37-2-3476     | MTP-898         | GDA          | 56          | 296469         | 6428986         | Open site      | Valid              | Artefact : -                                |                  |                |
|               | <u>Contact</u>  |              |             |                |                 |                |                    |                                             |                  | <u>Permits</u> |
| 37-2-3477     | MTP-899         | GDA          | 56          | 296552         | 6428945         | Open site      | Valid              | Artefact : -                                |                  |                |
|               | <u>Contact</u>  |              |             |                |                 |                |                    |                                             |                  | <u>Permits</u> |
| 37-2-3478     | MTP-900         | GDA          | 56          | 296615         | 6428982         | Open site      | Valid              | Artefact : -                                |                  |                |
|               | <u>Contact</u>  |              |             |                |                 |                |                    |                                             |                  | <u>Permits</u> |
| 37-2-3479     | MTP-901         | GDA          | 56          | 296764         | 6428926         | Open site      | Valid              | Modified Tree<br>(Carved or Scarred) :<br>- |                  |                |
|               | <u>Contact</u>  |              |             |                |                 |                |                    |                                             |                  | <u>Permits</u> |
| 37-2-3480     | MTP-902         | GDA          | 56          | 296709         | 6429128         | Open site      | Valid              | Artefact : -                                |                  |                |
|               | <u>Contact</u>  |              |             |                |                 |                |                    |                                             |                  | <u>Permits</u> |
| 37-2-3481     | MTP-903         | GDA          | 56          | 296890         | 6429268         | Open site      | Valid              | Artefact : -                                |                  |                |

Report generated by AHIMS Web Service on 28/09/2011 for Geordie Oakes for the following area at Datum :GDA, Zone : 56, Eastings : 291225 - 297873, Northings : 6428732 - 6429400 with a Buffer of 0 meters.Additional Info : Archaeological Assessment. Number of Aboriginal sites and Aboriginal objects found is 97

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# AHIMS Web Services (AWS)

## Extensive search - Site list report

Your Ref Number : 60224819

Client Service ID : 52286

| SiteID    | SiteName                | Datum                     | Zone               | Easting | Northing | Context   | Site Status | SiteFeatures            | SiteTypes | Reports |
|-----------|-------------------------|---------------------------|--------------------|---------|----------|-----------|-------------|-------------------------|-----------|---------|
|           | <a href="#">Contact</a> | <a href="#">Recorders</a> | Mr.Lennard Roberts |         |          |           |             | <a href="#">Permits</a> |           |         |
| 37-2-3483 | MTP-905                 | GDA                       | 56                 | 297311  | 6429363  | Open site | Valid       | Artefact : -            |           |         |
|           | <a href="#">Contact</a> | <a href="#">Recorders</a> | Mr.Lennard Roberts |         |          |           |             | <a href="#">Permits</a> |           |         |
| 37-2-3484 | MTP-906                 | GDA                       | 56                 | 297447  | 6429247  | Open site | Valid       | Artefact : -            |           |         |
|           | <a href="#">Contact</a> | <a href="#">Recorders</a> | Mr.Lennard Roberts |         |          |           |             | <a href="#">Permits</a> |           |         |
| 37-2-3485 | MTP-907                 | GDA                       | 56                 | 297573  | 6429096  | Open site | Valid       | Artefact : -            |           |         |
|           | <a href="#">Contact</a> | <a href="#">Recorders</a> | Mr.Lennard Roberts |         |          |           |             | <a href="#">Permits</a> |           |         |
| 37-2-3486 | MTP-908                 | GDA                       | 56                 | 297471  | 6429115  | Open site | Valid       | Artefact : -            |           |         |
|           | <a href="#">Contact</a> | <a href="#">Recorders</a> | Mr.Lennard Roberts |         |          |           |             | <a href="#">Permits</a> |           |         |
| 37-2-3487 | MTP-909                 | GDA                       | 56                 | 297430  | 6429014  | Open site | Valid       | Artefact : -            |           |         |
|           | <a href="#">Contact</a> | <a href="#">Recorders</a> | Mr.Lennard Roberts |         |          |           |             | <a href="#">Permits</a> |           |         |
| 37-2-3488 | MTP-910                 | GDA                       | 56                 | 297432  | 6429028  | Open site | Valid       | Artefact : -            |           |         |
|           | <a href="#">Contact</a> | <a href="#">Recorders</a> | Mr.Lennard Roberts |         |          |           |             | <a href="#">Permits</a> |           |         |
| 37-2-3489 | MTP-911                 | GDA                       | 56                 | 297488  | 6429030  | Open site | Valid       | Artefact : -            |           |         |
|           | <a href="#">Contact</a> | <a href="#">Recorders</a> | Mr.Lennard Roberts |         |          |           |             | <a href="#">Permits</a> |           |         |
| 37-2-3490 | MTP-912                 | GDA                       | 56                 | 297351  | 6428946  | Open site | Valid       | Artefact : -            |           |         |
|           | <a href="#">Contact</a> | <a href="#">Recorders</a> | Mr.Lennard Roberts |         |          |           |             | <a href="#">Permits</a> |           |         |
| 37-2-3287 | MTP-708                 | GDA                       | 56                 | 295126  | 6429265  | Open site | Valid       | Artefact : -            |           |         |
|           | <a href="#">Contact</a> | <a href="#">Recorders</a> | Mr.Lennard Roberts |         |          |           |             | <a href="#">Permits</a> |           |         |
| 37-2-3288 | MTP-709                 | GDA                       | 56                 | 295032  | 6429145  | Open site | Valid       | Artefact : -            |           |         |
|           | <a href="#">Contact</a> | <a href="#">Recorders</a> | Mr.Lennard Roberts |         |          |           |             | <a href="#">Permits</a> |           |         |
| 37-2-3051 | MTP-471                 | GDA                       | 56                 | 294131  | 6428967  | Open site | Valid       | Artefact : -            |           |         |
|           | <a href="#">Contact</a> | <a href="#">Recorders</a> | Mr.Lennard Roberts |         |          |           |             | <a href="#">Permits</a> |           |         |
| 37-2-3052 | MTP-472                 | GDA                       | 56                 | 294200  | 6428956  | Open site | Valid       | Artefact : -            |           |         |
|           | <a href="#">Contact</a> | <a href="#">Recorders</a> | Mr.Lennard Roberts |         |          |           |             | <a href="#">Permits</a> |           |         |
| 37-2-3053 | MTP-473                 | GDA                       | 56                 | 294247  | 6428918  | Open site | Valid       | Artefact : -            |           |         |
|           | <a href="#">Contact</a> | <a href="#">Recorders</a> | Mr.Lennard Roberts |         |          |           |             | <a href="#">Permits</a> |           |         |
| 37-2-3054 | MTP-474                 | GDA                       | 56                 | 294274  | 6428935  | Open site | Valid       | Artefact : -            |           |         |
|           | <a href="#">Contact</a> | <a href="#">Recorders</a> | Mr.Lennard Roberts |         |          |           |             | <a href="#">Permits</a> |           |         |
| 37-2-3055 | MTP-475                 | GDA                       | 56                 | 294324  | 6428880  | Open site | Valid       | Artefact : -            |           |         |
|           | <a href="#">Contact</a> | <a href="#">Recorders</a> | Mr.Lennard Roberts |         |          |           |             | <a href="#">Permits</a> |           |         |
| 37-2-3056 | MTP-476                 | GDA                       | 56                 | 294221  | 6429003  | Open site | Valid       | Artefact : -            |           |         |
|           | <a href="#">Contact</a> | <a href="#">Recorders</a> | Mr.Lennard Roberts |         |          |           |             | <a href="#">Permits</a> |           |         |

Report generated by AHIMS Web Service on 28/09/2011 for Geordie Oakes for the following area at Datum :GDA, Zone : 56, Eastings : 291225 - 297873, Northings : 6428732 - 6429400 with a Buffer of 0 meters.Additional Info : Archaeological Assessment. Number of Aboriginal sites and Aboriginal objects found is 97

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Your Ref Number : 60224819

Client Service ID : 52286

## AHIMS Web Services (AWS)

### Extensive search - Site list report

| <u>SiteID</u> | <u>SiteName</u> | <u>Datum</u> | <u>Zone</u> | <u>Easting</u> | <u>Northing</u> | <u>Context</u> | <u>Site Status</u> | <u>SiteFeatures</u> | <u>SiteTypes</u> | <u>Reports</u> |
|---------------|-----------------|--------------|-------------|----------------|-----------------|----------------|--------------------|---------------------|------------------|----------------|
| 37-2-3057     | MTP-477         | GDA          | 56          | 293670         | 6428840         | Open site      | Valid              | Artefact : -        |                  |                |
|               | <u>Contact</u>  |              |             |                |                 |                |                    |                     |                  | <u>Permits</u> |
| 37-2-3058     | MTP-478         | GDA          | 56          | 293581         | 6428851         | Open site      | Valid              | Artefact : -        |                  |                |
|               | <u>Contact</u>  |              |             |                |                 |                |                    |                     |                  | <u>Permits</u> |
| 37-2-3059     | MTP-479         | GDA          | 56          | 293519         | 6428942         | Open site      | Valid              | Artefact : -        |                  |                |
|               | <u>Contact</u>  |              |             |                |                 |                |                    |                     |                  | <u>Permits</u> |
| 37-2-3060     | MTP-480         | GDA          | 56          | 293635         | 6428804         | Open site      | Valid              | Artefact : -        |                  |                |
|               | <u>Contact</u>  |              |             |                |                 |                |                    |                     |                  | <u>Permits</u> |
| 37-2-3061     | MTP-481         | GDA          | 56          | 293684         | 6428790         | Open site      | Valid              | Artefact : -        |                  |                |
|               | <u>Contact</u>  |              |             |                |                 |                |                    |                     |                  | <u>Permits</u> |
| 37-2-3062     | MTP-482         | GDA          | 56          | 293805         | 6428767         | Open site      | Valid              | Artefact : -        |                  |                |
|               | <u>Contact</u>  |              |             |                |                 |                |                    |                     |                  | <u>Permits</u> |
| 37-2-3063     | MTP-483         | GDA          | 56          | 294121         | 6428737         | Open site      | Valid              | Artefact : -        |                  |                |
|               | <u>Contact</u>  |              |             |                |                 |                |                    |                     |                  | <u>Permits</u> |
| 37-2-3067     | MTP-487         | GDA          | 56          | 294407         | 6428759         | Open site      | Valid              | Artefact : -        |                  |                |
|               | <u>Contact</u>  |              |             |                |                 |                |                    |                     |                  | <u>Permits</u> |
| 37-2-3068     | MTP-488         | GDA          | 56          | 294364         | 6428777         | Open site      | Valid              | Artefact : -        |                  |                |
|               | <u>Contact</u>  |              |             |                |                 |                |                    |                     |                  | <u>Permits</u> |
| 37-2-3069     | MTP-489         | GDA          | 56          | 294286         | 6428782         | Open site      | Valid              | Artefact : -        |                  |                |
|               | <u>Contact</u>  |              |             |                |                 |                |                    |                     |                  | <u>Permits</u> |
| 37-2-3070     | MTP-490         | GDA          | 56          | 294253         | 6428819         | Open site      | Valid              | Artefact : -        |                  |                |
|               | <u>Contact</u>  |              |             |                |                 |                |                    |                     |                  | <u>Permits</u> |
| 37-2-3071     | MTP-491         | GDA          | 56          | 294226         | 6428783         | Open site      | Valid              | Artefact : -        |                  |                |
|               | <u>Contact</u>  |              |             |                |                 |                |                    |                     |                  | <u>Permits</u> |
| 37-2-3072     | MTP-492         | GDA          | 56          | 294174         | 6428777         | Open site      | Valid              | Artefact : -        |                  |                |
|               | <u>Contact</u>  |              |             |                |                 |                |                    |                     |                  | <u>Permits</u> |
| 37-2-3073     | MTP-493         | GDA          | 56          | 294124         | 6428834         | Open site      | Valid              | Artefact : -        |                  |                |
|               | <u>Contact</u>  |              |             |                |                 |                |                    |                     |                  | <u>Permits</u> |
| 37-2-3491     | MTP-913         | GDA          | 56          | 297394         | 6428808         | Open site      | Valid              | Artefact : -        |                  |                |
|               | <u>Contact</u>  |              |             |                |                 |                |                    |                     |                  | <u>Permits</u> |
| 37-2-3493     | MTP-915         | GDA          | 56          | 297742         | 6428751         | Open site      | Valid              | Artefact : -        |                  |                |
|               | <u>Contact</u>  |              |             |                |                 |                |                    |                     |                  | <u>Permits</u> |

Report generated by AHIMS Web Service on 28/09/2011 for Geordie Oaks for the following area at Datum :GDA, Zone : 56, Eastings : 291225 - 297873, Northings : 6428732 - 6429400 with a Buffer of 0 meters.Additional Info : Archaeological Assessment. Number of Aboriginal sites and Aboriginal objects found is 97

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# AHIMS Web Services (AWS)

## Extensive search - Site list report

Your Ref Number : 60224819

Client Service ID : 52286

| SiteID    | SiteName                | Datum                     | Zone               | Easting | Northing | Context   | Site Status | SiteFeatures                                | SiteTypes | Reports                 |
|-----------|-------------------------|---------------------------|--------------------|---------|----------|-----------|-------------|---------------------------------------------|-----------|-------------------------|
| 37-2-3494 | MTP-916                 | GDA                       | 56                 | 297728  | 6428825  | Open site | Valid       | Artefact : -                                |           |                         |
|           | <a href="#">Contact</a> | <a href="#">Recorders</a> | Mr.Lennard Roberts |         |          |           |             |                                             |           | <a href="#">Permits</a> |
| 37-2-2916 | MTP-113                 | GDA                       | 56                 | 294457  | 6429049  | Open site | Valid       | Artefact : -                                |           |                         |
|           | <a href="#">Contact</a> | <a href="#">Recorders</a> | Mr.Lennard Roberts |         |          |           |             |                                             |           | <a href="#">Permits</a> |
| 37-2-2844 | MTP-40                  | GDA                       | 56                 | 293712  | 6428744  | Open site | Valid       | Artefact : -                                |           |                         |
|           | <a href="#">Contact</a> | <a href="#">Recorders</a> | Mr.Lennard Roberts |         |          |           |             |                                             |           | <a href="#">Permits</a> |
| 37-2-2850 | MTP-46                  | GDA                       | 56                 | 297418  | 6429033  | Open site | Valid       | Artefact : -                                |           |                         |
|           | <a href="#">Contact</a> | <a href="#">Recorders</a> | Mr.Lennard Roberts |         |          |           |             |                                             |           | <a href="#">Permits</a> |
| 37-2-2851 | MTP-47                  | GDA                       | 56                 | 297428  | 6429018  | Open site | Valid       | Artefact : -                                |           |                         |
|           | <a href="#">Contact</a> | <a href="#">Recorders</a> | Mr.Lennard Roberts |         |          |           |             |                                             |           | <a href="#">Permits</a> |
| 37-2-2852 | MTP-48                  | GDA                       | 56                 | 297292  | 6429202  | Open site | Valid       | Artefact : -                                |           |                         |
|           | <a href="#">Contact</a> | <a href="#">Recorders</a> | Mr.Lennard Roberts |         |          |           |             |                                             |           | <a href="#">Permits</a> |
| 37-2-2854 | MTP-50                  | GDA                       | 56                 | 297273  | 6429212  | Open site | Valid       | Artefact : -                                |           |                         |
|           | <a href="#">Contact</a> | <a href="#">Recorders</a> | Mr.Lennard Roberts |         |          |           |             |                                             |           | <a href="#">Permits</a> |
| 37-2-2855 | MTP-51                  | GDA                       | 56                 | 296942  | 6428777  | Open site | Valid       | Modified Tree<br>(Carved or Scarred) :<br>- |           |                         |
|           | <a href="#">Contact</a> | <a href="#">Recorders</a> | Mr.Lennard Roberts |         |          |           |             |                                             |           | <a href="#">Permits</a> |
| 37-2-3370 | MTP-791                 | GDA                       | 56                 | 296691  | 6428750  | Open site | Valid       | Artefact : -                                |           |                         |
|           | <a href="#">Contact</a> | <a href="#">Recorders</a> | Mr.Lennard Roberts |         |          |           |             |                                             |           | <a href="#">Permits</a> |
| 37-2-3840 | MTP-1262                | GDA                       | 56                 | 294875  | 6429001  | Open site | Valid       | Artefact : -                                |           |                         |
|           | <a href="#">Contact</a> | <a href="#">Recorders</a> | Mr.Lennard Roberts |         |          |           |             |                                             |           | <a href="#">Permits</a> |
| 37-2-3198 | MTP-619                 | GDA                       | 56                 | 292333  | 6429391  | Open site | Valid       | Artefact : -                                |           |                         |
|           | <a href="#">Contact</a> | <a href="#">Recorders</a> | Mr.Lennard Roberts |         |          |           |             |                                             |           | <a href="#">Permits</a> |
| 37-2-3203 | MTP-624                 | GDA                       | 56                 | 292844  | 6429373  | Open site | Valid       | Artefact : -                                |           |                         |
|           | <a href="#">Contact</a> | <a href="#">Recorders</a> | Mr.Lennard Roberts |         |          |           |             |                                             |           | <a href="#">Permits</a> |
| 37-2-2853 | MTP-49                  | GDA                       | 56                 | 297236  | 6429249  | Open site | Valid       | Artefact : -                                |           |                         |
|           | <a href="#">Contact</a> | <a href="#">Recorders</a> | Mr.Lennard Roberts |         |          |           |             |                                             |           | <a href="#">Permits</a> |
| 37-2-3042 | MTP-462                 | GDA                       | 56                 | 294062  | 6428996  | Open site | Valid       | Artefact : -                                |           |                         |
|           | <a href="#">Contact</a> | <a href="#">Recorders</a> | Mr.Lennard Roberts |         |          |           |             |                                             |           | <a href="#">Permits</a> |
| 37-2-3049 | MTP-469                 | GDA                       | 56                 | 294073  | 6428936  | Open site | Valid       | Artefact : -                                |           |                         |
|           | <a href="#">Contact</a> | <a href="#">Recorders</a> | Mr.Lennard Roberts |         |          |           |             |                                             |           | <a href="#">Permits</a> |
| 37-2-3289 | MTP-710                 | GDA                       | 56                 | 294908  | 6429017  | Open site | Valid       | Artefact : -                                |           |                         |

Report generated by AHIMS Web Service on 28/09/2011 for Geordie Oakes for the following area at Datum :GDA, Zone : 56, Eastings : 291225 - 297873, Northings : 6428732 - 6429400 with a Buffer of 0 meters.Additional Info : Archaeological Assessment. Number of Aboriginal sites and Aboriginal objects found is 97

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Your Ref Number : 60224819  
 Client Service ID : 52286

# AHIMS Web Services (AWS)

## Extensive search - Site list report

| <u>SitID</u> | <u>SiteName</u> | <u>Datum</u>     | <u>Zone</u>         | <u>Easting</u> | <u>Northing</u> | <u>Context</u> | <u>Site Status</u> | <u>SiteFeatures</u> | <u>SiteTypes</u> | <u>Reports</u> |
|--------------|-----------------|------------------|---------------------|----------------|-----------------|----------------|--------------------|---------------------|------------------|----------------|
|              | <u>Contact</u>  | <u>Recorders</u> | Mr.Lennard Roberts  |                |                 |                |                    | <u>Permits</u>      |                  |                |
| 37-2-4060    | MTP-1400        | GDA              | 56                  | 292930         | 6429241         | Open site      | Valid              | Artefact : -        |                  |                |
|              | <u>Contact</u>  | <u>Recorders</u> | Ms.Helen Selimiotis |                |                 |                |                    | <u>Permits</u>      |                  |                |

Report generated by AHIMS Web Service on 28/09/2011 for Geordie Oakes for the following area at Datum :GDA, Zone : 56, Eastings : 291225 - 297873, Northings : 6428732 - 6429400 with a Buffer of 0 meters.Additional Info : Archaeological Assessment. Number of Aboriginal sites and Aboriginal objects found is 97  
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# AHIMS Web Services (AWS)

## Extensive search - Site list report

Your Ref Number : 60224819

Client Service ID : 52284

| SiteID    | SiteName         | Datum | Zone | Easting | Northing | Context   | Site Status | SiteFeatures                                | SiteTypes      | Reports            |
|-----------|------------------|-------|------|---------|----------|-----------|-------------|---------------------------------------------|----------------|--------------------|
| 37-2-0570 | B1;              | AGD   | 56   | 296300  | 6428000  | Open site | Valid       | Artefact : -                                | Open Camp Site | 2687,100681,100765 |
|           | <u>Contact</u>   |       |      |         |          |           |             |                                             |                |                    |
|           | <u>Recorders</u> |       |      |         |          |           |             |                                             |                |                    |
| 37-2-0591 | B22;             | AGD   | 56   | 293450  | 6427900  | Open site | Valid       | Artefact : -                                | Open Camp Site | 2687,100681,100765 |
|           | <u>Contact</u>   |       |      |         |          |           |             |                                             |                |                    |
|           | <u>Recorders</u> |       |      |         |          |           |             |                                             |                |                    |
| 37-2-0601 | B32;             | AGD   | 56   | 295500  | 6428400  | Open site | Valid       | Artefact : -                                | Open Camp Site | 2687,100681,100765 |
|           | <u>Contact</u>   |       |      |         |          |           |             |                                             |                |                    |
|           | <u>Recorders</u> |       |      |         |          |           |             |                                             |                |                    |
| 37-2-0602 | B33;             | AGD   | 56   | 294750  | 6428250  | Open site | Valid       | Artefact : -                                | Open Camp Site | 2687,100681,100765 |
|           | <u>Contact</u>   |       |      |         |          |           |             |                                             |                |                    |
|           | <u>Recorders</u> |       |      |         |          |           |             |                                             |                |                    |
| 37-2-0603 | B34;             | AGD   | 56   | 294850  | 6428550  | Open site | Valid       | Artefact : -                                | Open Camp Site | 2687,100681,100765 |
|           | <u>Contact</u>   |       |      |         |          |           |             |                                             |                |                    |
|           | <u>Recorders</u> |       |      |         |          |           |             |                                             |                |                    |
| 37-2-0604 | B35;             | AGD   | 56   | 294450  | 6428150  | Open site | Valid       | Artefact : -                                | Open Camp Site | 2687,100681,100765 |
|           | <u>Contact</u>   |       |      |         |          |           |             |                                             |                |                    |
|           | <u>Recorders</u> |       |      |         |          |           |             |                                             |                |                    |
| 37-2-2629 | BMRA8            | GDA   | 56   | 291860  | 6428319  | Open site | Destroyed   | Artefact : 1                                |                | 101517             |
|           | <u>Contact</u>   |       |      |         |          |           |             |                                             |                |                    |
|           | <u>Recorders</u> |       |      |         |          |           |             |                                             |                |                    |
| 37-2-2630 | BMRA9            | GDA   | 56   | 291793  | 6428304  | Open site | Destroyed   | Artefact : 1                                |                | 101517             |
|           | <u>Contact</u>   |       |      |         |          |           |             |                                             |                |                    |
|           | <u>Recorders</u> |       |      |         |          |           |             |                                             |                |                    |
| 37-2-3061 | MTP-481          | GDA   | 56   | 293684  | 6428790  | Open site | Valid       | Artefact : -                                |                |                    |
|           | <u>Contact</u>   |       |      |         |          |           |             |                                             |                |                    |
|           | <u>Recorders</u> |       |      |         |          |           |             |                                             |                |                    |
| 37-2-3062 | MTP-482          | GDA   | 56   | 293805  | 6428767  | Open site | Valid       | Artefact : -                                |                |                    |
|           | <u>Contact</u>   |       |      |         |          |           |             |                                             |                |                    |
|           | <u>Recorders</u> |       |      |         |          |           |             |                                             |                |                    |
| 37-2-3063 | MTP-483          | GDA   | 56   | 294121  | 6428737  | Open site | Valid       | Artefact : -                                |                |                    |
|           | <u>Contact</u>   |       |      |         |          |           |             |                                             |                |                    |
|           | <u>Recorders</u> |       |      |         |          |           |             |                                             |                |                    |
| 37-2-3064 | MTP-484          | GDA   | 56   | 294202  | 6428653  | Open site | Valid       | Modified Tree<br>(Carved or Scarred) :<br>- |                |                    |
|           | <u>Contact</u>   |       |      |         |          |           |             |                                             |                |                    |
|           | <u>Recorders</u> |       |      |         |          |           |             |                                             |                |                    |
| 37-2-3065 | MTP-485          | GDA   | 56   | 294270  | 6428697  | Open site | Valid       | Artefact : -                                |                |                    |
|           | <u>Contact</u>   |       |      |         |          |           |             |                                             |                |                    |
|           | <u>Recorders</u> |       |      |         |          |           |             |                                             |                |                    |
| 37-2-3066 | MTP-486          | GDA   | 56   | 294452  | 6428649  | Open site | Valid       | Artefact : -                                |                |                    |
|           | <u>Contact</u>   |       |      |         |          |           |             |                                             |                |                    |
|           | <u>Recorders</u> |       |      |         |          |           |             |                                             |                |                    |

Report generated by AHIMS Web Service on 28/09/2011 for Geordie Oakes for the following area at Datum :GDA, Zone : 56, Eastings : 291225 - 297873, Northings : 6428128 - 6428732 with a Buffer of 50 meters.Additional Info : Archaeological Assessment. Number of Aboriginal sites and Aboriginal objects found is 74

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Your Ref Number : 60224819

Client Service ID : 52284

## AHIMS Web Services (AWS)

### Extensive search - Site list report

| <u>SiteID</u> | <u>SiteName</u> | <u>Datum</u> | <u>Zone</u> | <u>Easting</u> | <u>Northing</u> | <u>Context</u> | <u>Site Status</u> | <u>SiteFeatures</u> | <u>SiteTypes</u> | <u>Reports</u> |
|---------------|-----------------|--------------|-------------|----------------|-----------------|----------------|--------------------|---------------------|------------------|----------------|
| 37-2-3067     | MTP-487         | GDA          | 56          | 294407         | 6428759         | Open site      | Valid              | Artefact : -        |                  |                |
|               | <u>Contact</u>  |              |             |                |                 |                |                    |                     |                  | <u>Permits</u> |
| 37-2-3068     | MTP-488         | GDA          | 56          | 294364         | 6428777         | Open site      | Valid              | Artefact : -        |                  |                |
|               | <u>Contact</u>  |              |             |                |                 |                |                    |                     |                  | <u>Permits</u> |
| 37-2-3069     | MTP-489         | GDA          | 56          | 294286         | 6428782         | Open site      | Valid              | Artefact : -        |                  |                |
|               | <u>Contact</u>  |              |             |                |                 |                |                    |                     |                  | <u>Permits</u> |
| 37-2-3071     | MTP-491         | GDA          | 56          | 294226         | 6428783         | Open site      | Valid              | Artefact : -        |                  |                |
|               | <u>Contact</u>  |              |             |                |                 |                |                    |                     |                  | <u>Permits</u> |
| 37-2-3072     | MTP-492         | GDA          | 56          | 294174         | 6428777         | Open site      | Valid              | Artefact : -        |                  |                |
|               | <u>Contact</u>  |              |             |                |                 |                |                    |                     |                  | <u>Permits</u> |
| 37-2-3074     | MTP-494         | GDA          | 56          | 293893         | 6428644         | Open site      | Valid              | Artefact : -        |                  |                |
|               | <u>Contact</u>  |              |             |                |                 |                |                    |                     |                  | <u>Permits</u> |
| 37-2-3075     | MTP-495         | GDA          | 56          | 293783         | 6428689         | Open site      | Valid              | Artefact : -        |                  |                |
|               | <u>Contact</u>  |              |             |                |                 |                |                    |                     |                  | <u>Permits</u> |
| 37-2-3076     | MTP-496         | GDA          | 56          | 293640         | 6428644         | Open site      | Valid              | Artefact : -        |                  |                |
|               | <u>Contact</u>  |              |             |                |                 |                |                    |                     |                  | <u>Permits</u> |
| 37-2-3077     | MTP-497         | GDA          | 56          | 293554         | 6428680         | Open site      | Valid              | Artefact : -        |                  |                |
|               | <u>Contact</u>  |              |             |                |                 |                |                    |                     |                  | <u>Permits</u> |
| 37-2-3078     | MTP-498         | GDA          | 56          | 293754         | 6428539         | Open site      | Valid              | Artefact : -        |                  |                |
|               | <u>Contact</u>  |              |             |                |                 |                |                    |                     |                  | <u>Permits</u> |
| 37-2-3079     | MTP-499         | GDA          | 56          | 293983         | 6428531         | Open site      | Valid              | Artefact : -        |                  |                |
|               | <u>Contact</u>  |              |             |                |                 |                |                    |                     |                  | <u>Permits</u> |
| 37-2-3080     | MTP-500         | GDA          | 56          | 294040         | 6428511         | Open site      | Valid              | Artefact : -        |                  |                |
|               | <u>Contact</u>  |              |             |                |                 |                |                    |                     |                  | <u>Permits</u> |
| 37-2-3081     | MTP-501         | GDA          | 56          | 294236         | 6428505         | Open site      | Valid              | Artefact : -        |                  |                |
|               | <u>Contact</u>  |              |             |                |                 |                |                    |                     |                  | <u>Permits</u> |
| 37-2-3082     | MTP-502         | GDA          | 56          | 294282         | 6428493         | Open site      | Valid              | Artefact : -        |                  |                |
|               | <u>Contact</u>  |              |             |                |                 |                |                    |                     |                  | <u>Permits</u> |
| 37-2-3083     | MTP-503         | GDA          | 56          | 294323         | 6428471         | Open site      | Valid              | Artefact : -        |                  |                |
|               | <u>Contact</u>  |              |             |                |                 |                |                    |                     |                  | <u>Permits</u> |
| 37-2-3084     | MTP-504         | GDA          | 56          | 294404         | 6428430         | Open site      | Valid              | Artefact : -        |                  |                |
|               | <u>Contact</u>  |              |             |                |                 |                |                    |                     |                  | <u>Permits</u> |

Report generated by AHIMS Web Service on 28/09/2011 for Geordie Oakes for the following area at Datum :GDA, Zone : 56, Eastings : 291225 - 297873, Northings : 6428128 - 6428732 with a Buffer of 50 meters.Additional Info : Archaeological Assessment. Number of Aboriginal sites and Aboriginal objects found is 74

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# AHIMS Web Services (AWS)

## Extensive search - Site list report

Your Ref Number : 60224819  
Client Service ID : 52284

| SiteID    | SiteName                | Datum                     | Zone               | Easting | Northing | Context   | Site Status | SiteFeatures                                | SiteTypes | Reports                 |
|-----------|-------------------------|---------------------------|--------------------|---------|----------|-----------|-------------|---------------------------------------------|-----------|-------------------------|
| 37-2-3085 | MTP-505                 | GDA                       | 56                 | 294469  | 6428471  | Open site | Valid       | Artefact : -                                |           |                         |
|           | <a href="#">Contact</a> | <a href="#">Recorders</a> | Mr.Lennard Roberts |         |          |           |             |                                             |           | <a href="#">Permits</a> |
| 37-2-3086 | MTP-506                 | GDA                       | 56                 | 294524  | 6428441  | Open site | Valid       | Artefact : -                                |           |                         |
|           | <a href="#">Contact</a> | <a href="#">Recorders</a> | Mr.Lennard Roberts |         |          |           |             |                                             |           | <a href="#">Permits</a> |
| 37-2-3087 | MTP-507                 | GDA                       | 56                 | 294553  | 6428432  | Open site | Valid       | Artefact : -                                |           |                         |
|           | <a href="#">Contact</a> | <a href="#">Recorders</a> | Mr.Lennard Roberts |         |          |           |             |                                             |           | <a href="#">Permits</a> |
| 37-2-3088 | MTP-508                 | GDA                       | 56                 | 294582  | 6428389  | Open site | Valid       | Artefact : -                                |           |                         |
|           | <a href="#">Contact</a> | <a href="#">Recorders</a> | Mr.Lennard Roberts |         |          |           |             |                                             |           | <a href="#">Permits</a> |
| 37-2-3089 | MTP-509                 | GDA                       | 56                 | 294715  | 6428402  | Open site | Valid       | Artefact : -                                |           |                         |
|           | <a href="#">Contact</a> | <a href="#">Recorders</a> | Mr.Lennard Roberts |         |          |           |             |                                             |           | <a href="#">Permits</a> |
| 37-2-3091 | MTP-511                 | GDA                       | 56                 | 294464  | 6428556  | Open site | Valid       | Artefact : -                                |           |                         |
|           | <a href="#">Contact</a> | <a href="#">Recorders</a> | Mr.Lennard Roberts |         |          |           |             |                                             |           | <a href="#">Permits</a> |
| 37-2-3092 | MTP-512                 | GDA                       | 56                 | 294235  | 6428580  | Open site | Valid       | Artefact : -                                |           |                         |
|           | <a href="#">Contact</a> | <a href="#">Recorders</a> | Mr.Lennard Roberts |         |          |           |             |                                             |           | <a href="#">Permits</a> |
| 37-2-3093 | MTP-513                 | GDA                       | 56                 | 293908  | 6428467  | Open site | Valid       | Artefact : -                                |           |                         |
|           | <a href="#">Contact</a> | <a href="#">Recorders</a> | Mr.Lennard Roberts |         |          |           |             |                                             |           | <a href="#">Permits</a> |
| 37-2-3094 | MTP-514                 | GDA                       | 56                 | 293794  | 6428411  | Open site | Valid       | Artefact : -                                |           |                         |
|           | <a href="#">Contact</a> | <a href="#">Recorders</a> | Mr.Lennard Roberts |         |          |           |             |                                             |           | <a href="#">Permits</a> |
| 37-2-3095 | MTP-515                 | GDA                       | 56                 | 293306  | 6428503  | Open site | Valid       | Modified Tree<br>(Carved or Scarred) :<br>- |           |                         |
|           | <a href="#">Contact</a> | <a href="#">Recorders</a> | Mr.Lennard Roberts |         |          |           |             |                                             |           | <a href="#">Permits</a> |
| 37-2-3096 | MTP-516                 | GDA                       | 56                 | 293351  | 6428427  | Open site | Valid       | Artefact : -                                |           |                         |
|           | <a href="#">Contact</a> | <a href="#">Recorders</a> | Mr.Lennard Roberts |         |          |           |             |                                             |           | <a href="#">Permits</a> |
| 37-2-3098 | MTP-519                 | GDA                       | 56                 | 294501  | 6428281  | Open site | Valid       | Artefact : -                                |           |                         |
|           | <a href="#">Contact</a> | <a href="#">Recorders</a> | Mr.Lennard Roberts |         |          |           |             |                                             |           | <a href="#">Permits</a> |
| 37-2-3492 | MTP-914                 | GDA                       | 56                 | 297358  | 6428682  | Open site | Valid       | Artefact : -                                |           |                         |
|           | <a href="#">Contact</a> | <a href="#">Recorders</a> | Mr.Lennard Roberts |         |          |           |             |                                             |           | <a href="#">Permits</a> |
| 37-2-3493 | MTP-915                 | GDA                       | 56                 | 297742  | 6428751  | Open site | Valid       | Artefact : -                                |           |                         |
|           | <a href="#">Contact</a> | <a href="#">Recorders</a> | Mr.Lennard Roberts |         |          |           |             |                                             |           | <a href="#">Permits</a> |
| 37-2-3099 | MTP-520                 | GDA                       | 56                 | 294538  | 6428266  | Open site | Valid       | Artefact : -                                |           |                         |
|           | <a href="#">Contact</a> | <a href="#">Recorders</a> | Mr.Lennard Roberts |         |          |           |             |                                             |           | <a href="#">Permits</a> |
| 37-2-3100 | MTP-521                 | GDA                       | 56                 | 294598  | 6428225  | Open site | Valid       | Artefact : -                                |           |                         |

Report generated by AHIMS Web Service on 28/09/2011 for Geordie Oakes for the following area at Datum :GDA, Zone : 56, Eastings : 291225 - 297873, Northings : 6428128 - 6428732 with a Buffer of 50 meters.Additional Info : Archaeological Assessment. Number of Aboriginal sites and Aboriginal objects found is 74  
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Your Ref Number : 60224819

Client Service ID : 52284

## AHIMS Web Services (AWS)

### Extensive search - Site list report

| SiteID    | SiteName                | Datum                     | Zone               | Easting | Northing | Context   | Site Status | SiteFeatures                                | SiteTypes | Reports |
|-----------|-------------------------|---------------------------|--------------------|---------|----------|-----------|-------------|---------------------------------------------|-----------|---------|
|           | <a href="#">Contact</a> | <a href="#">Recorders</a> | Mr.Lennard Roberts |         |          |           |             | <a href="#">Permits</a>                     |           |         |
| 37-2-3101 | MTP-522                 | GDA                       | 56                 | 294659  | 6428206  | Open site | Valid       | Artefact : -                                |           |         |
|           | <a href="#">Contact</a> | <a href="#">Recorders</a> | Mr.Lennard Roberts |         |          |           |             | <a href="#">Permits</a>                     |           |         |
| 37-2-3102 | MTP-523                 | GDA                       | 56                 | 294722  | 6428346  | Open site | Valid       | Artefact : -                                |           |         |
|           | <a href="#">Contact</a> | <a href="#">Recorders</a> | Mr.Lennard Roberts |         |          |           |             | <a href="#">Permits</a>                     |           |         |
| 37-2-3103 | MTP-524                 | GDA                       | 56                 | 294554  | 6428374  | Open site | Valid       | Artefact : -                                |           |         |
|           | <a href="#">Contact</a> | <a href="#">Recorders</a> | Mr.Lennard Roberts |         |          |           |             | <a href="#">Permits</a>                     |           |         |
| 37-2-3104 | MTP-525                 | GDA                       | 56                 | 294497  | 6428362  | Open site | Valid       | Artefact : -                                |           |         |
|           | <a href="#">Contact</a> | <a href="#">Recorders</a> | Mr.Lennard Roberts |         |          |           |             | <a href="#">Permits</a>                     |           |         |
| 37-2-3105 | MTP-526                 | GDA                       | 56                 | 294211  | 6428446  | Open site | Valid       | Artefact : -                                |           |         |
|           | <a href="#">Contact</a> | <a href="#">Recorders</a> | Mr.Lennard Roberts |         |          |           |             | <a href="#">Permits</a>                     |           |         |
| 37-2-3106 | MTP-527                 | GDA                       | 56                 | 294056  | 6428431  | Open site | Valid       | Artefact : -                                |           |         |
|           | <a href="#">Contact</a> | <a href="#">Recorders</a> | Mr.Lennard Roberts |         |          |           |             | <a href="#">Permits</a>                     |           |         |
| 37-2-3107 | MTP-528                 | GDA                       | 56                 | 293937  | 6428277  | Open site | Valid       | Modified Tree<br>(Carved or Scarred) :<br>- |           |         |
|           | <a href="#">Contact</a> | <a href="#">Recorders</a> | Mr.Lennard Roberts |         |          |           |             | <a href="#">Permits</a>                     |           |         |
| 37-2-3108 | MTP-529                 | GDA                       | 56                 | 293637  | 6428257  | Open site | Valid       | Artefact : -                                |           |         |
|           | <a href="#">Contact</a> | <a href="#">Recorders</a> | Mr.Lennard Roberts |         |          |           |             | <a href="#">Permits</a>                     |           |         |
| 37-2-3109 | MTP-530                 | GDA                       | 56                 | 293519  | 6428316  | Open site | Valid       | Artefact : -                                |           |         |
|           | <a href="#">Contact</a> | <a href="#">Recorders</a> | Mr.Lennard Roberts |         |          |           |             | <a href="#">Permits</a>                     |           |         |
| 37-2-3110 | MTP-531                 | GDA                       | 56                 | 293446  | 6428179  | Open site | Valid       | Artefact : -                                |           |         |
|           | <a href="#">Contact</a> | <a href="#">Recorders</a> | Mr.Lennard Roberts |         |          |           |             | <a href="#">Permits</a>                     |           |         |
| 37-2-3111 | MTP-532                 | GDA                       | 56                 | 293520  | 6428181  | Open site | Valid       | Artefact : -                                |           |         |
|           | <a href="#">Contact</a> | <a href="#">Recorders</a> | Mr.Lennard Roberts |         |          |           |             | <a href="#">Permits</a>                     |           |         |
| 37-2-3112 | MTP-533                 | GDA                       | 56                 | 294095  | 6428149  | Open site | Valid       | Artefact : -                                |           |         |
|           | <a href="#">Contact</a> | <a href="#">Recorders</a> | Mr.Lennard Roberts |         |          |           |             | <a href="#">Permits</a>                     |           |         |
| 37-2-3113 | MTP-534                 | GDA                       | 56                 | 294211  | 6428071  | Open site | Valid       | Artefact : -                                |           |         |
|           | <a href="#">Contact</a> | <a href="#">Recorders</a> | Mr.Lennard Roberts |         |          |           |             | <a href="#">Permits</a>                     |           |         |
| 37-2-3114 | MTP-535                 | GDA                       | 56                 | 294328  | 6428075  | Open site | Valid       | Artefact : -                                |           |         |
|           | <a href="#">Contact</a> | <a href="#">Recorders</a> | Mr.Lennard Roberts |         |          |           |             | <a href="#">Permits</a>                     |           |         |
| 37-2-3116 | MTP-537                 | GDA                       | 56                 | 294696  | 6428080  | Open site | Valid       | Artefact : -                                |           |         |
|           | <a href="#">Contact</a> | <a href="#">Recorders</a> | Mr.Lennard Roberts |         |          |           |             | <a href="#">Permits</a>                     |           |         |

Report generated by AHIMS Web Service on 28/09/2011 for Geordie Oakes for the following area at Datum :GDA, Zone : 56, Eastings : 291225 - 297873, Northings : 6428128 - 6428732 with a Buffer of 50 meters.Additional Info : Archaeological Assessment. Number of Aboriginal sites and Aboriginal objects found is 74

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# AHIMS Web Services (AWS)

## Extensive search - Site list report

Your Ref Number : 60224819

Client Service ID : 52284

| SiteID    | SiteName                | Datum                     | Zone               | Easting | Northing | Context   | Site Status | SiteFeatures                           | SiteTypes | Reports                 |
|-----------|-------------------------|---------------------------|--------------------|---------|----------|-----------|-------------|----------------------------------------|-----------|-------------------------|
| 37-2-3118 | MTP-539                 | GDA                       | 56                 | 294743  | 6428087  | Open site | Valid       | Artefact : -                           |           |                         |
|           | <a href="#">Contact</a> | <a href="#">Recorders</a> | Mr.Lennard Roberts |         |          |           |             |                                        |           | <a href="#">Permits</a> |
| 37-2-3119 | MTP-540                 | GDA                       | 56                 | 294620  | 6428148  | Open site | Valid       | Artefact : -                           |           |                         |
|           | <a href="#">Contact</a> | <a href="#">Recorders</a> | Mr.Lennard Roberts |         |          |           |             |                                        |           | <a href="#">Permits</a> |
| 37-2-3120 | MTP-541                 | GDA                       | 56                 | 294578  | 6428144  | Open site | Valid       | Artefact : -                           |           |                         |
|           | <a href="#">Contact</a> | <a href="#">Recorders</a> | Mr.Lennard Roberts |         |          |           |             |                                        |           | <a href="#">Permits</a> |
| 37-2-3121 | MTP-542                 | GDA                       | 56                 | 293939  | 6428243  | Open site | Valid       | Artefact : -                           |           |                         |
|           | <a href="#">Contact</a> | <a href="#">Recorders</a> | Mr.Lennard Roberts |         |          |           |             |                                        |           | <a href="#">Permits</a> |
| 37-2-3122 | MTP-543                 | GDA                       | 56                 | 293513  | 6428113  | Open site | Valid       | Artefact : -                           |           |                         |
|           | <a href="#">Contact</a> | <a href="#">Recorders</a> | Mr.Lennard Roberts |         |          |           |             |                                        |           | <a href="#">Permits</a> |
| 37-2-3123 | MTP-544                 | GDA                       | 56                 | 293163  | 6428082  | Open site | Valid       | Artefact : -                           |           |                         |
|           | <a href="#">Contact</a> | <a href="#">Recorders</a> | Mr.Lennard Roberts |         |          |           |             |                                        |           | <a href="#">Permits</a> |
| 37-2-2843 | MTP-39                  | GDA                       | 56                 | 293935  | 6428611  | Open site | Valid       | Artefact : -                           |           |                         |
|           | <a href="#">Contact</a> | <a href="#">Recorders</a> | Mr.Lennard Roberts |         |          |           |             |                                        |           | <a href="#">Permits</a> |
| 37-2-2844 | MTP-40                  | GDA                       | 56                 | 293712  | 6428744  | Open site | Valid       | Artefact : -                           |           |                         |
|           | <a href="#">Contact</a> | <a href="#">Recorders</a> | Mr.Lennard Roberts |         |          |           |             |                                        |           | <a href="#">Permits</a> |
| 37-2-2845 | MTP-41                  | GDA                       | 56                 | 293956  | 6428616  | Open site | Valid       | Artefact : -                           |           |                         |
|           | <a href="#">Contact</a> | <a href="#">Recorders</a> | Mr.Lennard Roberts |         |          |           |             |                                        |           | <a href="#">Permits</a> |
| 37-2-2855 | MTP-51                  | GDA                       | 56                 | 296942  | 6428777  | Open site | Valid       | Modified Tree<br>(Carved or Scarred) : |           |                         |
|           | <a href="#">Contact</a> | <a href="#">Recorders</a> | Mr.Lennard Roberts |         |          |           |             |                                        |           | <a href="#">Permits</a> |
| 37-2-3370 | MTP-791                 | GDA                       | 56                 | 296691  | 6428750  | Open site | Valid       | Artefact : -                           |           |                         |
|           | <a href="#">Contact</a> | <a href="#">Recorders</a> | Mr.Lennard Roberts |         |          |           |             |                                        |           | <a href="#">Permits</a> |
| 37-2-3090 | MTP-510                 | GDA                       | 56                 | 294512  | 6428568  | Open site | Valid       | Artefact : -                           |           |                         |
|           | <a href="#">Contact</a> | <a href="#">Recorders</a> | Mr.Lennard Roberts |         |          |           |             |                                        |           | <a href="#">Permits</a> |
| 37-2-3097 | MTP-518                 | GDA                       | 56                 | 293970  | 6428344  | Open site | Valid       | Artefact : -                           |           |                         |
|           | <a href="#">Contact</a> | <a href="#">Recorders</a> | Mr.Lennard Roberts |         |          |           |             |                                        |           | <a href="#">Permits</a> |

Report generated by AHIMS Web Service on 28/09/2011 for Geordie Oakes for the following area at Datum :GDA, Zone : 56, Eastings : 291225 - 297873, Northings : 6428128 - 6428732 with a Buffer of 50 meters.Additional Info : Archaeological Assessment. Number of Aboriginal sites and Aboriginal objects found is 74

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Your Ref Number : 60224819

Client Service ID : 52278

## AHIMS Web Services (AWS)

### Extensive search - Site list report

| <u>SiteID</u> | <u>SiteName</u>  | <u>Datum</u> | <u>Zone</u> | <u>Easting</u> | <u>Northing</u> | <u>Context</u> | <u>Site Status</u> | <u>SiteFeatures</u> | <u>SiteTypes</u> | <u>Reports</u>     |
|---------------|------------------|--------------|-------------|----------------|-----------------|----------------|--------------------|---------------------|------------------|--------------------|
| 37-2-0571     | B2;              | AGD          | 56          | 297000         | 6427500         | Open site      | Valid              | Artefact : -        | Open Camp Site   | 2687,100681,100765 |
|               | <u>Contact</u>   |              |             |                |                 |                |                    |                     |                  |                    |
|               | <u>Recorders</u> |              |             |                |                 |                |                    |                     |                  |                    |
| 37-2-0572     | B3;              | AGD          | 56          | 296500         | 6427600         | Open site      | Valid              | Artefact : -        | Open Camp Site   | 2687,100681,100765 |
|               | <u>Contact</u>   |              |             |                |                 |                |                    |                     |                  |                    |
|               | <u>Recorders</u> |              |             |                |                 |                |                    |                     |                  |                    |
| 37-2-0573     | B4;              | AGD          | 56          | 295900         | 6427650         | Open site      | Valid              | Artefact : -        | Open Camp Site   | 2687,100681,100765 |
|               | <u>Contact</u>   |              |             |                |                 |                |                    |                     |                  |                    |
|               | <u>Recorders</u> |              |             |                |                 |                |                    |                     |                  |                    |
| 37-2-0591     | B22;             | AGD          | 56          | 293450         | 6427900         | Open site      | Valid              | Artefact : -        | Open Camp Site   | 2687,100681,100765 |
|               | <u>Contact</u>   |              |             |                |                 |                |                    |                     |                  |                    |
|               | <u>Recorders</u> |              |             |                |                 |                |                    |                     |                  |                    |
| 37-2-0592     | B23;             | AGD          | 56          | 293500         | 6427800         | Open site      | Valid              | Artefact : -        | Open Camp Site   | 2687,100681,100765 |
|               | <u>Contact</u>   |              |             |                |                 |                |                    |                     |                  |                    |
|               | <u>Recorders</u> |              |             |                |                 |                |                    |                     |                  |                    |
| 37-2-0593     | B24;             | AGD          | 56          | 293550         | 6427500         | Open site      | Valid              | Artefact : -        | Open Camp Site   | 2687,100681,100765 |
|               | <u>Contact</u>   |              |             |                |                 |                |                    |                     |                  |                    |
|               | <u>Recorders</u> |              |             |                |                 |                |                    |                     |                  |                    |
| 37-2-0594     | B25;             | AGD          | 56          | 293700         | 6427700         | Open site      | Valid              | Artefact : -        | Open Camp Site   | 2687,100681,100765 |
|               | <u>Contact</u>   |              |             |                |                 |                |                    |                     |                  |                    |
|               | <u>Recorders</u> |              |             |                |                 |                |                    |                     |                  |                    |
| 37-2-0595     | B26;             | AGD          | 56          | 293880         | 6427580         | Open site      | Valid              | Artefact : -        | Open Camp Site   | 2687,100681,100765 |
|               | <u>Contact</u>   |              |             |                |                 |                |                    |                     |                  |                    |
|               | <u>Recorders</u> |              |             |                |                 |                |                    |                     |                  |                    |
| 37-2-0596     | B27;             | AGD          | 56          | 293950         | 6427550         | Open site      | Valid              | Artefact : -        | Open Camp Site   | 2687,100681,100765 |
|               | <u>Contact</u>   |              |             |                |                 |                |                    |                     |                  |                    |
|               | <u>Recorders</u> |              |             |                |                 |                |                    |                     |                  |                    |
| 37-2-0597     | B28;             | AGD          | 56          | 294130         | 6427250         | Open site      | Valid              | Artefact : -        | Open Camp Site   | 2687,100681,100765 |
|               | <u>Contact</u>   |              |             |                |                 |                |                    |                     |                  |                    |
|               | <u>Recorders</u> |              |             |                |                 |                |                    |                     |                  |                    |
| 37-2-0598     | B29;             | AGD          | 56          | 294250         | 6427650         | Open site      | Valid              | Artefact : -        | Open Camp Site   | 2687,100681,100765 |
|               | <u>Contact</u>   |              |             |                |                 |                |                    |                     |                  |                    |
|               | <u>Recorders</u> |              |             |                |                 |                |                    |                     |                  |                    |
| 37-2-0599     | B30;             | AGD          | 56          | 294350         | 6427550         | Open site      | Valid              | Artefact : -        | Open Camp Site   | 2687,100681,100765 |
|               | <u>Contact</u>   |              |             |                |                 |                |                    |                     |                  |                    |
|               | <u>Recorders</u> |              |             |                |                 |                |                    |                     |                  |                    |
| 37-2-0600     | B31;             | AGD          | 56          | 294610         | 6427500         | Open site      | Valid              | Artefact : -        | Open Camp Site   | 2687,100681,100765 |

Report generated by AHIMS Web Service on 28/09/2011 for Geordie Oakes for the following area at Datum :GDA, Zone : 56, Eastings : 291225 - 297873, Northings : 6427341 - 6428128 with a Buffer of 50 meters.Additional Info : Archaeological Assessment. Number of Aboriginal sites and Aboriginal objects found is 72

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# AHIMS Web Services (AWS) Extensive search - Site list report

Your Ref Number : 60224819

Client Service ID : 52278

| SiteID    | SiteName       | Datum            | Zone | Easting | Northing | Context   | Site Status | SiteFeatures                                | SiteTypes | Reports       |
|-----------|----------------|------------------|------|---------|----------|-----------|-------------|---------------------------------------------|-----------|---------------|
|           | <u>Contact</u> | <u>Recorders</u> |      |         |          |           |             | <u>Permits</u>                              |           |               |
| 37-2-2091 | BMRA5          | AGD              | 56   | 292094  | 6427550  | Open site | Destroyed   | Artefact : 1                                | 851       | 100765,101517 |
|           | <u>Contact</u> | <u>Recorders</u> |      |         |          |           |             | <u>Permits</u>                              |           |               |
| 37-2-2092 | BMRA6          | AGD              | 56   | 291883  | 6427699  | Open site | Destroyed   | Artefact : 1                                |           | 100765,101517 |
|           | <u>Contact</u> | <u>Recorders</u> |      |         |          |           |             | <u>Permits</u>                              |           |               |
| 37-2-2628 | BMRA7          | GDA              | 56   | 291494  | 6427760  | Open site | Destroyed   | Artefact : 1                                |           | 101517        |
|           | <u>Contact</u> | <u>Recorders</u> |      |         |          |           |             | <u>Permits</u>                              |           |               |
| 37-2-3147 | MTP-568        | GDA              | 56   | 294514  | 6427796  | Open site | Valid       | Artefact : -                                |           |               |
|           | <u>Contact</u> | <u>Recorders</u> |      |         |          |           |             | <u>Permits</u>                              |           |               |
| 37-2-3148 | MTP-569        | GDA              | 56   | 294443  | 6427778  | Open site | Valid       | Artefact : -                                |           |               |
|           | <u>Contact</u> | <u>Recorders</u> |      |         |          |           |             | <u>Permits</u>                              |           |               |
| 37-2-3149 | MTP-570        | GDA              | 56   | 294417  | 6427728  | Open site | Valid       | Artefact : -                                |           |               |
|           | <u>Contact</u> | <u>Recorders</u> |      |         |          |           |             | <u>Permits</u>                              |           |               |
| 37-2-3150 | MTP-571        | GDA              | 56   | 294408  | 6427802  | Open site | Valid       | Artefact : -                                |           |               |
|           | <u>Contact</u> | <u>Recorders</u> |      |         |          |           |             | <u>Permits</u>                              |           |               |
| 37-2-3151 | MTP-572        | GDA              | 56   | 294352  | 6427795  | Open site | Valid       | Artefact : -                                |           |               |
|           | <u>Contact</u> | <u>Recorders</u> |      |         |          |           |             | <u>Permits</u>                              |           |               |
| 37-2-3152 | MTP-573        | GDA              | 56   | 294285  | 6427806  | Open site | Valid       | Artefact : -                                |           |               |
|           | <u>Contact</u> | <u>Recorders</u> |      |         |          |           |             | <u>Permits</u>                              |           |               |
| 37-2-3153 | MTP-574        | GDA              | 56   | 294178  | 6427789  | Open site | Valid       | Artefact : -                                |           |               |
|           | <u>Contact</u> | <u>Recorders</u> |      |         |          |           |             | <u>Permits</u>                              |           |               |
| 37-2-3154 | MTP-575        | GDA              | 56   | 294138  | 6427774  | Open site | Valid       | Artefact : -                                |           |               |
|           | <u>Contact</u> | <u>Recorders</u> |      |         |          |           |             | <u>Permits</u>                              |           |               |
| 37-2-3155 | MTP-576        | GDA              | 56   | 293914  | 6427817  | Open site | Valid       | Artefact : -                                |           |               |
|           | <u>Contact</u> | <u>Recorders</u> |      |         |          |           |             | <u>Permits</u>                              |           |               |
| 37-2-3156 | MTP-577        | GDA              | 56   | 293494  | 6427685  | Open site | Not a Site  | Modified Tree<br>(Carved or Scarred) :<br>- |           |               |
|           | <u>Contact</u> | <u>Recorders</u> |      |         |          |           |             | <u>Permits</u>                              |           |               |
| 37-2-3157 | MTP-578        | GDA              | 56   | 293481  | 6427698  | Open site | Valid       | Artefact : -                                |           |               |
|           | <u>Contact</u> | <u>Recorders</u> |      |         |          |           |             | <u>Permits</u>                              |           |               |
| 37-2-3158 | MTP-579        | GDA              | 56   | 294240  | 6427508  | Open site | Valid       | Artefact : -                                |           |               |
|           | <u>Contact</u> | <u>Recorders</u> |      |         |          |           |             | <u>Permits</u>                              |           |               |

Report generated by AHIMS Web Service on 28/09/2011 for Geordie Oakes for the following area at Datum :GDA, Zone : 56, Eastings : 291225 - 297873, Northings : 6427341 - 6428128 with a Buffer of 50 meters.Additional Info : Archaeological Assessment. Number of Aboriginal sites and Aboriginal objects found is 72

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Your Ref Number : 60224819

Client Service ID : 52278

## AHIMS Web Services (AWS)

### Extensive search - Site list report

| <u>SiteID</u> | <u>SiteName</u> | <u>Datum</u> | <u>Zone</u> | <u>Easting</u> | <u>Northing</u> | <u>Context</u> | <u>Site Status</u> | <u>SiteFeatures</u> | <u>SiteTypes</u> | <u>Reports</u> |
|---------------|-----------------|--------------|-------------|----------------|-----------------|----------------|--------------------|---------------------|------------------|----------------|
| 37-2-3159     | MTP-580         | GDA          | 56          | 294317         | 6427492         | Open site      | Valid              | Artefact : -        |                  |                |
|               | <u>Contact</u>  |              |             |                |                 |                |                    |                     |                  | <u>Permits</u> |
| 37-2-3160     | MTP-581         | GDA          | 56          | 294323         | 6427527         | Open site      | Valid              | Artefact : -        |                  |                |
|               | <u>Contact</u>  |              |             |                |                 |                |                    |                     |                  | <u>Permits</u> |
| 37-2-3161     | MTP-582         | GDA          | 56          | 294337         | 6427449         | Open site      | Valid              | Artefact : -        |                  |                |
|               | <u>Contact</u>  |              |             |                |                 |                |                    |                     |                  | <u>Permits</u> |
| 37-2-3162     | MTP-583         | GDA          | 56          | 294659         | 6427540         | Open site      | Valid              | Artefact : -        |                  |                |
|               | <u>Contact</u>  |              |             |                |                 |                |                    |                     |                  | <u>Permits</u> |
| 37-2-3163     | MTP-584         | GDA          | 56          | 294415         | 6427602         | Open site      | Valid              | Artefact : -        |                  |                |
|               | <u>Contact</u>  |              |             |                |                 |                |                    |                     |                  | <u>Permits</u> |
| 37-2-3164     | MTP-585         | GDA          | 56          | 294371         | 6427589         | Open site      | Valid              | Artefact : -        |                  |                |
|               | <u>Contact</u>  |              |             |                |                 |                |                    |                     |                  | <u>Permits</u> |
| 37-2-3110     | MTP-531         | GDA          | 56          | 293446         | 6428179         | Open site      | Valid              | Artefact : -        |                  |                |
|               | <u>Contact</u>  |              |             |                |                 |                |                    |                     |                  | <u>Permits</u> |
| 37-2-3111     | MTP-532         | GDA          | 56          | 293520         | 6428181         | Open site      | Valid              | Artefact : -        |                  |                |
|               | <u>Contact</u>  |              |             |                |                 |                |                    |                     |                  | <u>Permits</u> |
| 37-2-3112     | MTP-533         | GDA          | 56          | 294095         | 6428149         | Open site      | Valid              | Artefact : -        |                  |                |
|               | <u>Contact</u>  |              |             |                |                 |                |                    |                     |                  | <u>Permits</u> |
| 37-2-3113     | MTP-534         | GDA          | 56          | 294211         | 6428071         | Open site      | Valid              | Artefact : -        |                  |                |
|               | <u>Contact</u>  |              |             |                |                 |                |                    |                     |                  | <u>Permits</u> |
| 37-2-3114     | MTP-535         | GDA          | 56          | 294328         | 6428075         | Open site      | Valid              | Artefact : -        |                  |                |
|               | <u>Contact</u>  |              |             |                |                 |                |                    |                     |                  | <u>Permits</u> |
| 37-2-3115     | MTP-536         | GDA          | 56          | 294601         | 6428002         | Open site      | Valid              | Artefact : -        |                  |                |
|               | <u>Contact</u>  |              |             |                |                 |                |                    |                     |                  | <u>Permits</u> |
| 37-2-3116     | MTP-537         | GDA          | 56          | 294696         | 6428080         | Open site      | Valid              | Artefact : -        |                  |                |
|               | <u>Contact</u>  |              |             |                |                 |                |                    |                     |                  | <u>Permits</u> |
| 37-2-3117     | MTP-538         | GDA          | 56          | 294717         | 6428038         | Open site      | Valid              | Artefact : -        |                  |                |
|               | <u>Contact</u>  |              |             |                |                 |                |                    |                     |                  | <u>Permits</u> |
| 37-2-3118     | MTP-539         | GDA          | 56          | 294743         | 6428087         | Open site      | Valid              | Artefact : -        |                  |                |
|               | <u>Contact</u>  |              |             |                |                 |                |                    |                     |                  | <u>Permits</u> |
| 37-2-3119     | MTP-540         | GDA          | 56          | 294620         | 6428148         | Open site      | Valid              | Artefact : -        |                  |                |
|               | <u>Contact</u>  |              |             |                |                 |                |                    |                     |                  | <u>Permits</u> |

Report generated by AHIMS Web Service on 28/09/2011 for Geordie Oaks for the following area at Datum :GDA, Zone : 56, Eastings : 291225 - 297873, Northings : 6427341 - 6428128 with a Buffer of 50 meters.Additional Info : Archaeological Assessment. Number of Aboriginal sites and Aboriginal objects found is 72

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# AHIMS Web Services (AWS)

## Extensive search - Site list report

Your Ref Number : 60224819

Client Service ID : 52278

| SiteID    | SiteName                | Datum                     | Zone               | Easting | Northing | Context   | Site Status | SiteFeatures | SiteTypes | Reports                 |
|-----------|-------------------------|---------------------------|--------------------|---------|----------|-----------|-------------|--------------|-----------|-------------------------|
| 37-2-3120 | MTP-541                 | GDA                       | 56                 | 294578  | 6428144  | Open site | Valid       | Artefact : - |           |                         |
|           | <a href="#">Contact</a> | <a href="#">Recorders</a> | Mr.Lennard Roberts |         |          |           |             |              |           |                         |
| 37-2-3122 | MTP-543                 | GDA                       | 56                 | 293513  | 6428113  | Open site | Valid       | Artefact : - |           | <a href="#">Permits</a> |
|           | <a href="#">Contact</a> | <a href="#">Recorders</a> | Mr.Lennard Roberts |         |          |           |             |              |           |                         |
| 37-2-3123 | MTP-544                 | GDA                       | 56                 | 293163  | 6428082  | Open site | Valid       | Artefact : - |           |                         |
|           | <a href="#">Contact</a> | <a href="#">Recorders</a> | Mr.Lennard Roberts |         |          |           |             |              |           |                         |
| 37-2-3124 | MTP-545                 | GDA                       | 56                 | 293650  | 6427997  | Open site | Valid       | Artefact : - |           | <a href="#">Permits</a> |
|           | <a href="#">Contact</a> | <a href="#">Recorders</a> | Mr.Lennard Roberts |         |          |           |             |              |           |                         |
| 37-2-3125 | MTP-546                 | GDA                       | 56                 | 293717  | 6427946  | Open site | Valid       | Artefact : - |           | <a href="#">Permits</a> |
|           | <a href="#">Contact</a> | <a href="#">Recorders</a> | Mr.Lennard Roberts |         |          |           |             |              |           |                         |
| 37-2-3126 | MTP-547                 | GDA                       | 56                 | 293760  | 6427968  | Open site | Valid       | Artefact : - |           | <a href="#">Permits</a> |
|           | <a href="#">Contact</a> | <a href="#">Recorders</a> | Mr.Lennard Roberts |         |          |           |             |              |           |                         |
| 37-2-3127 | MTP-548                 | GDA                       | 56                 | 294332  | 6427890  | Open site | Valid       | Artefact : - |           | <a href="#">Permits</a> |
|           | <a href="#">Contact</a> | <a href="#">Recorders</a> | Mr.Lennard Roberts |         |          |           |             |              |           |                         |
| 37-2-3128 | MTP-549                 | GDA                       | 56                 | 294404  | 6427892  | Open site | Valid       | Artefact : - |           | <a href="#">Permits</a> |
|           | <a href="#">Contact</a> | <a href="#">Recorders</a> | Mr.Lennard Roberts |         |          |           |             |              |           |                         |
| 37-2-3129 | MTP-550                 | GDA                       | 56                 | 294520  | 6427830  | Open site | Valid       | Artefact : - |           | <a href="#">Permits</a> |
|           | <a href="#">Contact</a> | <a href="#">Recorders</a> | Mr.Lennard Roberts |         |          |           |             |              |           |                         |
| 37-2-3130 | MTP-551                 | GDA                       | 56                 | 294494  | 6427885  | Open site | Valid       | Artefact : - |           | <a href="#">Permits</a> |
|           | <a href="#">Contact</a> | <a href="#">Recorders</a> | Mr.Lennard Roberts |         |          |           |             |              |           |                         |
| 37-2-3131 | MTP-552                 | GDA                       | 56                 | 294564  | 6427988  | Open site | Valid       | Artefact : - |           | <a href="#">Permits</a> |
|           | <a href="#">Contact</a> | <a href="#">Recorders</a> | Mr.Lennard Roberts |         |          |           |             |              |           |                         |
| 37-2-3132 | MTP-553                 | GDA                       | 56                 | 294524  | 6427937  | Open site | Valid       | Artefact : - |           | <a href="#">Permits</a> |
|           | <a href="#">Contact</a> | <a href="#">Recorders</a> | Mr.Lennard Roberts |         |          |           |             |              |           |                         |
| 37-2-3133 | MTP-554                 | GDA                       | 56                 | 294422  | 6427982  | Open site | Valid       | Artefact : - |           | <a href="#">Permits</a> |
|           | <a href="#">Contact</a> | <a href="#">Recorders</a> | Mr.Lennard Roberts |         |          |           |             |              |           |                         |
| 37-2-3134 | MTP-555                 | GDA                       | 56                 | 294235  | 6428009  | Open site | Valid       | Artefact : - |           | <a href="#">Permits</a> |
|           | <a href="#">Contact</a> | <a href="#">Recorders</a> | Mr.Lennard Roberts |         |          |           |             |              |           |                         |
| 37-2-3135 | MTP-556                 | GDA                       | 56                 | 293841  | 6427847  | Open site | Valid       | Artefact : - |           | <a href="#">Permits</a> |
|           | <a href="#">Contact</a> | <a href="#">Recorders</a> | Mr.Lennard Roberts |         |          |           |             |              |           |                         |
| 37-2-3136 | MTP-557                 | GDA                       | 56                 | 293999  | 6427733  | Open site | Valid       | Artefact : - |           | <a href="#">Permits</a> |
|           | <a href="#">Contact</a> | <a href="#">Recorders</a> | Mr.Lennard Roberts |         |          |           |             |              |           |                         |

Report generated by AHIMS Web Service on 28/09/2011 for Geordie Oakes for the following area at Datum :GDA, Zone : 56, Eastings : 291225 - 297873, Northings : 6427341 - 6428128 with a Buffer of 50 meters.Additional Info : Archaeological Assessment. Number of Aboriginal sites and Aboriginal objects found is 72

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## AHIMS Web Services (AWS)

### Extensive search - Site list report

| SiteID    | SiteName       | Datum            | Zone | Easting             | Northing | Context   | Site Status | SiteFeatures   | SiteTypes | Reports |
|-----------|----------------|------------------|------|---------------------|----------|-----------|-------------|----------------|-----------|---------|
| 37-2-3137 | MTP-558        | GDA              | 56   | 294128              | 6427725  | Open site | Valid       | Artefact : -   |           |         |
|           | <u>Contact</u> | <u>Recorders</u> |      | Mr.Lennard Roberts  |          |           |             | <u>Permits</u> |           |         |
| 37-2-3139 | MTP-560        | GDA              | 56   | 294320              | 6427714  | Open site | Valid       | Artefact : -   |           |         |
|           | <u>Contact</u> | <u>Recorders</u> |      | Mr.Lennard Roberts  |          |           |             | <u>Permits</u> |           |         |
| 37-2-3140 | MTP-561        | GDA              | 56   | 294376              | 6427643  | Open site | Valid       | Artefact : -   |           |         |
|           | <u>Contact</u> | <u>Recorders</u> |      | Mr.Lennard Roberts  |          |           |             | <u>Permits</u> |           |         |
| 37-2-3141 | MTP-562        | GDA              | 56   | 294449              | 6427668  | Open site | Valid       | Artefact : -   |           |         |
|           | <u>Contact</u> | <u>Recorders</u> |      | Mr.Lennard Roberts  |          |           |             | <u>Permits</u> |           |         |
| 37-2-3142 | MTP-563        | GDA              | 56   | 294508              | 6427674  | Open site | Valid       | Artefact : -   |           |         |
|           | <u>Contact</u> | <u>Recorders</u> |      | Mr.Lennard Roberts  |          |           |             | <u>Permits</u> |           |         |
| 37-2-3143 | MTP-564        | GDA              | 56   | 294555              | 6427624  | Open site | Valid       | Artefact : -   |           |         |
|           | <u>Contact</u> | <u>Recorders</u> |      | Mr.Lennard Roberts  |          |           |             | <u>Permits</u> |           |         |
| 37-2-3144 | MTP-565        | GDA              | 56   | 294588              | 6427659  | Open site | Valid       | Artefact : -   |           |         |
|           | <u>Contact</u> | <u>Recorders</u> |      | Mr.Lennard Roberts  |          |           |             | <u>Permits</u> |           |         |
| 37-2-3146 | MTP-567        | GDA              | 56   | 294516              | 6427752  | Open site | Valid       | Artefact : -   |           |         |
|           | <u>Contact</u> | <u>Recorders</u> |      | Mr.Lennard Roberts  |          |           |             | <u>Permits</u> |           |         |
| 37-2-2846 | MTP-42         | GDA              | 56   | 293755              | 6427988  | Open site | Valid       | Artefact : -   |           |         |
|           | <u>Contact</u> | <u>Recorders</u> |      | Mr.Lennard Roberts  |          |           |             | <u>Permits</u> |           |         |
| 37-2-3138 | MTP-559        | GDA              | 56   | 294222              | 6427733  | Open site | Valid       | Artefact : -   |           |         |
|           | <u>Contact</u> | <u>Recorders</u> |      | Mr.Lennard Roberts  |          |           |             | <u>Permits</u> |           |         |
| 37-2-3145 | MTP-566        | GDA              | 56   | 294641              | 6427663  | Open site | Valid       | Artefact : -   |           |         |
|           | <u>Contact</u> | <u>Recorders</u> |      | Mr.Lennard Roberts  |          |           |             | <u>Permits</u> |           |         |
| 37-2-4061 | MTP-1413       | GDA              | 56   | 293422              | 6427540  | Open site | Valid       | Artefact : -   |           |         |
|           | <u>Contact</u> | <u>Recorders</u> |      | Ms.Helen Selimiotis |          |           |             | <u>Permits</u> |           |         |

Report generated by AHIMS Web Service on 28/09/2011 for Geordie Oakes for the following area at Datum :GDA, Zone : 56, Eastings : 291225 - 297873, Northings : 6427341 - 6428128 with a Buffer of 50 meters.Additional Info : Archaeological Assessment. Number of Aboriginal sites and Aboriginal objects found is 72

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AHIMS Web Services (AWS)  
Extensive search - Site list report

Your Ref Number : 60224819  
Client Service ID : 52276

| <u>SiteID</u> | <u>SiteName</u><br><u>Contact</u> | <u>Datum</u><br><u>Recorders</u> | <u>Zone</u> | <u>Easting</u> | <u>Northing</u> | <u>Context</u> | <u>Site Status</u> | <u>SiteFeatures</u><br><u>Permits</u> | <u>SiteTypes</u> | <u>Reports</u> |
|---------------|-----------------------------------|----------------------------------|-------------|----------------|-----------------|----------------|--------------------|---------------------------------------|------------------|----------------|
|---------------|-----------------------------------|----------------------------------|-------------|----------------|-----------------|----------------|--------------------|---------------------------------------|------------------|----------------|

There are no sites found for given search criteria.

Report generated by AHIMS Web Service on 28/09/2011 for Geordie Oakes for the following area at Datum :GDA, Zone : 56, Eastings : 291204 - 292879, Northings : 6424190 - 6425683 with a Buffer of 0 meters.Additional Info : Archaeological Assessment. Number of Aboriginal sites and Aboriginal objects found is 0  
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Your Ref Number : 60224819

Client Service ID : 52275

## AHIMS Web Services (AWS)

### Extensive search - Site list report

| <u>SiteID</u> | <u>SiteName</u>      | <u>Datum</u>     | <u>Zone</u>                     | <u>Easting</u> | <u>Northing</u> | <u>Context</u> | <u>Site Status</u> | <u>SiteFeatures</u> | <u>SiteTypes</u> | <u>Reports</u>            |
|---------------|----------------------|------------------|---------------------------------|----------------|-----------------|----------------|--------------------|---------------------|------------------|---------------------------|
| 37-2-0574     | B5;                  | AGD              | 56                              | 295850         | 6426950         | Open site      | Valid              | Artefact : -        | Open Camp Site   | 2687,100681,100765        |
|               | <u>Contact</u>       | <u>Recorders</u> | Elizabeth Rich                  |                |                 |                |                    | <u>Permits</u>      | 851              |                           |
| 37-2-0575     | B6;                  | AGD              | 56                              | 296140         | 6426700         | Open site      | Valid              | Artefact : -        | Open Camp Site   | 2687,100681,100765        |
|               | <u>Contact</u>       | <u>Recorders</u> | Elizabeth Rich                  |                |                 |                |                    | <u>Permits</u>      | 851              |                           |
| 37-2-0576     | B7;                  | AGD              | 56                              | 296740         | 6426520         | Open site      | Valid              | Artefact : -        | Open Camp Site   | 2687,100681,100765        |
|               | <u>Contact</u>       | <u>Recorders</u> | Elizabeth Rich                  |                |                 |                |                    | <u>Permits</u>      | 851              |                           |
| 37-2-0577     | B8;                  | AGD              | 56                              | 294880         | 6425880         | Open site      | Valid              | Artefact : -        | Open Camp Site   | 2687,100681,100765        |
|               | <u>Contact</u>       | <u>Recorders</u> | Ms.Laila Haglund                |                |                 |                |                    | <u>Permits</u>      | 851              |                           |
| 37-2-0578     | B9;                  | AGD              | 56                              | 294480         | 6426550         | Open site      | Valid              | Artefact : -        | Open Camp Site   | 2687,100681,100765        |
|               | <u>Contact</u>       | <u>Recorders</u> | Ms.Laila Haglund                |                |                 |                |                    | <u>Permits</u>      | 851              |                           |
| 37-2-0582     | B13; - Bengalla Mine | AGD              | 56                              | 293500         | 6425700         | Open site      | Destroyed          | Artefact : -        | Open Camp Site   | 2687,100681,100765,100995 |
|               | <u>Contact</u>       | <u>Recorders</u> | Elizabeth Rich,Barry French     |                |                 |                |                    | <u>Permits</u>      | 851,2621         |                           |
| 37-2-0583     | B14;                 | AGD              | 56                              | 293120         | 6425630         | Open site      | Valid              | Artefact : -        | Open Camp Site   | 2687,100681,100765        |
|               | <u>Contact</u>       | <u>Recorders</u> | Elizabeth Rich                  |                |                 |                |                    | <u>Permits</u>      |                  |                           |
| 37-2-0584     | B15;                 | AGD              | 56                              | 294200         | 6426480         | Open site      | Valid              | Artefact : -        | Open Camp Site   | 2687,100681,100765        |
|               | <u>Contact</u>       | <u>Recorders</u> | Bobbie Oakley,Ms.Laila Haglund  |                |                 |                |                    | <u>Permits</u>      |                  |                           |
| 37-2-0585     | B16;                 | AGD              | 56                              | 293700         | 6426600         | Open site      | Valid              | Artefact : -        | Open Camp Site   | 2687,100681,100765        |
|               | <u>Contact</u>       | <u>Recorders</u> | Elizabeth Rich,Barry French     |                |                 |                |                    | <u>Permits</u>      |                  |                           |
| 37-2-0586     | B17;                 | AGD              | 56                              | 293600         | 6426700         | Open site      | Valid              | Artefact : -        | Open Camp Site   | 2687,100681,100765        |
|               | <u>Contact</u>       | <u>Recorders</u> | Bobbie Oakley,Ms.Jill Ruig      |                |                 |                |                    | <u>Permits</u>      |                  |                           |
| 37-2-0587     | B18;                 | AGD              | 56                              | 293700         | 6426800         | Open site      | Valid              | Artefact : -        | Open Camp Site   | 2687,100681,100765        |
|               | <u>Contact</u>       | <u>Recorders</u> | Bobbie Oakley,Ms.Jill Ruig      |                |                 |                |                    | <u>Permits</u>      |                  |                           |
| 37-2-0588     | B19;                 | AGD              | 56                              | 294000         | 6426620         | Open site      | Valid              | Artefact : -        | Open Camp Site   | 2687,100681,100765        |
|               | <u>Contact</u>       | <u>Recorders</u> | Elizabeth Rich,Ms.Laila Haglund |                |                 |                |                    | <u>Permits</u>      |                  |                           |
| 37-2-0589     | B20;                 | AGD              | 56                              | 294200         | 6426750         | Open site      | Valid              | Artefact : -        | Open Camp Site   | 2687,100681,100765        |

Report generated by AHIMS Web Service on 28/09/2011 for Geordie Oakes for the following area at Datum :GDA, Zone : 56, Eastings : 291173 - 297900, Northings : 6425683 - 6427341 with a Buffer of 0 meters.Additional Info : Archaeological assessment. Number of Aboriginal sites and Aboriginal objects found is 74

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# **AHIMS Web Services (AWS)** **Extensive search - Site list report**

Your Ref Number : 60224819

Client Service ID : 52275

| SiteID    | SiteName                       | Datum            | Zone | Easting | Northing | Context   | Site Status | SiteFeatures   | SiteTypes      | Reports            |
|-----------|--------------------------------|------------------|------|---------|----------|-----------|-------------|----------------|----------------|--------------------|
|           | <u>Contact</u>                 | <u>Recorders</u> |      |         |          |           |             | <u>Permits</u> |                |                    |
| 37-2-0590 | B21;                           | AGD              | 56   | 294250  | 6426850  | Open site | Valid       | Artefact : -   | Open Camp Site | 2687,100681,100765 |
|           | <u>Contact</u>                 | <u>Recorders</u> |      |         |          |           |             | <u>Permits</u> |                |                    |
| 37-2-2086 | BEF1                           | AGD              | 56   | 293682  | 6426532  | Open site | Valid       | Artefact : 1   |                |                    |
|           | <u>Contact</u>                 | <u>Recorders</u> |      |         |          |           |             | <u>Permits</u> |                |                    |
| 37-2-2087 | BMRA1                          | AGD              | 56   | 292790  | 6425589  | Open site | Destroyed   | Artefact : 1   |                | 100765,101517      |
|           | <u>Contact</u> Searle          | <u>Recorders</u> |      |         |          |           |             | <u>Permits</u> |                |                    |
| 37-2-2088 | BMRA2                          | AGD              | 56   | 292802  | 6426004  | Open site | Destroyed   | Artefact : 1   |                | 100765,101517      |
|           | <u>Contact</u> Searle          | <u>Recorders</u> |      |         |          |           |             | <u>Permits</u> |                |                    |
| 37-2-2089 | BMRA3                          | AGD              | 56   | 292761  | 6426498  | Open site | Destroyed   | Artefact : 1   |                | 100765,101517      |
|           | <u>Contact</u>                 | <u>Recorders</u> |      |         |          |           |             | <u>Permits</u> |                |                    |
| 37-2-2090 | BMRA4                          | AGD              | 56   | 292583  | 6426881  | Open site | Destroyed   | Artefact : 1   |                | 100765,101517      |
|           | <u>Contact</u> Searle          | <u>Recorders</u> |      |         |          |           |             | <u>Permits</u> |                |                    |
| 37-2-2108 | BEF1 - Bengalla Mining Company | AGD              | 56   | 293785  | 6426722  | Open site | Destroyed   | Artefact : 1   |                | 100765             |
|           | <u>Contact</u> Searle          | <u>Recorders</u> |      |         |          |           |             | <u>Permits</u> | 2621           |                    |
| 37-2-2093 | B 2                            | AGD              | 56   | 293453  | 6425665  | Open site | Valid       | Artefact : 6   |                |                    |
|           | <u>Contact</u> Searle          | <u>Recorders</u> |      |         |          |           |             | <u>Permits</u> |                |                    |
| 37-2-2094 | B 3                            | AGD              | 56   | 293558  | 6425608  | Open site | Valid       | Artefact : 7   |                |                    |
|           | <u>Contact</u> Searle          | <u>Recorders</u> |      |         |          |           |             | <u>Permits</u> |                |                    |
| 37-2-2095 | B4                             | AGD              | 56   | 293615  | 6425597  | Open site | Valid       | Artefact : 1   |                |                    |
|           | <u>Contact</u> Searle          | <u>Recorders</u> |      |         |          |           |             | <u>Permits</u> |                |                    |
| 37-2-2096 | B5                             | AGD              | 56   | 293739  | 6425715  | Open site | Valid       | Artefact : 1   |                |                    |
|           | <u>Contact</u> Searle          | <u>Recorders</u> |      |         |          |           |             | <u>Permits</u> |                |                    |
| 37-2-2097 | B6                             | AGD              | 56   | 293791  | 6425766  | Open site | Valid       | Artefact : 1   |                |                    |
|           | <u>Contact</u> Searle          | <u>Recorders</u> |      |         |          |           |             | <u>Permits</u> |                |                    |
| 37-2-2098 | B7_                            | AGD              | 56   | 293713  | 6425763  | Open site | Valid       | Artefact : 1   |                |                    |
|           | <u>Contact</u> Searle          | <u>Recorders</u> |      |         |          |           |             | <u>Permits</u> |                |                    |
| 37-2-2099 | B8                             | AGD              | 56   | 293659  | 6425819  | Open site | Valid       | Artefact : 1   |                |                    |
|           | <u>Contact</u> Searle          | <u>Recorders</u> |      |         |          |           |             | <u>Permits</u> |                |                    |
| 37-2-2100 | B9_                            | AGD              | 56   | 293919  | 6425856  | Open site | Valid       | Artefact : 1   |                |                    |
|           | <u>Contact</u> Searle          | <u>Recorders</u> |      |         |          |           |             | <u>Permits</u> |                |                    |
| 37-2-2101 | B10_                           | AGD              | 56   | 293634  | 6425917  | Open site | Valid       | Artefact : 1   |                |                    |

Report generated by AHIMS Web Service on 28/09/2011 for Geordie Oakes for the following area at Datum :GDA, Zone : 56, Eastings : 291173 - 297900, Northings : 6425683 - 6427341 with a Buffer of 0 meters.Additional Info : Archaeological assessment. Number of Aboriginal sites and Aboriginal objects found is 74

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Your Ref Number : 60224819

Client Service ID : 52275

## AHIMS Web Services (AWS)

### Extensive search - Site list report

| SiteID    | SiteName                       | Datum            | Zone                | Easting | Northing | Context   | Site Status | SiteFeatures | SiteTypes | Reports |
|-----------|--------------------------------|------------------|---------------------|---------|----------|-----------|-------------|--------------|-----------|---------|
|           | <u>Contact</u> Searle          | <u>Recorders</u> | <u>Permits</u>      |         |          |           |             |              |           |         |
| 37-2-2102 | B11_                           | AGD              | 56                  | 293699  | 6425974  | Open site | Valid       | Artefact : 1 |           |         |
|           | <u>Contact</u> Searle          | <u>Recorders</u> | <u>Permits</u>      |         |          |           |             |              |           |         |
| 37-2-2103 | B12_                           | AGD              | 56                  | 293758  | 6426039  | Open site | Valid       | Artefact : 1 |           |         |
|           | <u>Contact</u> Searle          | <u>Recorders</u> | <u>Permits</u>      |         |          |           |             |              |           |         |
| 37-2-2104 | B13_                           | AGD              | 56                  | 294688  | 6425891  | Open site | Valid       | Artefact : 1 |           |         |
|           | <u>Contact</u> Searle          | <u>Recorders</u> | <u>Permits</u>      |         |          |           |             |              |           |         |
| 37-2-2105 | B14_                           | AGD              | 56                  | 294367  | 6425715  | Open site | Valid       | Artefact : 1 |           |         |
|           | <u>Contact</u> Searle          | <u>Recorders</u> | <u>Permits</u>      |         |          |           |             |              |           |         |
| 37-2-2106 | B15_                           | AGD              | 56                  | 294627  | 6425597  | Open site | Valid       | Artefact : 1 |           |         |
|           | <u>Contact</u> Searle          | <u>Recorders</u> | <u>Permits</u>      |         |          |           |             |              |           |         |
| 37-2-2107 | B16_                           | AGD              | 56                  | 294685  | 6425654  | Open site | Valid       | Artefact : 1 |           |         |
|           | <u>Contact</u> Searle          | <u>Recorders</u> | <u>Permits</u>      |         |          |           |             |              |           |         |
| 37-2-2109 | BEF2 - Bengalla Mining Company | AGD              | 56                  | 294028  | 6426561  | Open site | Destroyed   | Artefact : 1 |           | 100765  |
|           | <u>Contact</u> Searle          | <u>Recorders</u> | <u>Permits</u> 2621 |         |          |           |             |              |           |         |
| 37-2-2110 | BEF3 - Bengalla Mining Company | AGD              | 56                  | 294021  | 6426577  | Open site | Destroyed   | Artefact : 1 |           | 100765  |
|           | <u>Contact</u> Searle          | <u>Recorders</u> | <u>Permits</u> 2621 |         |          |           |             |              |           |         |
| 37-2-2111 | BEF4 - Bengalla Mining Company | AGD              | 56                  | 294012  | 6426572  | Open site | Destroyed   | Artefact : 1 |           | 100765  |
|           | <u>Contact</u> Searle          | <u>Recorders</u> | <u>Permits</u> 2621 |         |          |           |             |              |           |         |
| 37-2-2113 | Area 2 B2, 3,4,5,6,7           | AGD              | 56                  | 293453  | 6425665  | Open site | Destroyed   | Artefact : 1 |           | 100765  |
|           | <u>Contact</u> Searle          | <u>Recorders</u> | <u>Permits</u> 2621 |         |          |           |             |              |           |         |
| 37-2-2114 | Area 2 B 8                     | AGD              | 56                  | 293558  | 6425608  | Open site | Destroyed   | Artefact : 1 |           | 100765  |
|           | <u>Contact</u> Searle          | <u>Recorders</u> | <u>Permits</u> 2621 |         |          |           |             |              |           |         |
| 37-2-2115 | Area 2 B 9                     | AGD              | 56                  | 293615  | 6425597  | Open site | Destroyed   | Artefact : 1 |           | 100765  |
|           | <u>Contact</u> Searle          | <u>Recorders</u> | <u>Permits</u> 2621 |         |          |           |             |              |           |         |
| 37-2-2116 | Area 2 B 10                    | AGD              | 56                  | 293739  | 6425715  | Open site | Destroyed   | Artefact : 1 |           | 100765  |
|           | <u>Contact</u> Searle          | <u>Recorders</u> | <u>Permits</u> 2621 |         |          |           |             |              |           |         |
| 37-2-2117 | Area 2 B 11                    | AGD              | 56                  | 293791  | 6425766  | Open site | Destroyed   | Artefact : 1 |           | 100765  |
|           | <u>Contact</u> Searle          | <u>Recorders</u> | <u>Permits</u> 2621 |         |          |           |             |              |           |         |
| 37-2-2118 | Area 2 B 12                    | AGD              | 56                  | 293713  | 6425763  | Open site | Destroyed   | Artefact : 1 |           | 100765  |
|           | <u>Contact</u> Searle          | <u>Recorders</u> | <u>Permits</u> 2621 |         |          |           |             |              |           |         |
| 37-2-2119 | Area 2 B 13                    | AGD              | 56                  | 293659  | 6425819  | Open site | Destroyed   | Artefact : 1 |           | 100765  |
|           | <u>Contact</u> Searle          | <u>Recorders</u> | <u>Permits</u> 2621 |         |          |           |             |              |           |         |

Report generated by AHIMS Web Service on 28/09/2011 for Geordie Oakes for the following area at Datum :GDA, Zone : 56, Eastings : 291173 - 297900, Northings : 6425683 - 6427341 with a Buffer of 0 meters.Additional Info : Archaeological assessment. Number of Aboriginal sites and Aboriginal objects found is 74

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# AHIMS Web Services (AWS)

## Extensive search - Site list report

Your Ref Number : 60224819

Client Service ID : 52275

| SiteID    | SiteName              | Datum            | Zone                                   | Easting | Northing | Context   | Site Status | SiteFeatures | SiteTypes | Reports |
|-----------|-----------------------|------------------|----------------------------------------|---------|----------|-----------|-------------|--------------|-----------|---------|
| 37-2-2120 | Area 2 B 14           | AGD              | 56                                     | 293919  | 6425856  | Open site | Destroyed   | Artefact : 1 |           | 100765  |
|           | <u>Contact</u> Searle | <u>Recorders</u> | Indigenous Outcomes - Cheryl Kitchener |         |          |           |             |              |           |         |
| 37-2-2121 | Area 2 B 15           | AGD              | 56                                     | 293634  | 6425917  | Open site | Destroyed   | Artefact : 1 |           | 100765  |
|           | <u>Contact</u> Searle | <u>Recorders</u> | Indigenous Outcomes - Cheryl Kitchener |         |          |           |             |              |           |         |
| 37-2-2122 | Area 2 B 16           | AGD              | 56                                     | 293699  | 6425974  | Open site | Destroyed   | Artefact : 1 |           | 100765  |
|           | <u>Contact</u> Searle | <u>Recorders</u> | Indigenous Outcomes - Cheryl Kitchener |         |          |           |             |              |           |         |
| 37-2-2123 | Area 2 B 17           | AGD              | 56                                     | 293758  | 6426039  | Open site | Destroyed   | Artefact : 1 |           | 100765  |
|           | <u>Contact</u> Searle | <u>Recorders</u> | Indigenous Outcomes - Cheryl Kitchener |         |          |           |             |              |           |         |
| 37-2-2124 | Area 1 B 18           | AGD              | 56                                     | 294688  | 6425891  | Open site | Destroyed   | Artefact : 1 |           | 100765  |
|           | <u>Contact</u> Searle | <u>Recorders</u> | Indigenous Outcomes - Cheryl Kitchener |         |          |           |             |              |           |         |
| 37-2-2125 | Area 1 B 19           | AGD              | 56                                     | 294367  | 6425715  | Open site | Destroyed   | Artefact : 1 |           | 100765  |
|           | <u>Contact</u> Searle | <u>Recorders</u> | Indigenous Outcomes - Cheryl Kitchener |         |          |           |             |              |           |         |
| 37-2-2126 | Area 1 B 20           | AGD              | 56                                     | 294627  | 6425597  | Open site | Destroyed   | Artefact : 1 |           | 100765  |
|           | <u>Contact</u> Searle | <u>Recorders</u> | Indigenous Outcomes - Cheryl Kitchener |         |          |           |             |              |           |         |
| 37-2-2127 | Area 1 B 21           | AGD              | 56                                     | 294685  | 6425654  | Open site | Destroyed   | Artefact : 1 |           | 100765  |
|           | <u>Contact</u> Searle | <u>Recorders</u> | Indigenous Outcomes - Cheryl Kitchener |         |          |           |             |              |           |         |
| 37-2-3534 | MTP-956               | GDA              | 56                                     | 293655  | 6427070  | Open site | Valid       | Artefact : - |           |         |
|           | <u>Contact</u>        | <u>Recorders</u> | Mr.Lennard Roberts                     |         |          |           |             |              |           |         |
| 37-2-3535 | MTP-957               | GDA              | 56                                     | 293606  | 6427166  | Open site | Valid       | Artefact : - |           |         |
|           | <u>Contact</u>        | <u>Recorders</u> | Mr.Lennard Roberts                     |         |          |           |             |              |           |         |
| 37-2-3536 | MTP-958               | GDA              | 56                                     | 293616  | 6426854  | Open site | Valid       | Artefact : - |           |         |
|           | <u>Contact</u>        | <u>Recorders</u> | Mr.Lennard Roberts                     |         |          |           |             |              |           |         |
| 37-2-3538 | MTP-960               | GDA              | 56                                     | 293707  | 6426546  | Open site | Valid       | Artefact : - |           |         |
|           | <u>Contact</u>        | <u>Recorders</u> | Mr.Lennard Roberts                     |         |          |           |             |              |           |         |
| 37-2-3539 | MTP-961               | GDA              | 56                                     | 293663  | 6426676  | Open site | Valid       | Artefact : - |           |         |
|           | <u>Contact</u>        | <u>Recorders</u> | Mr.Lennard Roberts                     |         |          |           |             |              |           |         |
| 37-2-3540 | MTP-962               | GDA              | 56                                     | 293657  | 6426687  | Open site | Valid       | Artefact : - |           |         |
|           | <u>Contact</u>        | <u>Recorders</u> | Mr.Lennard Roberts                     |         |          |           |             |              |           |         |
| 37-2-3541 | MTP-963               | GDA              | 56                                     | 293696  | 6426754  | Open site | Valid       | Artefact : - |           |         |
|           | <u>Contact</u>        | <u>Recorders</u> | Mr.Lennard Roberts                     |         |          |           |             |              |           |         |
| 37-2-3542 | MTP-964               | GDA              | 56                                     | 293653  | 6426850  | Open site | Valid       | Artefact : - |           |         |
|           | <u>Contact</u>        | <u>Recorders</u> | Mr.Lennard Roberts                     |         |          |           |             |              |           |         |

Report generated by AHIMS Web Service on 28/09/2011 for Geordie Oakes for the following area at Datum :GDA, Zone : 56, Eastings : 291173 - 297900, Northings : 6425683 - 6427341 with a Buffer of 0 meters.Additional Info : Archaeological assessment. Number of Aboriginal sites and Aboriginal objects found is 74

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Your Ref Number : 60224819

Client Service ID : 52275

## AHIMS Web Services (AWS)

### Extensive search - Site list report

| SiteID    | SiteName       | Datum            | Zone                | Easting | Northing | Context   | Site Status | SiteFeatures | SiteTypes | Reports        |
|-----------|----------------|------------------|---------------------|---------|----------|-----------|-------------|--------------|-----------|----------------|
| 37-2-3543 | MTP-965        | GDA              | 56                  | 293674  | 6426885  | Open site | Valid       | Artefact : - |           |                |
|           | <u>Contact</u> | <u>Recorders</u> | Mr.Lennard Roberts  |         |          |           |             |              |           | <u>Permits</u> |
| 37-2-3544 | MTP-966        | GDA              | 56                  | 293650  | 6426907  | Open site | Valid       | Artefact : - |           |                |
|           | <u>Contact</u> | <u>Recorders</u> | Mr.Lennard Roberts  |         |          |           |             |              |           | <u>Permits</u> |
| 37-2-3545 | MTP-967        | GDA              | 56                  | 293574  | 6426250  | Open site | Valid       | Artefact : - |           |                |
|           | <u>Contact</u> | <u>Recorders</u> | Mr.Lennard Roberts  |         |          |           |             |              |           | <u>Permits</u> |
| 37-2-3546 | MTP-968        | GDA              | 56                  | 293355  | 6426073  | Open site | Valid       | Artefact : - |           |                |
|           | <u>Contact</u> | <u>Recorders</u> | Mr.Lennard Roberts  |         |          |           |             |              |           | <u>Permits</u> |
| 37-2-3547 | MTP-969        | GDA              | 56                  | 293221  | 6425907  | Open site | Valid       | Artefact : - |           |                |
|           | <u>Contact</u> | <u>Recorders</u> | Mr.Lennard Roberts  |         |          |           |             |              |           | <u>Permits</u> |
| 37-2-3548 | MTP-970        | GDA              | 56                  | 293182  | 6425886  | Open site | Valid       | Artefact : - |           |                |
|           | <u>Contact</u> | <u>Recorders</u> | Mr.Lennard Roberts  |         |          |           |             |              |           | <u>Permits</u> |
| 37-2-3549 | MTP-971        | GDA              | 56                  | 293105  | 6425932  | Open site | Valid       | Artefact : - |           |                |
|           | <u>Contact</u> | <u>Recorders</u> | Mr.Lennard Roberts  |         |          |           |             |              |           | <u>Permits</u> |
| 37-2-3550 | MTP-972        | GDA              | 56                  | 293183  | 6425961  | Open site | Valid       | Artefact : - |           |                |
|           | <u>Contact</u> | <u>Recorders</u> | Mr.Lennard Roberts  |         |          |           |             |              |           | <u>Permits</u> |
| 37-2-3551 | MTP-973        | GDA              | 56                  | 293334  | 6426058  | Open site | Valid       | Artefact : - |           |                |
|           | <u>Contact</u> | <u>Recorders</u> | Mr.Lennard Roberts  |         |          |           |             |              |           | <u>Permits</u> |
| 37-2-3552 | MTP-974        | GDA              | 56                  | 293349  | 6426079  | Open site | Valid       | Artefact : - |           |                |
|           | <u>Contact</u> | <u>Recorders</u> | Mr.Lennard Roberts  |         |          |           |             |              |           | <u>Permits</u> |
| 37-2-3537 | MTP-959        | GDA              | 56                  | 293641  | 6426641  | Open site | Valid       | Artefact : - |           |                |
|           | <u>Contact</u> | <u>Recorders</u> | Mr.Lennard Roberts  |         |          |           |             |              |           | <u>Permits</u> |
| 37-2-4062 | MTP-1460       | GDA              | 56                  | 293513  | 6426231  | Open site | Valid       | Artefact : - |           |                |
|           | <u>Contact</u> | <u>Recorders</u> | Ms.Helen Selimiotis |         |          |           |             |              |           | <u>Permits</u> |
| 37-2-4063 | MTP-1462       | GDA              | 56                  | 293615  | 6426715  | Open site | Valid       | Artefact : - |           |                |
|           | <u>Contact</u> | <u>Recorders</u> | Ms.Helen Selimiotis |         |          |           |             |              |           | <u>Permits</u> |

Report generated by AHIMS Web Service on 28/09/2011 for Geordie Oaks for the following area at Datum :GDA, Zone : 56, Eastings : 291173 - 297900, Northings : 6425683 - 6427341 with a Buffer of 0 meters.Additional Info : Archaeological assessment. Number of Aboriginal sites and Aboriginal objects found is 74

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## Appendix D

# Survey Coverage

## Appendix D Survey Coverage

| Transect # | Surveyors | Width | Exposure | Visibility | Length   | Total Area Surveyed(m) | Total Area Surveyed (ha) | Effective Coverage Area (ha) |
|------------|-----------|-------|----------|------------|----------|------------------------|--------------------------|------------------------------|
| 1          | 13        | 130   | 20%      | 40%        | 1805.418 | 234704.2976            | 23.47042976              | 1.877634381                  |
| 2          | 13        | 130   | 10%      | 50%        | 1552.216 | 201788.0227            | 20.17880227              | 1.008940113                  |
| 3          | 13        | 130   | 10%      | 30%        | 1487.467 | 193370.7299            | 19.33707299              | 0.58011219                   |
| 4          | 13        | 130   | 30%      | 60%        | 2032.319 | 264201.5               | 26.42015                 | 4.755627001                  |
| 6          | 12        | 120   | 20%      | 40%        | 1619.889 | 194386.6844            | 19.43866844              | 1.555093475                  |
| 7          | 12        | 120   | 20%      | 30%        | 2100.729 | 252087.4889            | 25.20874889              | 1.512524934                  |
| 8          | 12        | 120   | 30%      | 20%        | 2959.442 | 355133.0224            | 35.51330224              | 2.130798135                  |
| 9          | 11        | 110   | 10%      | 40%        | 1323.276 | 145560.4055            | 14.55604055              | 0.582241622                  |
| 10         | 11        | 110   | 10%      | 60%        | 3529.158 | 388207.4027            | 38.82074027              | 2.329244416                  |
| 11         | 11        | 110   | 40%      | 80%        | 1846.463 | 203110.904             | 20.3110904               | 6.499548927                  |
| 12         | 11        | 110   | 10%      | 50%        | 1725.869 | 189845.5374            | 18.98455374              | 0.949227687                  |
| 13         | 11        | 110   | 10%      | 40%        | 1752.383 | 192762.1106            | 19.27621106              | 0.771048442                  |
| 14         | 11        | 110   | 20%      | 40%        | 2468.418 | 271525.9496            | 27.15259496              | 2.172207597                  |
| 15         | 11        | 110   | 30%      | 60%        | 2511.372 | 276250.9706            | 27.62509706              | 4.972517471                  |
| 16         | 11        | 110   | 20%      | 30%        | 968.2571 | 106508.2808            | 10.65082808              | 0.639049685                  |
| 17         | 12        | 120   | 10%      | 20%        | 617.3227 | 74078.72447            | 7.407872447              | 0.148157449                  |
| 18         | 12        | 120   | 10%      | 20%        | 856.981  | 102837.7239            | 10.28377239              | 0.205675448                  |
| 19         | 12        | 120   | 30%      | 40%        | 2859.807 | 343176.8305            | 34.31768305              | 4.118121966                  |
| 20         | 12        | 120   | 20%      | 20%        | 2474.824 | 296978.9317            | 29.69789317              | 1.187915727                  |
| 21         | 12        | 120   | 30%      | 30%        | 2233.263 | 267991.5856            | 26.79915856              | 2.41192427                   |
| 22         | 12        | 120   | 30%      | 40%        | 856.6524 | 102798.2889            | 10.27982889              | 1.233579467                  |
| 23         | 12        | 120   | 40%      | 60%        | 2315.777 | 277893.2861            | 27.78932861              | 6.669438867                  |
| 24         | 12        | 120   | 20%      | 40%        | 1819.684 | 218362.1106            | 21.83621106              | 1.746896885                  |
| 25         | 12        | 120   | 40%      | 50%        | 1772.792 | 212735.0977            | 21.27350977              | 4.254701953                  |
| 26         | 12        | 120   | 40%      | 60%        | 1973.572 | 236828.6727            | 23.68286727              | 5.683888146                  |
| 27         | 12        | 120   | 20%      | 40%        | 3682.819 | 441938.291             | 44.1938291               | 3.535506328                  |
| 28         | 12        | 120   | 30%      | 60%        | 2042.389 | 245086.6228            | 24.50866228              | 4.41155921                   |
| 29         | 13        | 130   | 20%      | 40%        | 3581.083 | 465540.7752            | 46.55407752              | 3.724326202                  |
| 30         | 13        | 130   | 20%      | 30%        | 3545.949 | 460973.3536            | 46.09733536              | 2.765840122                  |
| 31         | 13        | 130   | 20%      | 30%        | 1163.409 | 151243.1582            | 15.12431582              | 0.907458949                  |

|              |    |     |     |     |          |             |                    |                    |
|--------------|----|-----|-----|-----|----------|-------------|--------------------|--------------------|
| 32           | 12 | 120 | 20% | 40% | 4710.363 | 565243.5972 | 56.52435972        | 4.521948777        |
| 33           | 11 | 110 | 20% | 20% | 4177.355 | 459509.0076 | 45.95090076        | 1.83803603         |
| 34           | 3  | 30  | 30% | 20% | 1157.896 | 34736.87947 | 3.473687947        | 0.208421277        |
| 35           | 13 | 130 | 20% | 40% | 3253.006 | 422890.8404 | 42.28908404        | 3.383126723        |
| 36           | 13 | 130 | 10% | 10% | 3285.112 | 427064.6092 | 42.70646092        | 0.427064609        |
| 37           | 13 | 130 | 10% | 10% | 3281.419 | 426584.421  | 42.6584421         | 0.426584421        |
| 38           | 13 | 130 | 10% | 10% | 3313.981 | 430817.4828 | 43.08174828        | 0.430817483        |
| 39           | 13 | 130 | 10% | 10% | 3317.467 | 431270.665  | 43.1270665         | 0.431270665        |
| 40           | 13 | 130 | 10% | 10% | 3348.425 | 435295.1871 | 43.52951871        | 0.435295187        |
| 41           | 13 | 130 | 10% | 10% | 304.3735 | 39568.55127 | 3.956855127        | 0.039568551        |
| 42           | 13 | 130 | 20% | 20% | 730.5453 | 94970.88528 | 9.497088528        | 0.379883541        |
| <b>TOTAL</b> |    |     |     |     |          |             | <b>1113.585889</b> | <b>87.86282433</b> |

## Appendix E

# Aboriginal Archaeological Site Data





[illegible]



































|      |            |           |                 |                      |                  |   |      |      |      |        |          |               |   |      |         |          |       |     |  |  |             |             |             |             |     |             |
|------|------------|-----------|-----------------|----------------------|------------------|---|------|------|------|--------|----------|---------------|---|------|---------|----------|-------|-----|--|--|-------------|-------------|-------------|-------------|-----|-------------|
| 1061 | BM-AS25-12 | Silcrete  | Flake           | Complete             |                  | 0 | 23.2 | 26.9 | 9.6  | None   | Multiple |               | 0 | 0    |         |          |       |     |  |  | 292333.1509 | 6425339.177 | 2132.549156 | 84.31205726 | 1st | Lower slope |
| 1062 | BM-AS25-12 | Silcrete  | Flake           | Split Flake (Siret)  |                  | 0 | 48.2 | 32.3 | 10.9 |        |          |               | 0 | 0    |         |          |       |     |  |  | 292333.3693 | 6425340.638 | 2131.84937  | 85.66671643 | 1st | Lower slope |
| 1063 | BM-AS25-12 | IM/Tuff   | Flake           | Complete             |                  | 0 | 29.1 | 40.3 | 10.2 | None   | Single   |               | 0 | 0    |         |          |       |     |  |  | 292345.2899 | 6425339.068 | 2121.168257 | 81.86197745 | 1st | Lower slope |
| 1064 | BM-AS26-12 | Silcrete  | Core            |                      | Multidirectional | 3 | 50.6 | 41.7 | 24.8 | 1-50%  |          |               | 5 | 28.1 |         |          |       |     |  |  | 291448.8189 | 6425489.506 | 2946.912031 | 37.03458806 | 1st | Upper slope |
| 1065 | BM-AS26-12 | Silcrete  | Flake           | Complete             |                  | 0 | 41.1 | 22.5 | 13.2 | 1-50%  | Single   |               | 0 | 0    |         |          |       |     |  |  | 291520.332  | 6425508.616 | 2873.054304 | 94.01285992 | 1st | Upper slope |
| 1066 | BM-AS06-12 | IM/Tuff   | Flake           | Complete             |                  | 0 | 27.1 | 27.6 | 8    | None   | Single   |               | 0 | 0    |         |          |       |     |  |  | 292394.0287 | 6425475.983 | 2031.824129 | 221.5853627 | 1st | Lower slope |
| 1067 | BM-AS06-12 | Silcrete  | Flake Shatter   |                      |                  | 0 | 15.4 | 14.5 | 2.8  |        |          |               | 0 | 0    |         |          |       |     |  |  | 292395.1357 | 6425473.397 | 2031.510857 | 219.2383558 | 1st | Lower slope |
| 1068 | BM-IA01-12 | IM/Tuff   | Flake           | Complete             |                  | 0 | 45   | 42   | 14.7 | None   | Single   |               | 0 | 0    |         |          |       |     |  |  | 293979.2547 | 6427459.606 | 1444.081526 | 271.3545638 | 2nd | Lower slope |
| 1069 | BM-IA02-12 | Silcrete  | Flake           | Complete             |                  | 0 | 43.4 | 32.7 | 11.9 | 1-50%  | Single   |               | 0 | 0    |         |          |       |     |  |  | 293105.8539 | 6427486.783 | 1885.37458  | 112.1290063 | 2nd | Mid slope   |
| 1070 | BM-IA03-12 | Silcrete  | Flake           |                      |                  | 0 | 0    | 0    | 0    |        |          |               | 0 | 0    |         |          |       |     |  |  | 292741.5184 | 6427051.001 | 1879.87443  | 233.1611277 | 1st | Mid slope   |
| 1071 | BM-IA04-12 | Other     | Flake           | Broken FI (Proximal) |                  | 0 | 26.5 | 0    | 0    |        |          |               | 0 | 0    |         |          |       |     |  |  | 293086.8943 | 6426348.331 | 1285.315554 | 308.7290919 | 2nd | Upper slope |
| 1072 | BM-IA05-12 | Silcrete  | Flake           | Complete             |                  | 0 | 23   | 25   | 8    | None   | Single   |               | 0 | 0    |         |          |       |     |  |  | 292830.1773 | 6427900.603 | 2379.500527 | 254.1792451 | 1st | Upper slope |
| 1073 | BM-IA06-12 | Silcrete  | Flake           | Complete             |                  | 0 | 38   | 30   | 9.5  | None   | Single   |               | 0 | 0    |         |          |       |     |  |  | 292414.7711 | 6428066.675 | 2779.794793 | 131.3327657 | 1st | Upper slope |
| 1074 | BM-IA07-12 | Quartz    | Flake           | Complete             |                  | 0 | 38   | 30.7 | 15.7 | None   | Single   |               | 0 | 0    |         |          |       |     |  |  | 292449.6859 | 6427622.627 | 2451.574906 | 28.86901936 | 2nd | Mid slope   |
| 1075 | BM-IA08-12 | IM/Tuff   | Flake           | Complete             |                  | 0 | 29.7 | 29.8 | 8.4  | 1-50%  | Cortical |               | 0 | 0    |         |          |       |     |  |  | 292235.0164 | 6427681.769 | 2656.305708 | 26.63672356 | 1st | Upper slope |
| 1076 | BM-IA09-12 | Silcrete  | Flake           | Broken FI (Proximal) |                  | 0 | 35.3 | 0    | 0    |        | Single   |               | 0 | 0    |         |          |       |     |  |  | 292874.7298 | 6429137.074 | 3406.903814 | 137.9095023 | 1st | Upper slope |
| 1077 | BM-IA10-12 | Silcrete  | Flake           | Complete             |                  | 0 | 68   | 48   | 16   | 1-50%  | Single   |               | 0 | 0    |         |          |       |     |  |  | 292119.1395 | 6426980.838 | 2403.479279 | 152.5619964 | 1st | Mid slope   |
| 1078 | BM-IA11-12 | IM/Tuff   | Angular Shatter |                      |                  | 0 | 29.7 | 28   | 20   |        |          |               | 0 | 0    |         |          |       |     |  |  | 291959.0422 | 6426694.261 | 2463.416953 | 107.3203727 | 2nd | Mid slope   |
| 1079 | BM-IA12-12 | FGS Other | Flake           | Complete             |                  | 0 | 77.9 | 47.7 | 17.5 | 1-50%  | Multiple |               | 0 | 0    |         |          |       |     |  |  | 292340.1632 | 6426455.166 | 2038.007176 | 133.2002112 | 2nd | Mid slope   |
| 1080 | BM-IA13-12 | Silcrete  | Core            |                      | Multidirectional | 4 | 41.1 | 28.8 | 15   | None   |          | Indeterminate | 8 | 38.6 |         |          |       |     |  |  | 292140.1135 | 6426567.087 | 2257.038929 | 113.9452823 | 2nd | Mid slope   |
| 1081 | BM-IA14-12 | Silcrete  | Core            |                      |                  | 1 | 25.9 | 24.6 | 16.1 | None   |          | Indeterminate | 4 | 23.9 |         |          |       |     |  |  | 291467.3161 | 6426433.216 | 2896.406176 | 27.17171783 | 1st | Mid slope   |
| 1082 | BM-IA15-12 | IM/Tuff   | Flake           | Broken FI (Proximal) |                  | 0 | 26.2 | 0    | 0    |        | Multiple |               | 0 | 0    |         |          |       |     |  |  | 291770.6565 | 6426148.145 | 2570.55022  | 135.2376091 | 2nd | Mid slope   |
| 1083 | BM-IA16-12 | Silcrete  | Core            |                      | Multidirectional | 2 | 79.7 | 73   | 29.5 | 1-50%  |          | Flake         | 5 | 24.6 |         |          |       |     |  |  | 291840.5192 | 6425815.612 | 2511.259626 | 376.8552413 | 1st | Upper slope |
| 1084 | BM-IA17-12 | Silcrete  | Flake Shatter   |                      |                  | 0 | 14.3 | 9.8  | 1.8  |        |          |               | 0 | 0    |         |          |       |     |  |  | 292380.9937 | 6425752.653 | 1982.902739 | 260.7459204 | 3rd | Mid slope   |
| 1085 | BM-IA18-12 | FGS Other | Core            |                      | Bifacial         | 1 | 111  | 82.5 | 31.4 | 51-99% |          | Cobble        | 9 | 30.4 |         |          |       |     |  |  | 291954.7039 | 6425628.813 | 2423.918028 | 251.7795718 | 1st | Mid slope   |
| 1086 | BM-IA19-12 | Silcrete  | Flake Shatter   |                      |                  | 0 | 41.9 | 0    | 0    |        |          |               | 0 | 0    |         |          |       |     |  |  | 291700.6968 | 6425294.329 | 2748.21566  | 123.23415   | 1st | Mid slope   |
| 1087 | BM-IA20-12 | Silcrete  | Flake           | Complete             |                  | 0 | 28.1 | 39.7 | 7.1  | None   | Single   |               | 0 | 0    |         |          |       |     |  |  | 292306.135  | 6425197.639 | 2209.377135 | 77.68199789 | 1st | Lower slope |
| 1088 | BM-IA21-12 | Silcrete  | Flake           | Complete             |                  | 0 | 75   | 35   | 20   | None   | Single   |               | 0 | 0    |         |          |       |     |  |  | 292185.9954 | 6425108.485 | 2355.068751 | 203.7528924 | 1st | Mid slope   |
| 1089 | BM-IA22-12 | IM/Tuff   | Flake           | Complete             |                  | 0 | 48.9 | 58.2 | 15.9 | None   | Multiple |               | 0 | 0    |         |          |       |     |  |  | 292347.5468 | 6424992.501 | 2260.75848  | 265.4265562 | 1st | Mid slope   |
| 1090 | BM-IA23-12 | IM/Tuff   | Flake           | Complete             |                  | 0 | 48.3 | 37.3 | 29.4 | 1-50%  | Multiple |               | 0 | 0    |         |          |       |     |  |  | 292406.5204 | 6424802.846 | 2306.704666 | 455.5503098 | 1st | Mid slope   |
| 1091 | MTP-AS1-12 | Silcrete  | Flake Shatter   |                      |                  | 0 | 21   | 0    | 0    |        |          |               | 0 | 0    |         |          |       |     |  |  | 293409.6535 | 6427885.128 | 2047.344247 | 205.7791975 | 1st | Mid slope   |
| 1092 | MTP-AS1-12 | Silcrete  | Core            |                      | Multidirectional | 3 | 80.6 | 66.2 | 38   | None   |          | Flake         | 4 | 31.4 |         |          |       |     |  |  | 293421.1326 | 6427880.937 | 2038.412846 | 212.7615927 | 1st | Mid slope   |
| 1093 | MTP-AS2-12 | Quartz    | Core            |                      |                  | 1 | 12   | 7    | 5    | None   |          | Flake         | 1 | 12   |         |          |       |     |  |  | 294508.9654 | 6427392.762 | 1342.231514 | 113.7852392 | 1st | Lower slope |
| 1094 | MTP-AS2-12 | Silcrete  | Flake Shatter   |                      |                  | 0 | 12   | 0    | 0    |        |          |               | 0 | 0    |         |          |       |     |  |  | 294517.4528 | 6427392.733 | 1343.299244 | 107.036045  | 1st | Lower slope |
| 1095 | MTP-AS3-12 | Silcrete  | Flake           | Complete             |                  | 0 | 56.7 | 50   | 20.3 | None   | Single   |               | 0 | 0    |         |          |       |     |  |  | 294152.9898 | 6427942.799 | 1890.802446 | 220.7420919 | 2nd | Lower slope |
| 1096 | MTP-AS3-12 | Silcrete  | Flake           | Complete             |                  | 0 | 27.4 | 17.4 | 10.2 | None   | Single   |               | 0 | 0    |         |          |       |     |  |  | 294144.025  | 6427943.656 | 1892.561304 | 223.9347173 | 2nd | Lower slope |
| 1097 | MTP-IA1-12 | Other     | Retouched Flake | Complete             |                  | 0 | 0    | 0    | 0    |        |          |               | 0 | 0    | Scraper | Complete | Flake | V-D |  |  | 294099.6185 | 6427451.157 | 1410.50438  | 209.3339981 | 4th | Lower slope |
| 1098 | MTP-IA2-12 | Silcrete  | Flake           | Broken FI (Proximal) |                  | 0 | 21.4 | 0    | 0    |        | Multiple |               | 0 | 0    |         |          |       |     |  |  | 293974.1243 | 6428112.323 | 2083.412796 | 288.8860526 | 2nd | Mid slope   |

## Appendix F

# Arborist Scarred Tree Assessment

Scar Tree Assessment  
Bengalla Mining Company



# SCAR TREE ASSESSMENT

## BENGALLA MINING COMPANY PTY LTD



*Prepared for:* Bengalla Mining Company Pty Ltd

*Prepared by:* Global Soil Systems

*Date:* 22 August 2012

Scar Tree Assessment  
Bengalla Mining Company



# SCAR TREE ASSESSMENT BENGALLA MINING COMPANY PTY LTD

## August 2012

Prepared for:  
Bengalla Mining Company Pty Ltd

Prepared by:

---

Dr Mark Burns (PhD, Master Resource Science, BSc (Forestry - Honours1)  
Principal  
*Global Soil Systems*

Scar Tree Assessment  
Bengalla Mining Company



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Scar Tree Assessment  
Bengalla Mining Company



## 1.0 BACKGROUND AND OBJECTIVES

Dr Mark Burns (Director Global Soil Systems) was engaged to prepare this report for the Bengalla Mining Company. Other members of the inspection team included Geordie Oakes (AECOM), Maree Waugh (Aboriginal representative – Wallagan Cultural Services), Annie Hickey (Aboriginal representative - Gidawaa Walang Cultural Heritage Consultancy) and Calvin Leech (Bengalla Mine Environmental Adviser).

The principal objective of the inspection and this report was to clarify whether observed tree scarring related to early Aboriginal activity or whether it was attributable to other causes. A total of four trees were examined.

The assessment methodology largely conforms to Long (2005). Conclusions drawn are based on this approach and also a local case study and extensive practical involvement by the author in forestry, nursery, farm extension advice and mine rehabilitation over a 37 year period in the Hunter Valley, NSW.

## 2.0 CAUSES OF TREE SCARRING

Scars can be attributed to a range of man-made and natural causes (Long 2005). The main causes of scarring include the following.

### ***Natural Scarred Trees***

Some of the most common causes of tree scarring can be attributed to natural causes including lightning strikes, wind damage, branch tears, larval activity, termite activity, bird damage, fire damage, abrasion and numerous other minor impacts which can create small or large scars on trees. The exact cause of natural scarring is often difficult to identify as several factors can often combine to produce a scar. The majority of scars that exist in the Australian landscape today are the result of natural and incidental causes (Long 2005). The cumulative effects of natural tree growth and decay, land clearance and forest management have removed most of the mature trees which held cultural scars in the pre-contact and even historical periods of Australia's past. These have largely been replaced with younger trees bearing the impacts associated with the agricultural and forestry use of the landscape which followed the earlier subsistence use of the landscape after c.1870 (Long 2005). Many scars are the result of several processes, the order of which is not always clear.

In reviewing comments in this report it is important to understand that remnant forest and woodland areas on the floor of the upper Hunter Valley have been extensively disturbed and modified over a long period following the arrival of Europeans. As mentioned by Long (2005) this has effectively resulted in most tree scars being the result of natural and incidental causes. This needs to be kept firmly in mind when assessing the probability of scars relating to Aboriginal activity.

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### **European Scarred Trees**

A range of scars can also be related to European activity and European bark removal. Scars are generally limited to rectangular panels, approximately 1 – 3 meters in length, which reflects their primary use for building cladding. European scars can also include survey and blaze marks and bark strip scars. Scars can also relate to past clearing activities and associated damage to tree trunks.

### **Aboriginal Scarred Trees**

Aboriginal scars often have differing forms.

1. Curved (pre-form) bark removal scars. This category consists of circular, oval or elongated scars resulting from the removal of a pre-formed artifact, such as a canoe or container that took shape from a curved section of either the tree bole, a major limb or a large burl.
2. Bark slab (sheet) removal scars. Sheet and slab artifacts are produced from rectangular or square sheets of bark.
3. Toe holds. Toe holds are a series of small incisions into the bark designed to create a toe hold for climbing purposes.
4. Resource extraction holes such as smoke holes and access holes.
5. Other scar forms such as bark strip removal scars, grub procurement scars, marked and carved trees and wood removal scars.

## **3.0 LIFE SPANS AND A LOCAL EXAMPLE OF WOUND REGROWTH**

Past experience by the author in forestry and scar tree assessment in the Upper Hunter Valley has been drawn upon to determine both the age of trees, and the likely age of wound regrowth in the study trees.

### **Estimating Maximum Life Span**

There is no doubt that some Australian eucalypt species such as River Red Gum (*Eucalyptus camaldulensis*) can live up to 500 years and longer. Species in the colder south-eastern highlands of Australia such as *Eucalyptus regnans* can live for 200-400 years (Jacobs 1955). However, experience has shown that the maximum life span of most dominant eucalypt species such as Iron Bark (*Eucalyptus crebra*), Grey and White Box (*Eucalyptus moluccana* and *albens* respectively), Spotted Gum (*Corymbia maculata*) and Red gum (*Eucalyptus tereticornis/brakeyi*) in open woodland environments in the upper Hunter Valley is approximately 100 to 140 years. The relatively warm climate compared to southern states and tableland areas also does not tend to result in trees living longer than this. Many trees of these species can have shorter life spans. Despite this there may be exceptions and occasional trees may be slightly older.

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Life span is determined by the innate genetic potential of species, as well as the propensity for trees to suffer from lightning strike, wind damage and physical damage to trunks during past clearing. Accelerated crown dieback due to attack from leaf eating and sap sucking insect activity (dieback) can also lead to reduced life span (a common feature in the Upper Hunter Valley). Regular wildfires are also a contributing factor as are a multitude of causes relating to human activity such as clearing, logging etc. Secondary effects, including attack by termites and borers, can also follow primary damage to a tree and result in reduced life span.

Other factors can also be involved. As one example, three of the four trees in this assessment had obvious white ant and/or borer attack as well as natural fungal decay. The generally poor duplex clay soils on the floor of the Hunter Valley (away from the fertile alluvial flats), together with extended periods of drought, also tend to place ongoing stress on trees resulting in frequent crown dieback due to insect attack. This often leads to a consequent propensity for enhanced termite and borer attack and hence, shorter life spans.

Life span is relevant to this study in the context of tree age versus the cessation of Aboriginal scarring of trees (estimated at approximately 150 years ago in the Hunter Valley). For a tree to possess a significant Aboriginal related scar the tree would have had to be of a significant size at that time (150 years ago). This suggests that, for a tree to now show Aboriginal related scarring, it would now have to be at least 170 to 200 years old (i.e. at least 20 to 50 years old at the time of scarring). This is significantly older than the accepted maximum age span of remnant upper canopy species in the upper Hunter Valley. This simple consideration generally excludes many scars from being of Aboriginal origin.

### ***Wound Repair and Scar Age***

The estimated age of scarring is based on the estimated rate of wound repair as indicated by the depth of new wood around the wound.

One particularly relevant study involved a scar of known age on a Narrow-leaf Ironbark (*Eucalyptus crebra*) located on the corner of Common and Coal Roads approximately two kilometres north east of Muswellbrook on similar soil to that in the study area. The marked tree is shown below (**Plate 1**).

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**Plate 1:** Thirty year old scar on Narrow-leaf Ironbark near Muswellbrook (photo taken 2002)

Inquiry revealed that this tree was marked for survey purposes on 10 February 1972 by John Dennis Hickey from the East Maitland Lands office and identified as D5057/2003. While the tree had been lopped and had recently died six months prior to the photograph, the recent date of the tree's death (at that time) allowed an assessment of the growth rate of wound repair. The scar revealed that the tree had put on 200 mm of scar tissue (depth of over-growth) over a 30 year period. This gives an over growth repair rate of 6.6 mm per annum and thus supports the conservative scar growth rate of 5 mm per annum (a radial increase) or 10 mm per annum (diameter increment) assumed for this study (Global Soil Systems 2005).

This conservative approach has been adopted to avoid equivocation and it is likely that both tree and scar ages have been over stated in this report and that both are younger than proposed. If so, this makes the likelihood of scars being caused by pre-European Aboriginal activity even more unlikely. Hence if a scar is 15cm deep it has been estimated at 30 years old. Justification for this rate is based on many other observations in the upper Hunter Valley.

The above estimated growth increments are also conservative as a result of the age of the tree when scarring occurred. Tree growth is far more rapid in the early and mid-stages of growth and slows considerably as trees mature. Regrowth from scarring in all four trees in this assessment occurred when trees were relatively mature. Hence, scar regrowth would have been slower than would have been the case in younger trees where incremental wound regrowth would have been significantly higher than in these older trees.

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### ***Estimation of Tree Age and Time Since Scarring***

The above scar tree example also provides information on the likely age of the above tree. If we assume that the above 5 mm growth (radial wound regrowth) reflects the annual (one side of the tree) increase in tree growth, then the annual increase in the diameter of the trunk can be estimated at 10 mm (1 cm) (i.e. 2 x the annual radial increase (5 mm) of the wound). Consequently, as the diameter of the above reference tree was 110 cm at death its age was estimated at 110 years. As the depth of the scar was 20cm scar age was estimated at 40 years. Hence, the scar was formed when the tree was approximately 70 years old (110 - 40).

As mentioned above this estimate of diameter growth is most likely very conservative for many trees. As an example, incremental diameter growth in young trees (5 to 30 years old) in the central and Upper Hunter Valley (based on commercial forestry experience) has been frequently observed to be in the range 2 to 6 cm per annum and greater (author's personal experience). The growth of planted trees on Bengalla mine over the last 15 years further supports these growth estimates.

The practical effect of the above is that both trees and scars are most likely younger than estimated. If this is true than this makes the likelihood of scarring being Aboriginal related even more unlikely.

A secondary point is that, due to the pyramidal way a tree puts on growth, any damage to a tree trunk does not get any higher off the ground with age. Consequently, the heights of scars in this study are still the same as when damage first occurred.

A third point is that a tree would normally have to be of a reasonable size to be used for Aboriginal purpose. Hence, scar age is normally much less than tree age and the age of the tree at the time of scarring needs to be considered in the equation.

As mentioned, the above matching of tree diameter with age is consistent with many field observations by the author over many years in forestry, mine rehabilitation and farm extension work in the Hunter Valley. While the ratio of growth rate to age may change slightly between species the above estimates are still considered a reasonable ball-park average approximation.

### ***Dead Tree Considerations***

The above calculations are relatively simple in trees that are still alive at the time of assessment. The evaluation process becomes more difficult and less clear in fallen or dead trees where the age since tree death has to be factored in. Calculating time since the tree died can be assisted by evidence such as whether the tree was felled/damaged by a chainsaw. As chainsaws only started to become widely used in the Hunter Valley in the late 1950's/early 1960's trees that were felled by chainsaws (e.g. Tree 2 in this report) have most likely been dead for a maximum of 50-55 years.

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Other factors can also be used to approximate how long ago a tree died. As small branches fall off and decay first after death, the size of remnant branches can give some guidance. Similarly, bark slowly falls off the stump of a dead tree over time. The more bark - the shorter the time since death. In addition, the extent of weathering on a chainsaw felled tree can also be used to determine the age of other felled trees.

In addition, if a tree has been felled and the remnant crown has disappeared in that time (loggers only take the main trunk), this means that remnant wood has either been eaten by termites or rotted away, or been burnt by bush fires in that time. Prior to mine protection (say late 1970's onwards) wildfire was a frequent occurrence in Hunter woodlands and forests and remnant timber on the forest floor quickly disappeared as a result. This type of simple calculation can be used to assess tree, and hence scar age.

Despite this, there are still some dead trees where the time since death can only be guessed at based on observation and practical experience.

#### 4.0 METHODOLOGY

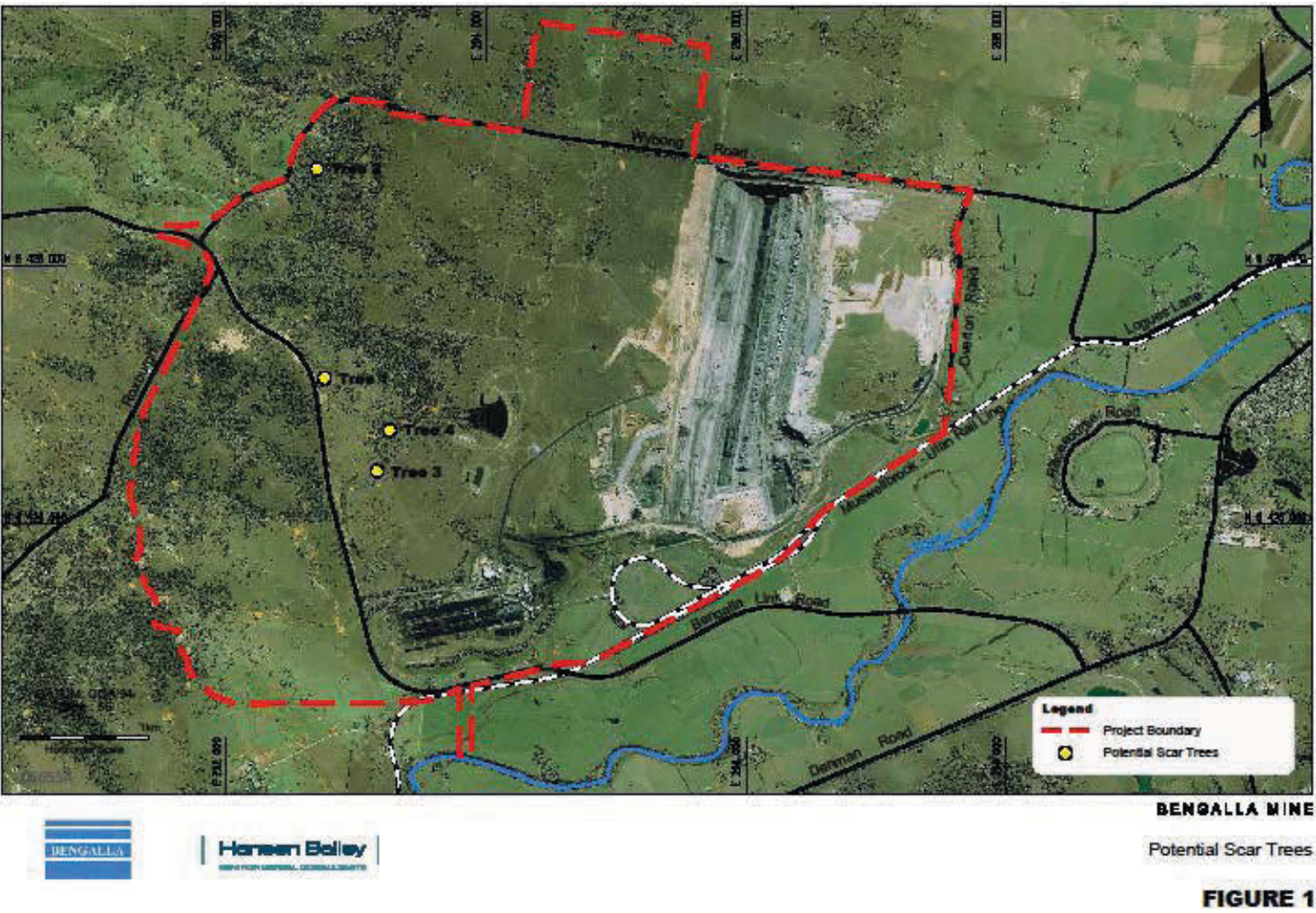
The following trees were inspected.

| Tree Reference | (MGA) E | (MGA) N |
|----------------|---------|---------|
| Tree 1         | 292756  | 6427129 |
| Tree 2         | 292698  | 6428743 |
| Tree 3         | 293161  | 6426412 |
| Tree 4         | 293257  | 6426726 |

The location of these trees is shown in **Figure 1** below.



FIGURE 1. LOCATION OF SCAR TREES – BENGALLA COAL MINE  
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The methodology employed was in accordance with "Scarred Trees, An Identification and Recording Manual" (Andrew Long 2005) and the preamble in this report. For each scar tree the following data was recorded:

- Tree species.
- Live trees (likely growth rate based on tree diameter)
- Tree age
  - Dead trees (age at death + time since death)
- Condition of tree.
- Girth of tree at 1.5m height.
- Diameter of tree.
- Diameter of tree over bark since death.
- Scar dimensions
  - Length -
  - Width -
  - Height of base of scar above ground -
- Overgrowth measurements
  - Thickness -
  - Width -
- Scar orientation.
- Origin of scar – European/Aboriginal/natural/uncertain.
- Type of scar.
- Axe marks present and type (Aboriginal/European).

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## 5.0 RESULTS

**Tree 1** 292756E 6427129N

A photograph of this scar tree is shown in **Plate 2** below.



**Plate 2:** Potential Scar Tree 1

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| Characteristics                         |                                                                  |     |    |
|-----------------------------------------|------------------------------------------------------------------|-----|----|
| Tree #                                  | Tree 1                                                           |     |    |
| Plate #                                 | Plate 2                                                          |     |    |
| Species                                 | Eucalyptus moluccana (Grey Box)                                  |     |    |
| Tree Age                                | Tree dead for approximately 25 years<br>Age at death - 107 years |     |    |
| Condition of Tree                       | Dead                                                             |     |    |
| Girth at 1.5 m Height                   | 305 cm                                                           |     |    |
| Diameter 1.5 m                          | 97 cm                                                            |     |    |
| Estimated Diameter with Bark (at death) | 107 cm                                                           |     |    |
| Scar Dimensions                         | Length -                                                         | 156 | cm |
|                                         | Width -                                                          | 18  | cm |
|                                         | Height from ground -                                             | 0   | cm |
| Overgrowth Measurements                 | Thickness -                                                      | 23  | cm |
|                                         | Width -                                                          | 15  | cm |
| Scar Orientation                        | South East                                                       |     |    |
| Origin of Scar                          | Natural (branch tear/termites)                                   |     |    |
| Type of Scar                            | Vertical                                                         |     |    |
| Axe Marks?                              | No                                                               |     |    |

### Comments and Discussion

This tree was dead at the time of assessment.

This tree was estimated to be approximately 107 years old at death and 25 years since death (total 132 years). The scar was estimated at approximately 23 years old at death. Hence, the estimated time since scar formation is estimated at 48 years (i.e. time since death = 25 years + scar age at death = 23 years). This is well after the likely cessation of Aboriginal related scarring.

The pyramidal and largely irregular shape of the scar, which extends down to a broad base at ground level also suggests a natural cause. It is likely initial scarring occurred through branch tear (see notch at top of scar) and has extended downwards as a result of borer and termite activity (both noted). This pattern of scarring (pyramidal) is typical of scarring on many other trees in the Hunter Valley not considered to be related to Aboriginal cultural activity. Other trees in this vicinity, not considered possible Aboriginal scar trees, showed similar scarring.

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**Tree 2** 292698E 6428743N

A photograph of this scar tree is shown in **Plate 3** below.



**Plate 3:** Scar Tree 2

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| Characteristics               |                                                                                                    |                 |                |
|-------------------------------|----------------------------------------------------------------------------------------------------|-----------------|----------------|
| Tree #                        | Tree 2                                                                                             |                 |                |
| Plate #                       | Plate 3                                                                                            |                 |                |
| Species                       | Eucalyptus crebra (Narrow-leaf Ironbark)                                                           |                 |                |
| Tree Age                      | Estimated age at death - 83 years<br>Estimated years since death - approximately 7 years (maximum) |                 |                |
| Condition of Tree             | Dead. Fallen using chain saw                                                                       |                 |                |
| Girth at 1.5 m Height         | 260 cm                                                                                             |                 |                |
| Diameter (over bark) at 1.5 m | 83 cm                                                                                              |                 |                |
| Estimated Diameter with Bark  | N/A                                                                                                |                 |                |
| Scar Dimensions               | Length -<br>Width -<br>Height from ground -                                                        | 120<br>28<br>70 | cm<br>cm<br>cm |
| Overgrowth Measurements       | Thickness -<br>Width -                                                                             | 15<br>10        | cm<br>cm       |
| Scar Orientation              | East                                                                                               |                 |                |
| Origin of Scar                | Natural – Branch Tear                                                                              |                 |                |
| Type of Scar                  | Vertical/elliptical                                                                                |                 |                |
| Axe Marks?                    | Yes – European - after scarring                                                                    |                 |                |

### Comments and Discussion

This tree was dead at the time of assessment and had been felled with a chain saw.

This tree was estimated to be approximately 83 years old at death and approximately seven years to now since death (90 years total). The relatively recent felling of this tree is supported by the presence of remnant bark on the stump. Based on wound depth the scar was estimated to be 15 years old at death. This dates the initial scarring at approximately 22 years old (i.e. time since death = 7 years + scar age at death = 15 years) and younger than the estimated 150 years considered the latest likely date for Aboriginal cultural scarring.

The location of the scar also suggests a natural cause and is consistent with the loss of an epicormic shoot (a secondary stem) near the base of tree which has died and fallen off. This conclusion is supported by the presence of fully closed over scar tissue below the dead wood (see ridge of healed scar tissue extending down to ground level below the dead scar wood). Again, this is a typical pattern of natural scarring observed on numerous other older trees in the upper Hunter Valley.

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**Tree 3** 293161E 6426412N

A photograph of this scar tree is shown in **Plate 4** below.



**Plate 4:** Scar Tree 3

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| Characteristics                         |                                        |                 |    |
|-----------------------------------------|----------------------------------------|-----------------|----|
| Tree #                                  | Tree 3                                 |                 |    |
| Plate #                                 | Plate 4                                |                 |    |
| Species                                 | Eucalyptus blakelyi (Blakelys Red Gum) |                 |    |
| Tree Age                                | Age as at 2012                         | 142 years (max) |    |
| Condition of Tree                       | Living - healthy                       |                 |    |
| Girth at 1.5 m Height                   | 445 cm                                 |                 |    |
| Diameter 1.5 m                          | 142 cm                                 |                 |    |
| Estimated Diameter with Bark (at death) | N/A                                    |                 |    |
| Scar Dimensions                         | Length -                               | 70              | cm |
|                                         | Width -                                | 28              | cm |
|                                         | Height from ground -                   | 62              | cm |
| Overgrowth Measurements                 | Thickness -                            | 48              | cm |
|                                         | Width -                                | 35              | cm |
| Scar Orientation                        | West                                   |                 |    |
| Origin of Scar                          | Natural/Branch or lower shoot tear     |                 |    |
| Type of Scar                            | Vertical/oval                          |                 |    |
| Axe Marks?                              | No                                     |                 |    |

### Comments and Discussion

This is a very large Red Gum and one of the largest trees in this vicinity. Red Gums are known to be fast growers (particularly when young) and quicker than other species such as Narrow-leaf Ironbark and Box. As such, applying the annual diameter increment assumption in this report (10 mm/year), which is based on the slower growing Narrow-leaf Ironbark, is probably very conservative and has most likely resulted in the age of this tree (and the scar) being over estimated by previous consultants.

Despite this, applying this conservative growth rate indicates that the tree was approximately 142 years old and that the scar was approximately 70 years old. That is, the scar was initiated when the tree was approximately 72 years old. These results indicate that scarring occurred well after the likely cessation of Aboriginal cultural scarring.

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**Tree 4** 293257E 6426726N

A photograph of this scar tree is shown in **Plate 5** below.



**Plate 5:** Scar Tree 4

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| Characteristics                                   |                                          |           |    |
|---------------------------------------------------|------------------------------------------|-----------|----|
| Tree #                                            | Tree 4                                   |           |    |
| Plate #                                           | Plate 5                                  |           |    |
| Species                                           | Eucalyptus crebra (Narrow-leaf Ironbark) |           |    |
| Tree Age                                          | As at 2012                               | 115 years |    |
| Condition of Tree                                 | Alive/Relatively healthy                 |           |    |
| Girth at 1.5 m Height                             | 362 cm                                   |           |    |
| Diameter 1.5 m                                    | 102 cm                                   |           |    |
| Estimated Diameter with Bark                      | 115 cm                                   |           |    |
| Elliptical Scar Dimensions<br>(section on ground) | Length -                                 | 182       | cm |
|                                                   | Width -                                  | 12        | cm |
|                                                   | Height from ground -                     | 80        | cm |
| Overgrowth Measurements                           | Thickness -                              | 28        | cm |
|                                                   | Width -                                  | 34        | cm |
| Scar Orientation                                  | East                                     |           |    |
| Origin of Scar                                    | Natural/Branch or lower shoot tear       |           |    |
| Type of Scar                                      | Vertical/thin                            |           |    |
| Axe Marks?                                        | No                                       |           |    |

### **Comments and Discussion**

This is a very large Narrow-leaf Ironbark and one of the largest of this species in this vicinity. The tree was estimated at 115 years old and the scar at approximately 28 years old. It was estimated that the scar was approximately 28 years old and obviously occurred well after the likely cessation of Aboriginal cultural scarring approximately 150 years ago.

Again, the most likely cause of scar ignition was the loss of a low epicormic stem at the base of the trunk. This is a common cause of low trunk scars on trees of this age and size in this area and was also observed in Tree 2 in this report. This conclusion is supported by the presence of healed scar wood below the existing scar opening (see above photograph). Other supporting evidence is the presence of a large root, located immediately below the original shoot. A similar scar/root pattern was observed in Trees 2, 3 and 4 in this study and strongly supports the original presence of a secondary stem/shoot.

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## 5.0 SUMMARY AND CONCLUSIONS

This report has made certain assumptions based on:

1. Cessation of Aboriginal scarring (estimated no later than 150 years ago).
2. Tree growth rates.
3. Rate of wound regrowth.

1860 has been used as the latest date of Aboriginal scarring. However, it is likely that the Hunter Valley was well colonized by that time. For instance Maitland was proclaimed as a town in 1833.

Average annual diameter increment has been estimated at 1 cm (10 mm) per year which is twice the radial growth rate as demonstrated by the rate of wound regrowth (0.5cm/year – a radius measurement) concluded using the example cited in Section 3. This rate of growth is considered very conservative as there is considerable evidence that many trees on the floor of the Valley grow faster than this (see discussion in Section 3).

Much of the scar damage observed in this report appears to relate to a period approximately 20 – 60 years ago when extensive ring-barking, felling and general tree damage appeared widespread within the Hunter Valley. The size of adjacent regrowth, observed in this study, further confirms general growth rate assumptions used in this report.

In terms of the life span of trees growing on the floor of the Valley the presence of European survey marks, such as that cited in Section 3, provide reliable data on scar and hence diameter growth, which can be used as guidelines.

In addition, extensive field experience by the author in commercial and farm forestry together with other general tree experience in the Hunter Valley over a 38 year period supports the conclusion that most dominant native forest/woodland trees do not live much beyond 100 – 140 years and grow at the rates suggested.

Based on the above assumptions and experience none of the scars in this study were considered to be of Aboriginal origin, with several occurring relatively recently within the last 40 years.

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## 6.0 REFERENCES

Long A. (2003). Scarred trees. An identification and recording manual. Victoria – Department for Victorian Communities. Prepared for Aboriginal Affairs Victoria.

Long A. (2005). Aboriginal scar trees in New South Wales – A Field Manual

Global Soil Systems (2005). Assessment of tree scar CB3. A report prepared for Muswellbrook Coal.

Jacobs M.R. (1955). Growth habits of the eucalypts. Published by Commonwealth of Australia, Forestry and Timber Bureau.