



APPENDIX K ABORIGINAL ARCHAEOLOGY AND CULTURAL HERITAGE IMPACT ASSESSMENT

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Aboriginal Archaeology and Cultural Heritage Impact Assessment Mt Arthur Coal, Muswellbrook, NSW

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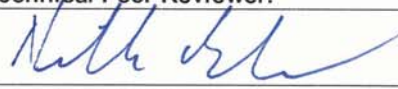


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Aboriginal Archaeology and Cultural Heritage
Impact Assessment

S

6067101_RPTFinalRev01_28Aug09

Environment

Contents

GLOSSARY OF TERMS	VII
ABBREVIATIONS AND ACRONYMS.....	XV
EXECUTIVE SUMMARY	ES1
1.0 INTRODUCTION	1
1.1 Project Description	1
1.1.1 Project Background	1
1.1.2 Current Mt Arthur Coal Approvals.....	1
1.1.3 Existing Heritage Management Areas	2
1.1.4 Mt Arthur Coal Consolidation Project Application	2
1.2 Study Area.....	3
1.3 Aims and Objectives.....	3
1.4 Project Team	4
1.5 Report Structure	4
1.6 Limitations	5
2.0 METHODOLOGY	7
2.1 Desktop Survey	7
2.2 Fieldwork Methodology.....	8
2.2.1 Archaeological Terrain Units.....	8
2.2.2 Landform Elements	10
2.2.3 Aboriginal Site Definition	11
2.2.4 Definition of “Aboriginal Site” used in this Survey	12
2.2.5 Specific Actions for Fieldwork.....	12
2.3 Discussion	12
3.0 EXISTING ENVIRONMENT.....	15
3.1 Environmental Context	15
3.1.1 Climate	15
3.1.2 Topography and Hydrology	15
3.1.3 Geology and Soils	18
3.1.4 Vegetation	20
3.1.5 Fauna	21
3.1.6 Past Land Use Practices and Disturbance	23
3.1.7 Summary of Environmental Conditions and Implications for Aboriginal Archaeology.....	24
3.2 Ethnographic Context	24
3.3 Archaeological Context.....	25
3.3.1 Previous Research and Archaeology of the EA Boundary.....	25
3.3.2 Registered Aboriginal Sites	36
3.4 Archaeological Summary of the Mt Arthur Coal Lease Areas	39
3.4.1 Predictive Model of Aboriginal Site Location.....	41
3.5 Conservation Areas and Heritage Management Zones	41
4.0 ABORIGINAL COMMUNITY CONSULTATION.....	43
4.1 Notification and Registration.....	43

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Aboriginal Archaeology and Cultural Heritage
Impact Assessment

i S

6067101_RPTFinalRev01_28Aug09

4.2	Consultation Regarding Survey Strategy and Conservation Values	45
4.3	Summary of Responses	45
4.4	Fieldwork Involvement.....	46
4.5	Draft Aboriginal Archaeological Assessment Review.....	47
4.6	Consultation during the Review Period and Finalisation of the Aboriginal Archaeological Assessment.....	48
4.6.1	Aboriginal Archaeology and Cultural heritage Impact Assessment Report	48
4.6.2	Saddlers Pit Grinding Grooves	49
4.7	Summary / Conclusion.....	50
5.0	SURVEY RESULTS	63
5.1	Fieldwork Conditions	63
5.1.1	Ground Surface Visibility, Erosion and Disturbance	63
5.1.2	Survey Coverage and Effective Coverage	63
5.2	Previously Recorded Sites in the Survey Areas.....	67
5.3	New Sites Recorded During the Present Survey	69
5.3.1	Edderton Road Survey Area.....	69
5.3.2	Mount Arthur Survey Area	69
5.3.3	Offset Survey Area	72
5.3.4	Stone Artefact Types	79
5.3.5	Raw Material for Stone Artefacts	79
5.3.6	Scarred Trees.....	80
5.3.7	Axe Grinding Grooves/Rock Engravings	80
5.3.8	Other Site Types	80
5.3.9	Summary	81
5.4	Interpretation of Results and Assessment of Predictive Model	81
5.4.1	Site Location and Artefact Numbers	81
5.4.2	Resources	84
6.0	SIGNIFICANCE ASSESSMENT	85
6.1	Principles of Assessment.....	85
6.2	Scientific (Archaeological) Value	86
6.3	Approaches to Scientific Significance Assessment.....	87
6.3.1	The Landscape Approach	87
6.3.2	Methodology for Quantitative Assessment of Scientific Significance	87
6.3.3	Research Potential	88
6.3.4	Rarity	89
6.3.5	Representativeness.....	90
6.3.6	Archaeological Integrity	90
6.3.7	Connectivity.....	91
6.3.8	Complexity.....	91
6.3.9	Educational Potential.....	92
6.3.10	Aesthetic Significance	92
6.4	Assessment.....	92
6.4.1	Quantitative Assessment.....	92

Use or disclosure of data contained on this sheet is subject to the restriction on the distribution page of this document..

Commercial in Confidence

Aboriginal Archaeology and Cultural Heritage
Impact Assessment

	6.4.2	Qualitative Assessment	93
6.5		Management Areas - Heritage	94
	6.5.1	Conservation Areas	94
	6.5.2	Conservation Zones Proposed By Kuskie (1999)	95
	6.5.3	Existing Heritage Management Zones	96
6.6		Social (Cultural) Value	100
	6.6.1	Assessment	100
6.7		Aboriginal Heritage Significance	101
7.0		IMPACT ASSESSMENT	109
7.1		Extensions to Mine Footprint	109
	7.1.1	Mine Extension Area 1	109
	7.1.2	Mine Extension Area 2	111
	7.1.3	Mine Extension Areas 3 and 4	115
	7.1.4	Mine Extension Area 5	116
7.2		Relocation of Edderton Road	118
7.3		Second Rail Loading Facility and Conveyors	119
7.4		Modifications to Existing Mine Infrastructure	119
7.5		Heritage Management Zones	119
	7.5.1	Macleans Hill Heritage Management Zone	119
	7.5.2	West of Edderton Road Heritage Management Zone	119
	7.5.3	Mount Arthur North West Slopes Heritage Management Zone	119
7.6		Comparative Analysis of Current HMZs with Offset Survey Area	119
7.7		Grinding Groove Sites	120
	7.7.1	Site 37-2-0110	120
	7.7.2	Site 37-2-0111	120
	7.7.3	Site 37-2-0731	120
8.0		APPLICABLE POLICY AND LEGISLATION	121
8.1		Commonwealth Legislation	121
	8.1.1	Aboriginal and Torres Strait Islander Heritage Protection Act 1984	121
8.2		New South Wales Legislation	121
	8.2.1	Environmental Planning and Assessment Act 1979	121
	8.2.2	National Parks and Wildlife Act 1974	121
8.3		Local Government	122
	8.3.1	Muswellbrook Local Environmental Plan 2009	123
	8.3.2	Hunter Regional Environmental Plan 1989 (Heritage)	123
	8.3.3	Hunter Regional Environmental Plan 1989	123
9.0		MITIGATION AND MANAGEMENT OF ABORIGINAL CULTURAL HERITAGE VALUES	125
9.1		Existing Mitigation and Management Strategies	125
	9.1.1	MAN Archaeology and Cultural Heritage Management Plan	125
	9.1.2	MAU Aboriginal Cultural Heritage Management Plan	126
	9.1.3	MAN South Pit Extension Project	127
9.2		Assessment of Mitigation and Management Strategies to Date	127
9.3		Mitigation and Management Options	137

Use or disclosure of data contained on this sheet is subject to the restriction on the distribution page of this document.

Commercial in Confidence

Aboriginal Archaeology and Cultural Heritage
Impact Assessment

9.3.1	Unmitigated Destruction	137
9.3.2	Mitigated Destruction (Salvage).....	137
9.3.3	Site Conservation	137
9.3.4	Monitoring.....	138
9.4	Management Strategy	138
9.4.1	Aboriginal Cultural Heritage Management Plan	139
9.4.2	Sites within the Mt Arthur North Survey Area.....	139
9.4.3	Sites within Mount Arthur Underground Survey Area.....	140
9.4.4	Sites within South Pit Extension Area	141
9.4.5	Sites within Bayswater No. 3	142
9.5	Sites of High Cultural Heritage Significance	142
9.5.1	Scarred Trees.....	142
9.5.2	Axe Grinding Groove Sites	143
10.0	REFERENCES	159

List of Tables

Table 1: Archaeological Terrain Units	9
Table 2: Landform Elements Identified in the Survey Area	10
Table 3-1: Vegetation Communities Recorded in the EA Boundary	20
Table 2: Aboriginal Prey Species in the EA Boundary	22
Table 3: Artefact Distribution at MAN Recorded by Koettig and Hughes (1985)	26
Table 4: Artefact Distributions at MAS recorded by Koettig and Hughes (1985)	27
Table 7: Artefact Distributions Recorded at MAN by Kuskie (1999)	30
Table 8: Artefact Distribution at Drayton Rail Loop Recorded by Kuskie (1999b)	32
Table 9: Artefact Distributions Recorded at South Pit Extension by Umwelt (2007).....	34
Table 10: Artefact Distributions Recorded at MAU by Umwelt (2008).....	35
Table 11: AHIMS Registered Aboriginal Sites within the EA Boundary	37
Table 12: AHIMS Registered Aboriginal Sites within the Edderton Road, Mount Arthur and Offset Search Areas.....	38
Table 13: Consulted Aboriginal Stakeholder Groups	43
Table 14: Registered Aboriginal Stakeholder Groups that Participated in Archaeological Survey.....	46
Table 15: Summary of Aboriginal Consultation	51
Table 16: Effective Coverage for the Edderton Road Survey Area	65
Table 17: Effective Coverage for the Mount Arthur Survey Area.....	65
Table 18: Effective Coverage for the Offset survey area.....	66
Table 19: Previously Recorded Aboriginal Sites in the Survey Areas (Offset survey area)	67
Table 20: Site Types Identified within the Survey Areas	69
Table 21: Summary of Sites Recorded within the Edderton Survey Area	69
Table 22: Summary of Sites Identified within the Mount Arthur Survey Area	70
Table 23: Summary of Sites Recorded within the Offset Survey Area	72
Table 24: Stone Artefacts Found Within the Survey Areas	79
Table 25: Raw Materials Used for Stone Tool Manufacture in the Survey Areas	80
Table 26: Sites and their Distance to Nearest Watercourse.....	82
Table 27: Assemblage Size	83
Table 28: Distribution of Sites in Archaeological Terrain Units.....	83
Table 29: Summary of Site Type and Site Contents	84
Table 30: Summary of Scientific Significance Assessment for the EA Boundary	93
Table 31: Comparison of Existing Heritage Management Zones with Proposed Offset Area.....	99

Use or disclosure of data contained on this sheet is subject to the restriction on the distribution page of this document..

Commercial in Confidence

Aboriginal Archaeology and Cultural Heritage
Impact Assessment

Table 32: Aboriginal Sites Recorded within the Macleans Hill Heritage Management Zone	103
Table 33: Aboriginal Sites Recorded within the West of Edderton Road Heritage Management Zone.	104
Table 34: Aboriginal Sites Recorded within the Mount Arthur North West Slopes Heritage Management Zone.....	106
Table 35: Aboriginal Sites Impacted by the Proposed Mine Extension Area 1	109
Table 36: Aboriginal Sites Impacted by the Proposed Mine Extension Area 2	111
Table 37: Aboriginal Sites Impacted by the Proposed Mine Extension Areas 3 and 4	116
Table 38: Aboriginal Sites Impacted by the Proposed Mine Extension Area 5	116
Table 39: Aboriginal Sites Impacted by the Proposed Edderton Road Realignment (Option 1)	118
Table 40: Aboriginal Sites Impacted by the Proposed Edderton Road Realignment (Option 2)	118
Table 39: Status of Development Consent Conditions for Aboriginal Sites at Bayswater No. 3 mine ..	129
Table 42: Status of Development Consent Conditions for Aboriginal Heritage Assessment, Management and Monitoring at Bayswater Rail Loading Facility and Rail Loop	130
Table 43: Status of Development Consent Conditions for Aboriginal Heritage Assessment, Management and Monitoring at Mt Arthur North	133
Table 44: Status of Project Approval Conditions for Aboriginal Heritage at Mt Arthur Coal Exploration Adit	135
Table 45: Status of Project Approval Conditions (Statement of Commitments) for Aboriginal Heritage in the South Pit Extension Project Area	135
Table 46: Status of Development Consent Conditions for Aboriginal Sites at the Mt Arthur Underground Project Area	136
Table 47: Amended Management Recommendations for Aboriginal Sites Impacted by the Proposed Mine Extension Area 1.....	145
Table 48: Amended Management Recommendations for Aboriginal Sites Impacted by the Proposed Mine Extension Area 2.....	148
Table 49: Amended Management Recommendations for Aboriginal Sites Impacted by the Proposed Mine Extension Areas 3 and 4	155
Table 50: Amended Management Recommendations for Aboriginal Sites Impacted by the Overburden Emplacement Area	156

List of Figures

Figure 1:	Regional Context of the EA Boundary
Figure 2:	Project Area and Aboriginal Heritage Survey Areas
Figure 3:	Archaeological Terrain Units – Edderton Road Survey Area
Figure 4:	Archaeological Terrain Units – Mount Arthur Survey Area
Figure 5:	Archaeological Terrain Units – Offset Survey Area
Figure 6:	Boundaries of Previous Major Archaeological Survey Areas
Figure 7:	AHIMS Search Results – EA Boundary
Figure 8:	AHIMS Search Results – Edderton Road Survey Area
Figure 9:	AHIMS Search Results – Mount Arthur Survey Area
Figure 10:	AHIMS Search Results – Offset survey area
Figure 11:	Conservation Areas and Heritage Management Zones at Mt Arthur Coal
Figure 12:	Survey Results and AHIMS Records – Edderton Road Survey Area
Figure 13:	Survey Results and AHIMS Records – Mount Arthur Survey Area
Figure 14:	Survey Results and AHIMS Records – Offset survey area
Figure 15:	Macleans Hill Heritage Management Zone and Mine Extension Area 1
Figure 16:	Edderton and Mount Arthur North West Slopes Heritage Management Zones and Mine Extension Area 2
Figure 17:	Mine Extension Areas 3, 4 and 5

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Aboriginal Archaeology and Cultural Heritage
Impact Assessment

v S

6067101_RPTFinalRev01_28Aug09

List of Plates

- Plate P1: Example of thick pasture cover with patches of low closed forest in the background within the Mount Arthur survey area.
- Plate P2: Typical low, thick pasture grass hampering visibility in the survey areas. This is within Mount Arthur survey area
- Plate P3: Example of ground cover on ridge crest offering higher archaeological visibility near Thomas Mitchell Drive in the Offset survey area
- Plate P4: Example of taller stratum vegetation affecting ground surface visibility
- Plate P5: Erosion area along Ramrod Creek in Offset survey area
- Plate P6: Large areas of sheetwash erosion found in Mount Arthur survey area
- Plate P7: Bondi Point found in Offset survey area
- Plate P8: Scarred tree at MAC21 in the Offset survey area
- Plate P9: Scarred tree found at MAC22 in the Offset survey area
- Plate P10: Hatchet head found at MAC24 in the Offset survey area
- Plate P11: Site view of grinding groove site 37-2-0111
- Plate P12: Close up of grinding grooves at 37-2-0111
- Plate P13: Close up of grinding grooves at site 37-2-0731

List of Appendices

- Appendix A AHIMS Search Results (Survey Areas Only)
- Appendix B Records of Aboriginal Community Consultation
- Appendix C Sites and Artefact Database – Sites Found in Survey Areas
- Appendix D Significance Criteria Definitions and Assessment Results
- Appendix E Significance Assessment of Archaeological Terrain Units (Kuskie 1999a)
- Appendix F Director General's Requirements

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Aboriginal Archaeology and Cultural Heritage
Impact Assessment

vi S

6067101_RPTFinalRev01_28Aug09

Glossary of Terms

Activity Area	A pattern of artefacts in a site indicating that a specific activity took place.
Adaptation	Adaptation means modifying a place to suit proposed compatible uses.
Alluvial	Pertaining to sediment mass deposited from transport by channelled stream flow or over-bank stream flow.
Anvil	Object that supports a stone artefact that is being struck with a hammer.
Archaeological Potential	The likelihood of the presence of archaeological evidence ascertained through physical evaluation (survey, test excavations) and historical research.
Artefact Scatter	A collection of artefacts usually distributed across the surface of the ground.
Aboriginal Object	<i>'...any deposit, object or material evidence (not being a handicraft made for sale) relating to the Aboriginal habitation of the area that comprises New South Wales, being habitation before or concurrent (or both) the occupation of that area by persons of non-Aboriginal extraction, and includes Aboriginal remains' (s.5 NPW Act)</i>
Aboriginal Place	Any place declared to be an Aboriginal place under s.84 of the <i>National Parks and Wildlife Act 1974</i> (NPW Act) because the place is or was of special significance with respect to Aboriginal culture. It may or may not contain Aboriginal objects.
Aboriginal Scarred Tree	A tree that bears a scar or scars which are wounds formed from the deliberate removal of bark or wood by Aboriginal people. Aboriginal scarred trees are often an indicator of an activity area.
Aboriginal Site	In this study, the term is used to define the present physical extent of visible Aboriginal archaeological material.
Archaeological Terrain Unit (ATU)	A term used to denote areas of a landscape based on two important environmental variables: landform element and class of slope. These are discrete, recurring areas of land for which it is assumed that the Aboriginal land use and resultant heritage evidence in one location can be extrapolated to other similar locations (Kuskie 1999a: 67).
Artefact	Any object which is physically modified by humans.
Assemblage	A collection of artefacts associated by a particular place or time and assumed generated by a single group of people. An assemblage can comprise different artefact types.

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Impact Assessment

vii S

6067101_RPTFinalRev01_28Aug09

Attribute	A well defined feature of an artefact that cannot be further subdivided. Archaeologists identify types of attributes, including form, style and technology, in order to classify and interpret artefacts.
Axe	A stone-headed axe characteristically containing two ground surfaces which meet at a bevel.
Backed Artefact	A stone tool where one margin of a flake is retouched at a steep angle and that margin is opposite a sharp edge.
Background Scatter	A term sometimes used to describe a low density scatter of isolated finds that are distributed through the landscape without any obvious focal point.
Basalt	Igneous volcanic rock sometimes used to make stone artefacts, although it is often unsuitable for stone implement production. Basalt is common in eastern Australia where there has been recent volcanic activity.
Bipolar Flake	A stone artefact made by striking into an anvil with a hammerstone. Bipolar flakes display crushing at either end.
Blade	A flake that is at least twice as long as it is wide.
Bondi Point	A small asymmetrical backed artefact with a point at one end and backing retouch.
Burin	A stone tool flaked on one or both ends to form a small chisel or grooving tool.
Burra Charter	The Burra Charter provides guidance for the conservation and management of places of cultural significance Australia. It sets a standard of practice for those who provide advice, make decisions about, or undertake works to places of cultural significance, including owners, managers and custodians. The most recent version of the Burra Charter was adopted by Australia ICOMOS (the Australian National Committee of ICOMOS) on 26 November 1999.
Chert	A crypto-crystalline sedimentary siliceous rock commonly used in the manufacture of stone implements.
Conjoin	A physical link between artefacts broken in antiquity.
Conjoin Set	A number of artefacts refitted together.
Conservation	As defined in The Burra Charter, conservation means all the processes of looking after a place so as to retain its cultural significance.
Conservation Area	A defined area of the landscape conserved in perpetuity for the management of the heritage values of that landscape.

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Aboriginal Archaeology and Cultural Heritage
Impact Assessment

viii S

6067101_RPTFinalRev01_28Aug09

Conservation Management Plan	A document that outlines the cultural heritage significance of an object or area and policies, guidelines, maintenance and strategies for the conservation of the object or area.
Contact Site	A site that displays an interaction between early colonists and Aboriginal Australians.
Core	A piece of flaked stone which has one or more negative flake scars but no positive flake scars.
Cortex	Weathered outer surface of a rock, usually chemically altered.
Country	A term used by Aboriginal people to refer to the land to which they belong.
Cultural significance	Cultural significance means aesthetic, historic, scientific, social or spiritual value for past, present or future generations (Australia ICOMOS Burra Charter Article 1.2).
Datum	The datum point is the location from which all measurements on a site are made. The datum point is tied into local survey maps.
Desktop Survey	A study that does not involve any field-based activity and only involves background research and reporting.
Diffusion	The spread of a cultural trait from one area to another by means of contact between people.
Distal	The terminating end of a flake opposite the bulb.
Edge Damage	The removal of small flakes, or crushing, from the edge of an artefact.
Effective Coverage	A quantifiable estimate of the area in which archaeological materials are “detectable”, i.e. exposed ground surface area.
Elouera	A type of backed blade, triangular sectioned and resembling an orange segment in shape.
Excavation	An archaeological field method that involves the disturbance of the earth to reveal previously buried archaeological materials.
Exposure	An area of land surface where the ground surface is visible, usually as the result of either 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.

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Impact Assessment

ix S

6067101_RPTFinalRev01_28Aug09

Feature	An artefact that cannot be normally removed from a site, e.g. foundations.
Fish Trap	A structure within a creek or river intended to guide fish or eels into a confined space for collection. Usually made with stone but may be formed from wood or reeds.
Flake	Any piece of stone struck off a core. It has a series of characteristics showing that it has been struck off. The most indicative of these features are ring cracks, showing where the hammer hit the core. Also the ventral surface may be deformed in characteristic fashion.
Flaked Piece/Waste Flake	An unmodified and unused flake, usually the by product of tool manufacture or core preparation.
Fluvial	Pertaining to rivers and streams. Deposits by flowing water.
Grinding Groove	A depression formed in rock from the sharpening of a stone hatchet head or use of a muller (topstone).
Grinding Stone	The abrasive stone used to abrade another artefact or to process food.
Ground Edge Hatchet	A stone axe that is oval or round in shape and has edges formed by grinding and sharpening. Ground edge axes were hafted to wooden handles using resin, wax or a combination of material.
Ground Visibility	A term used to describe the area of the ground's surface that is visible during archaeological field surveys.
Hafting	The process of attaching a stone artefact onto a handle or spear.
Hammerstone	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.
Hearth	Fireplace often recognised archaeologically through the presence of charcoal or burnt ground. Historical hearths are usually associated with a brick or stone structure.
Heritage	The word 'heritage' is commonly used to refer to our inheritance from the past. Heritage can be used to cover natural environment as well, for example the Natural Heritage Charter. In this document, cultural heritage refers to all Indigenous places and objects, and associated values, traditions, knowledge and cultures.
Heritage Management Zone (HMZ)	An area of the landscape set aside for specific heritage management purposes. These management areas are not established in perpetuity. Compare with Conservation Area.

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Impact Assessment

x S

6067101_RPTFinalRev01_28Aug09

Holocene	The geological period covering the last 10,000 years.
Indurated Mudstone	Indurated mudstone (sometimes referred to as “tuff”) is a general term that encompasses sedimentary rocks from very fine mud-sized particles that are invisible to the naked eye. The term may also encompass siltstones and claystones.
<i>In Situ</i>	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.
<i>In situ</i> conservation	Strategies and initiatives designed for the preservation and conservation of historical archaeological materials without the need to collect or excavate materials from their archaeological context.
Interpretation	A way of communicating meaning and relationships using original artefacts, by first-hand experience and by illustrations.
Isolated Find	A single artefact not located with any other.
Knapping	The process of striking rocks and causing them to fracture.
Landform Element	A small area of the landscape, within an area of 30 m, with particular geomorphic attributes.
Lithics	Of, or pertaining to, stone.
Manuport	An object that is unmodified but has been transported to its location by humans.
Microlith	Small backed stone artefacts.
Midden	A deposit of occupation debris, rubbish, or other by-products of human activity.
Natural Transformation	Change in the archaeological record as a result of natural processes.
Object	See Aboriginal object.
Place	See Aboriginal place.
Pleistocene	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.
Post-depositional	After deposition. A term commonly used with reference to factors affecting the preservation of artefacts and archaeological features.

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Aboriginal Archaeology and Cultural Heritage
Impact Assessment

xi S

6067101_RPTFinalRev01_28Aug09

Quartz	A hard transparent mineral commonly used in the manufacture of stone artefacts.
Quartzite	A metamorphic siliceous rock commonly used in the manufacture of stone artefacts.
Retouched Flake	A flake that has been flaked again in a manner that modifies an edge, commonly for the purpose of resharpening that edge.
Salvage Excavation	The archaeological excavation of a site conducted to obtain an example of the heritage values entailed within that site.
Scarred Tree	A tree that bears a scar or scars, which are wounds formed from a range of natural, accidental or deliberate impacts that cause damage to living plant tissue on a trunk or limb. See also <i>Aboriginal Scarred Tree</i> .
Scraper	A stone tool made on a flake or core with steep retouch along one or more edges.
Seriation	Method used to place artefacts in chronological order. Similar artefacts are placed more closely together.
Settlement Pattern	Distribution of human settlement on the landscape.
Significance	A term typically used to define the level of importance of a heritage site or place.
Silcrete	A siliceous rock commonly used in the manufacture of stone artefacts.
Site	An area where archaeological evidence is observed.
Stone Arrangement	An arrangement of stones into a shape or pattern. Often used for ceremonial purposes or place markers.
Surface Site	A site where artefacts are found on the ground surface.
Survey Coverage	The area of a study area surveyed, usually expressed as a percentage. See also Effective Coverage .
Sustainability	Sustainability is the ability to maintain the qualities that are valued in the built and natural environment. Sustainability can be measured in terms of economic, environmental and social factors.
Test Excavation	Excavation of small sections of an area to determine the archaeological remains and significance.
Toe-Hold	Small scar on the trunk and branches of a tree originally to facilitate climbing.

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Aboriginal Archaeology and Cultural Heritage
Impact Assessment

xii S

6067101_RPTFinalRev01_28Aug09

Tuff	Solidified volcanic ash. Used by some archaeologists to refer to indurated mudstone.
Usewear	The wear displayed on an artefact as a result of its use.

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Aboriginal Archaeology and Cultural Heritage
Impact Assessment

xiv S

6067101_RPTFinalRev01_28Aug09

Environment

Abbreviations and Acronyms

AFT	Artefact. Used in the AHIMS database to refer to an Aboriginal site feature/s comprising stone artefacts.
ACHMP	Aboriginal Cultural Heritage Management Plan.
AHILA	Aboriginal Heritage Information Licence Agreement. Licence agreement between DECC and authorised persons to obtain large amounts of data from AHIMS.
AHIMS	Aboriginal Heritage Information Management System. Database of recorded Aboriginal sites across NSW managed by DECC.
CA	Conservation Area. See glossary of terms.
DECC	Department of Environment and Climate Change. The government body responsible for regulating impacts to the Aboriginal heritage values of NSW under the <i>National Parks and Wildlife Act 1974</i> .
GDG	Grinding Groove. Used in the AHIMS database to refer to an Aboriginal site feature/s comprising stone artefacts.
HMZ	Heritage Management Zone. See glossary of terms.
PAD	Potential Archaeological Deposit. Used to define an area of the landscape that is believed to contain subsurface archaeological deposit.
STA	Stone Arrangement. Used in the AHIMS database to refer to an Aboriginal site feature/s comprising stone arrangement/s.
TRE	Scarred/Carved Tree. Used in the AHIMS database to refer to an Aboriginal site feature/s comprising Aboriginal scarred or carved trees.

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Aboriginal Archaeology and Cultural Heritage
Impact Assessment

xv S

6067101_RPTFinalRev01_28Aug09

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Aboriginal Archaeology and Cultural Heritage
Impact Assessment

xvi S

6067101_RPTFinalRev01_28Aug09

Environment

Executive Summary

ENSR Australia Pty Ltd (trading as AECOM) and hereafter referred to as AECOM was commissioned by Hansen Bailey Pty Ltd (on behalf of Hunter Valley Energy Coal (HVEC)) to prepare an Aboriginal archaeology and cultural heritage impact assessment for the Mt Arthur Coal Consolidation Project (the Project), near Muswellbrook, NSW. The assessment forms part of an Environmental Assessment (EA) being prepared by Hansen Bailey to support an application for a new Project Approval under Part 3A of the *Environmental Planning and Assessment Act 1979* to consolidate all existing planning approvals into one contemporary planning approval and to extend mining into additional areas of Mt Arthur Coal's mining leases (The Project).

Mt Arthur Coal currently has six planning approvals consisting of:

- Bayswater No. 3 open cut mine (DA 210/93), approved 12 September 1994);
- Bayswater Rail Loading Facility and Rail Loop (DA 105-04-00, approved 2 November 2000);
- Mt Arthur North (MAN) open cut mine (DA 144-05-2000, approved 1 May 2001);
- South Pit Extension (South Pit) (project application no. 06_0108, approved 9 January 2008);
- Exploration adit (project application 06_0040, approved 10 September 2006); and
- Mt Arthur Underground Project (MAU) (project application no. 06_0091, approved 2 December 2008).

Under these approvals, a total of five conservation and management areas totalling approximately 805 hectares (ha) have been, or are in the process of being, established. These conservation and management areas were set aside to conserve samples of Aboriginal sites and/or Aboriginal heritage landscape values, with the principal distinction being that conservation areas are set aside in perpetuity whilst management areas are not. The heritage management areas include:

- Macleans Hill Heritage Management Zone (HMZ) (139 ha);
- West of Edderton Road HMZ (131 ha);
- Mount Arthur North West Slopes HMZ (138 ha);

The conservation areas include:

- proposed Mount Arthur Conservation Area (CA) (105 ha); and
- proposed Saddlers Creek CA (250 ha).

Collectively, these areas conserve a sample of the environmental/cultural contexts (defined by Kuskie (1999)) identified at Mt Arthur Coal.

This study consists of two components:

- previously surveyed areas covering the entire Mt Arthur Coal Consolidation EA Boundary (the EA Boundary) consisting of MAN, MAU, South Pit Extension area, Bayswater No. 3 and the Bayswater Rail Loading Facility and Rail Loop; and

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Aboriginal Archaeology and Cultural Heritage
Impact Assessment

ES1 S

6067101_RPTFinalRev01_28Aug09

- three areas that have not been previously surveyed (the three “survey areas”), consisting of an 86 ha area to the north of Mount Arthur, a 495 ha area east of Thomas Mitchell Drive (Offset survey area) and a 37 ha area proposed as an alternative alignment for the northern end of Edderton Road.

A search of the Department of Environment and Climate Change’s (DECC) Aboriginal Heritage Information Management System (AHIMS) database shows that a total of 663 Aboriginal sites are currently registered within the EA Boundary, with nine located within the three survey areas. A review of the extensive body of research that has previously been conducted within the EA Boundary shows that open camp sites consisting of stone artefacts are the most common type of site to be found. Although scarred trees have been recorded, they are now few due to historic pastoral land clearing practices. Three grinding groove sites are also contained within the EA Boundary.

The survey for Aboriginal heritage values within the three survey areas identified a total of 94 previously unrecorded sites including both low density and extensive stone artefact scatters and two scarred trees within a variety of landform contexts, but mostly within close proximity to permanent or ephemeral water sources. These results are largely consistent with results from previous surveys in both the EA Boundary and the wider Upper Hunter Valley region. In addition, six previously recorded Aboriginal sites within the Offset survey area were located and site details updated.

As part of the Project, Mt Arthur Coal intends to extend open cut mining in four areas – Mine Extension Areas 1-4, and develop a 395 ha out-of-pit overburden emplacement area (Mine Extension Area 5). Mine Extension Areas 1 and 2 will impact on all three existing HMZs. The two proposed CAs, when finalised, will be established within a statutory context and conserved in perpetuity.

A component of this assessment was to assess the significance values of the three HMZs currently in place at Mt Arthur Coal, since these three management areas are within the proposed impact zone of the Project. The original archaeological assessment of the MAN study area did not identify specific significance values for Aboriginal sites in the HMZs, since two of them were not originally recommended as management areas. Instead, two management areas were recommended within the Bayswater No. 3 area (one of which was subsequently largely incorporated into the proposed Saddlers Creek CA).

Comparative analysis of significance values between the various major archaeological surveys previously undertaken at Mt Arthur Coal was problematic due to the inconsistency in the definition of what constitutes an Aboriginal site and inconsistency in applying heritage significance values to those sites. Previous major surveys defined sites and their significance on a landscape basis that attempted to introduce an interpretation of Aboriginal behaviours into the equation. In these surveys, large areas of the landscape were thus included within Aboriginal sites, even where it could be demonstrated that no material evidence exists on the surface or is likely to exist subsurface. In order to achieve a basis for comparative analysis, sites that lie within the proposed impact zones (disturbance areas), particularly those that lie within existing HMZs, were reassessed using a more standard (i.e. more commonly used) sites-based analysis.

The reassessment found that the three HMZs were not identified for their heritage values, but rather because they were in areas that were not intended for mining at the time the MAN development consent was issued. Furthermore, the assessment found that, when significance assessments were conducted on a site-basis, the Aboriginal sites within the three HMZs were generally of low scientific significance.

A significance assessment of the Offset survey area found sites of at least comparable, and in some cases much higher, value to those in the three existing HMZs. For example, the Offset survey area contains three sites (two scarred trees and a hatchet head) that are considered to have high scientific significance for their rarity within the region. Furthermore, the Offset survey area offers an area of contiguous lands that encompass a similar range of landscape elements that are currently contained

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within the three existing HMZs, and a contiguous extent of surface archaeological expression associated with Ramrod Creek, indicating contiguous archaeological deposits, particularly within the high creek banks and terraces. Consequently it is considered that the Offset survey area offers higher value conservation offset to the three existing HMZs within Mt Arthur Coal's MLs.

The assessment found that a total of 105 additional sites will be impacted by the Project. These sites are all considered to have low to low-moderate scientific significance and are well represented both within the region and the local context (i.e. within the various Mt Arthur Coal conservation and offset areas). It is considered that a comprehensive representative sample of Aboriginal site types and landscape contexts will be conserved within the Saddlers Creek CA, the Mount Arthur CA and the proposed Offset management area.

Specific management actions and commitments resulting from this assessment include:

- Revoking the three existing HMZs and the creation of an alternative conservation area encompassing the whole of the Offset survey area. This Offset area should be established in perpetuity (e.g. CA, rezoning or similar);
- Consideration will be given to compiling a new Aboriginal Cultural Heritage Management Plan (ACHMP), to encompass management of all Aboriginal heritage sites within the EA Boundary. The new ACHMP may incorporate and supersede all existing ACHMPs for the MAN, Bayswater Rail Loading Facility and Rail Loop, and will incorporate the new offset area. ACHMPs for the proposed Saddlers Creek and Mount Arthur CA areas may be kept separate since they are linked to agreements and require approval by the Minister;
- Continue to advance the creation of the Mount Arthur and Saddlers Creek CAs;
- Undertake specific management recommendations for Aboriginal sites considered to have high archaeological and/or cultural heritage significance (refer Section 9.5), including:
 - a) conserve DECC site #37-2-0111 (grinding groove site) and manage in situ for the life of this project; and
 - b) ongoing consultation with the local Aboriginal community and DECC to best mitigate the impact of surrounding overburden emplacement areas on the heritage values of DECC site #37-2-731 (Saddlers Pit grinding groove site). This may include consideration of salvage removal of the grinding groove site if this is feasible from an engineering perspective.

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Aboriginal Archaeology and Cultural Heritage
Impact Assessment

ES3 S

6067101_RPTFinalRev01_28Aug09

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Aboriginal Archaeology and Cultural Heritage
Impact Assessment

ES4 S

6067101_RPTFinalRev01_28Aug09

Environment

1.0 Introduction

ENSR Australia Pty Ltd (trading as AECOM) and hereafter referred to as AECOM was commissioned by Hansen Bailey Pty Ltd (on behalf of Hunter Valley Energy Coal Pty Ltd (HVEC)) to prepare an Aboriginal archaeology and cultural heritage impact assessment for the Mt Arthur Coal Consolidation Project (the Project), near Muswellbrook, NSW. The purpose of the assessment is to form part of an Environmental Assessment (EA) being prepared by Hansen Bailey to support an application for a new Project Approval for Mt Arthur Coal under Part 3A of the *Environmental Planning and Assessment Act 1979* (EP&A Act). The new Project Approval will consolidate Mt Arthur Coal's current planning approvals platform, introduce flexibilities into Mt Arthur Coal's mining operations and facilitate mining of additional areas within Mt Arthur Coal's existing mining leases (MLs).

1.1 Project Description

1.1.1 Project Background

Open cut mining commenced at Mt Arthur Coal in the early 1960s, with the development of Bayswater No. 2 mine (since ceased production). From 1995, coal production at Mt Arthur Coal was progressively increased when approval to mine Bayswater No. 3 was granted at a rate equivalent to five million tonnes per annum (mtpa) of Run of Mine (ROM) coal.

Mining capacity at Mt Arthur Coal continued to increase with approval in May 2001 to mine Mt Arthur North (MAN). MAN is located immediately to the west of Bayswater No. 2. In September 2006 Mt Arthur Coal received approval to construct an exploration adit and extract a bulk sample at the Mt Arthur Underground (MAU); approval to mine MAU was granted in December 2008. In January 2008 Mt Arthur Coal received approval to extend the approved MAN mining area further south to recover additional coal resources (South Pit Extension).

This Project, known as the Mt Arthur Coal Consolidation Project, intends to bring all existing surface approvals under one overall approval, extend coal production and introduce flexibilities into Mt Arthur Coal's operations (see **Section 1.1.4**).

1.1.2 Current Mt Arthur Coal Approvals

To summarise, Mt Arthur Coal currently has six development consents that permit:

- open cut mining:
 - Bayswater No. 3 (DA 210/93, approved 12 September 1994);
 - MAN (DA 144-05-2000, approved 1 May 2001); and
 - South Pit extension (Project Approval 06_0108, approved 9 January 2008);
- underground mining:
 - Exploration adit (Project Approval 06_0040, approved 10 September 2006);
 - MAU (Project Approval 06_0091, approved 2 December 2008); and
- the Bayswater Rail Loading Facility and Rail Loop (DA 105-04-00, approved 2 November 2000).

Mt Arthur Coal currently has approval to produce up to 28 Million tonnes per annum (Mtpa) of Run of Mine (ROM) coal from the combined complex, of which 8 Mtpa is from underground mining methods.

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Aboriginal Archaeology and Cultural Heritage
Impact Assessment

1 S

6067101_RPTFinalRev01_28Aug09

Coal production from the MAN mining area has been the focus of Mt Arthur Coal's operations since 2002. Open cut coal mining is conducted via shovel and excavator. In 2008, coal was mined from the Glen Munro seam to the Ramrod Creek seam within the Wittingham coal measures. Open cut mining methods at Mt Arthur Coal allow the full recovery of all coal down to the Ramrod Creek seam.

Coal preparation, handling and loading is undertaken at the centralised, Coal Handling and Preparation Plant (CHPP), which is strategically located in a valley to minimise environmental impacts. Export coal is loaded onto trains via the Rail Loading Facility whilst domestic coal is transported via conveyor directly to Macquarie Generation's Bayswater Power Station.

1.1.3 Existing Heritage Management Areas

Under the existing approvals, a total of five conservation and management areas totalling approximately 805 hectares (ha) have been, or are in the process of being, established. These conservation and management areas were set aside to conserve samples of Aboriginal sites and/or Aboriginal heritage landscape values, with the principal distinction being that conservation areas are set aside in perpetuity whilst management areas are not.

The heritage management areas include:

- Macleans Hill Heritage Management Zone (HMZ) (139 ha);
- West of Edderton Road HMZ (131 ha);
- Mount Arthur North West Slopes HMZ (138 ha);

The conservation areas include:

- proposed Mount Arthur Conservation Area (CA) (105 ha); and
- proposed Saddlers Creek CA (250 ha).

1.1.4 Mt Arthur Coal Consolidation Project Application

Project Approval will be sought under Part 3A of the EP&A Act to consolidate Mt Arthur Coal's existing open cut planning approvals and, in addition, allow mining of additional areas within Mt Arthur Coal's MLs. It is also intended that the new approval will provide a level of flexibility to mine in different areas at practical, varying rates.

The Project continues all aspects of Mt Arthur Coals current activities and specifically, seeks approval for the following:

- Consolidation of all of Mt Arthur Coal's open cut mining related planning approvals into one contemporary Project Approval;
- Extension of the mine footprint to uncover additional coal reserves within the current MLs;
- Increasing the Mt Arthur Coal complex approved production levels by 8 Mtpa up to 36 Mtpa ROM coal. This will be achieved by;
 - Increasing open cut coal production by up to 8 Mtpa; and
 - Having the flexibility to increase either open cut or underground production by an additional 4 Mtpa if the maximum production from either underground or open cut methods is not being met.
- Relocation of a section of Edderton Road in approximately 2019;

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- Upgrading the existing Mt Arthur CHPP to wash up to 36 Mtpa of ROM coal and allow the inclusion of an ultra-fine coal circuit to re-process fines, which will facilitate increased resource recovery and reduce water demand;
- Increasing the approved rail haulage capacity (in line with the increased coal production) from 19 mtpa to 27 mtpa, with the construction of a second rail load out facility and associated conveyor system;
- Modifications to existing infrastructure (such as workshop and bath house), construction of additional ROM coal hoppers and the extension of ROM and product coal stockpiles; and
- A total workforce of approximately 2,600 at peak production, which represents an increase of approximately 1,610 from current staffing levels and an estimated additional 720 positions directly attributable to the Project.

No changes to the mining method or hours of operation are proposed, although a gradual increase in the mobile equipment fleet will be required.

1.2 Study Area

Mt Arthur Coal is located in the Upper Hunter Valley region of NSW, approximately five km south west of Muswellbrook off Thomas Mitchell Drive (**Figure 1**). Current operations occur over an area of approximately 36 km². This report covers two areas of research (**Figure 2**):

- 1 the entire Mt Arthur Coal Consolidation EA Boundary, hereafter referred to as the “EA Boundary”, which includes the overall boundary around MAN, MAU, South Pit Extension and Bayswater No. 3. Assessment of heritage values for the majority of the EA Boundary will be by desktop study only; and
- 2 three parcels of land that will be physically surveyed for Aboriginal objects, hereafter collectively called the “survey areas.” These land parcels include:
 - a) *Edderton Road Survey Area* – a narrow strip located between MAU and Denman Road lying over the Mt Arthur Coal owned property “Windmill”, which is part of the proposed Edderton Road realignment;
 - b) *Mount Arthur Survey Area* – a land parcel immediately north of Mount Arthur. It is the only area within the EA Boundary that was not surveyed under one of the previous major surveys (Bayswater No. 3, MAN, MAU or South Pit Extension). This survey area is intended to “complete the picture”; and
 - c) *Offset survey area* – located east of Thomas Mitchell Drive, which is proposed as a possible offset for disturbance to existing HMZs (**Section 3.5**). This survey area is located outside the EA Boundary.

In total, the EA Boundary encompasses the following mining tenements: ML1358, ML1487, ML1548, ML1593, EL 5965, MPL263, CCL744, CL396 and A171.

1.3 Aims and Objectives

The overall aim of the Aboriginal heritage assessment was to assess the nature of the archaeological landscape of the EA Boundary and assess the potential impacts that the project may have on Aboriginal cultural heritage. This Project will also assist with the planning, design and management of future development projects and activities at Mt Arthur Coal. To achieve these aims, the following objectives were established:

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Aboriginal Archaeology and Cultural Heritage
Impact Assessment

3 S

6067101_RPTFinalRev01_28Aug09

- review of previous archaeological studies within the EA Boundary to assess the current status of Aboriginal cultural heritage and to provide a basis for developing a predictive model for site location;
- archaeological survey of three areas to locate any additional sites and/or items and validation of known Aboriginal sites in those survey areas;
- comparative assessment of Aboriginal sites and landscape values of the three existing HMZs with sites and landscape values within the Offset survey area;
- consultation with the relevant Aboriginal community groups;
- assessing the significance of any archaeological material identified; and
- presenting recommendations for the management of and/or mitigation of the Projects' impact on the archaeological resource identified.

1.4 Project Team

The Project team consisted of archaeologists and other specialists from AECOM, specialists from Hansen Bailey, and representatives from local Aboriginal community groups. Neville Baker (AECOM Principal Archaeologist) directed the Project, conducted two weeks of the field survey and provided technical and QA review of this report. Rick Bullers (AECOM Senior Archaeologist) conducted two days of the field survey and was principal author of this report. Geordie Oakes (AECOM Archaeologist) participated in the field survey and contributed to this report. Lee-Anne Bishop and Tim Osborne provided administrative and drafting support. Melissa Walker (Hansen Bailey Environmental Scientist) was the client's representative and wrote the Aboriginal community consultation section of this report (**Section 4.0**).

Representatives from local Aboriginal community groups who participated in the field survey included Michael Matthews (Giwirr Consultants), Colleen & Barry Stair (Hunter Valley Cultural Consultants), Lloyd Matthews (Bullen Bullen Consultants), Margaret Matthews (Aboriginal Native Title Consultants), John Matthews (Upper Hunter Heritage Consultants), Rhonda Ward, Jamie-Lee Stair (Ungooroo Cultural and Community Services), Barry Anderson (Lower Wonnarua Tribal Consultancy Pty Ltd), Justin Matthews (Culturally Aware), Katrina Cavanagh (Hunter Valley Aboriginal Corporation), Luke Hickey (Hunter Valley Cultural Surveying), Kathleen Steward-Kinchela (Yinarr Cultural Services), Elizabeth Howard (Valley Culture), Arthur Fletcher & Tony Matthews (Wonn1 Contracting), Shannon Griffiths (Wonnarua Culture Heritage), George Sampson (Cacatua Cultural Consultants), Dean Miller (Mingga Consultants), Barry French (Yarrowalk), Des Hickey (Wattaka Wonnarua CC Service), Ann Hickey (Gidawaa Walang Cultural Heritage Consultancy), Maree Waugh (Wonnarua Nations Aboriginal Corporation), Georgina Berry (Upper Hunter Wonnarua Council), Katrina Cavanagh (Hunter Traditional Owners Environmental Management) and Jade Bauer (Wannarua Local Aboriginal Land Council).

1.5 Report Structure

The report is structured as follows:

- **Section 2.0** describes the methodology used to conduct the assessment;
- **Section 3.0** provides environmental and archaeological contextual information;
- **Section 4.0** describes the methodology used for consultation with the Aboriginal community and the results obtained;
- **Section 5.0** lists the Aboriginal sites and objects identified in the survey areas, and discusses the results of the field survey;
- **Section 6.0** discusses the significance values within the EA Boundary;

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Aboriginal Archaeology and Cultural Heritage
Impact Assessment

- **Section 7.0** discusses the impacts of the Project on the heritage values of the EA Boundary;
- **Section 8.0** describes legislation guiding Aboriginal heritage management; and
- **Section 9.0** provides succinct management recommendations regarding the Aboriginal heritage values of the EA Boundary and Offset Area.

1.6 Limitations

Predictions have been made about the probability of subsurface archaeological materials occurring within the EA Boundary. It is possible that materials may occur in any landscape context, and the assessment of subsurface materials refers to the likelihood of occurrence based on surface indications and environmental context.

ENSR has undertaken a search of the Aboriginal Heritage Information Management System (AHIMS) held by Department of Environment and Climate Change (DECC). Register searches are constrained by the amount of data in the register and the quality of that data (for example grid references can be inaccurate). Large areas of NSW may not have been systematically searched and may contain Aboriginal objects and other heritage values not recorded on AHIMS.

Additionally, the AHIMS reports database can only be searched by the title of the report, which may not indicate the geographical location of the area covered. This means that it is possible that some known sites and some reports may have been omitted from this study. Sites and reports are regularly added and removed from AHIMS and therefore the accuracy of information provided from AHIMS is only valid on the day the register is searched.

A summary of the statutory requirements regarding Aboriginal heritage is provided in **Section 8.0**. This is provided based on experience with the heritage system in NSW and does not purport to be legal advice. It should be noted that legislation, regulations and guidelines change over time, and users of the report should satisfy themselves that the statutory requirements have not changed since the report was written.

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Aboriginal Archaeology and Cultural Heritage
Impact Assessment

6 S

6067101_RPTFinalRev01_28Aug09

Environment

2.0 Methodology

This section describes the methodology used for conducting the Aboriginal heritage assessment.

In order to achieve the aims outlined in **Section 1.3**, the Aboriginal heritage assessment was divided into two main functions:

- to assess the existing archaeological signature of the EA Boundary using desktop survey. Part of this process was to assess archaeological significance of the three existing HMZs; and
- field survey of three survey areas:
 - a) *Edderton Road Survey Area*: an area of 37.3 ha that will form the new corridor for the proposed Edderton Road realignment;
 - b) *Mount Arthur Survey Area*: an area of approximately 86.3 ha immediately north of Mount Arthur. It is the only area within the EA Boundary that was not surveyed under one of the previous major surveys (Bayswater No. 3, MAN, MAU and South Pit Extension. This survey area is intended to “complete the picture”; and
 - c) *Offset survey area*: an area of 495 ha located on the eastern side of Thomas Mitchell Drive, outside the EA Boundary. This area is proposed as a possible alternative to the three existing HMZ.

The guiding principles for this assessment are the Aboriginal Cultural Heritage Standards and Guidelines Kit (NPWS 1997), the draft Guidelines for Aboriginal Cultural Heritage Impact Assessment and Community Consultation (DEC 2005) and the Part 3A EP&A Act Guidelines for Aboriginal Cultural Heritage Impact Assessment and Community Consultation (DEC/DoP 2007).

2.1 Desktop Survey

The desktop survey methodology comprised:

- desktop review of previous archaeological reports relevant to the local area (**Section 3.3.1**);
- search of the DECC AHIMS Aboriginal sites database for both the EA Boundary as a whole and for the three survey areas individually prior to field survey (**Section 3.3.2**);
- consultation with Aboriginal parties about the Aboriginal heritage values of the land prior to and after the field survey – in accordance with the *National Parks & Wildlife Act 1974: Part 6 Approvals: Interim Community Consultation Requirements for Applicants* (DEC 2004) (**Section 4.0**);
- review of landscape character and landuse history which influences patterning of sites; and
- assessment of impacts on the Aboriginal heritage values of the EA Boundary, including assessment of recorded Aboriginal sites within the three existing HMZ and post-survey comparison with the Offset survey area (**Section 7.0**).

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Aboriginal Archaeology and Cultural Heritage
Impact Assessment

7 S

6067101_RPTFinalRev01_28Aug09

2.2 Fieldwork Methodology

The method used for the field survey included dividing the survey areas into a series of discrete landform based areas and placing transects within each landform area. This is in accordance with guidelines within *Aboriginal Cultural Heritage Standards and Guidelines* (NPWS 1997). To achieve this, the landscape was divided into a series of archaeological terrain units (see **Section 2.2.1**). In this way all landforms within the survey areas were sampled. Due to the nature of the terrain, one hundred percent survey coverage was not considered feasible and representative areas within each terrain unit were sampled. Furthermore, it must be emphasised that the effective coverage achieved is rarely 100% due to the presence of long grass or other vegetation/ground surface cover that inhibits observation of the ground surface and therefore any artefacts lying on the ground.

The approach used a combination of pedestrian and vehicle-based surveys. Pedestrian surveys were conducted in areas of steep, highly eroded and/or heavily vegetated terrain, with archaeologists and Aboriginal community representatives walking in line abreast at approximately 5 m intervals. Elsewhere, two vehicles driving at 20 m intervals in line abreast, were used to traverse large areas of open paddock where ground surface visibility was restricted due to dense pasture grass. This allowed the vehicles to traverse backwards and forwards across the paddocks and stop at all exposures and at locations considered to have the highest potential for Aboriginal sites. For specific methodologies in engaging Aboriginal community representatives refer to **Section 4.4**.

Notes on landform, soils and surface exposure were recorded. Records consisted of descriptive notes, Differential Global Positioning System¹ (DGPS) positions (MGA format), and photographs. Where artefact scatters were recorded, the position of each artefact in most sites was recorded using DGPS. Polygons were established for site boundaries and the centre position of the site recorded as the site location for site card purposes.

The survey strategy was formulated so that data obtained is comparable with other major surveys undertaken at Mt Arthur Coal (Kuskie 1999a; Kuskie and Clarke 2004; Umwelt 2007; Umwelt 2008). Like previous surveys, this survey used a system of archaeological terrain units (ATUs) to compartmentalise the landscape, except where minor modifications are noted in the text below. This survey also reverted to a more conventional definition of "Aboriginal site", rather than the somewhat unorthodox definition used by Kuskie (1999) and Umwelt (2007; 2008). For further information refer to **Sections 2.2.3** and **2.2.4**.

A draft survey methodology was presented to registered Aboriginal stakeholder groups during a meeting on 3 February 2009 (further detail provided in **Section 4.0**).

2.2.1 Archaeological Terrain Units

In order to obtain a level of comparability with Kuskie (1999), Kuskie and Clarke (2004) and Umwelt (2007; 2008), the three survey areas were divided into separate ATUs.

Kuskie (1999: 67) defined ATUs "... on the basis of two important environmental attributes, that are assumed to relate to the way in which Aboriginal people occupied the land. These are discrete, recurring areas of land for which it is assumed that Aboriginal land use and resultant heritage evidence in one location may be extrapolated to other similar locations." The two environmental attributes are landscape elements and class of slope.

The ATUs used in this study, as defined in **Table 1**, are based on McDonald et al's (1998) morphological units. The distribution of ATUs in the survey area is shown in **Figure 3** to **Figure 5**.

¹ Trimble GEO-XM, employing GPS Pathfinder Office software.

Table 1: Archaeological Terrain Units

Archaeological Terrain Unit	Description
Modified Terrain	Modified terrain refers to a landform that has been completely transformed by non-Aboriginal land use such as roads, overburden emplacement areas and mining pits.
Simple Slope (level to very gentle)	Simple slopes that can be characterised as level or having very gentle slopes of less than 3%. This ATU can include footslope, lower-slope, mid-slope and upper-slope landform elements, where they are not part of a level to very gentle drainage depression ATU. Bench or small hillocks may, in some cases, form part of this ATU.
Simple Slope (gentle)	Simple slopes that can be characterised as having gentle slopes of greater than 3% but less than 10%. This ATU can include footslope, lower-slope, mid-slope and upper-slope landform elements, where they are not part of a gentle drainage depression ATU. Bench or small hillocks may, in some cases, form part of this ATU.
Simple Slope (moderate to steep)	Simple slopes that can be characterised as having slope greater than 10%. This ATU can include footslope, lower-slope, mid-slope and upper-slope landform elements, where they are not part of a moderate to steep drainage depression ATU. Bench or small hillocks may, in some cases, form part of this ATU.
Drainage Depression (level to very gentle)	Drainage depressions that can be characterised as being level or very gently sloping to less than 3% gradient. Landform elements in this ATU include associated flats, floodplain, creek banks, alluvial terrace, footslope and creek channel.
Drainage Depression (gentle)	Drainage depressions that can be characterised as being gently sloping with a gradient greater than 3% but less than 10%. Landform elements in this ATU include associated flats, floodplain, creek banks, alluvial terrace, footslope and creek channel.
Drainage Depression (moderate to steep)	Drainage depressions that can be characterised as moderately to steeply sloping with a gradient greater than 10%. Landform elements in this ATU include associated creek banks and creek channel.
Ridge	Ridges are 'narrow crests with short adjoining slopes, the crest length being greater than the width of the landform element' (McDonald et al (1984: 19). Ridges in this study have adjoining gentle slopes greater than 3% but less than 10%. Ridge lines consist of crests and saddles within the survey area.
Spur Crest/Spur	Spur crests are elongated crests running downslope from a ridge crest. Spur crests are moderately to steeply sloping with gradients greater than 10%. Landform elements in this ATU include spur, secondary spur and spur crest.

Source: based on Kuskie (1999).

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Aboriginal Archaeology and Cultural Heritage
Impact Assessment

9 S

6067101_RPTFinalRev01_28Aug09

A total of nine ATU types were identified in the three survey areas. Each of the three survey areas contained a minimum of three of these ATUs, but none of the survey areas contained samples of all nine ATU types.

The ATUs were devised prior to the survey in order to develop the survey strategy in conjunction with the predictive model (**Section 3.4.1**). The ATU were also used as a means of calculating effective cover (**Section 5.1.2**). An assessment of effective coverage is a quantifiable estimate of the area in which archaeological materials are “detectable”, i.e. exposed ground surface area.

2.2.2 Landform Elements

Landform elements within the survey area were also recorded, in order to assist in interpreting archaeological site patterning and, consequently, Aboriginal occupation, throughout the survey areas’ landscape. It is also important for comparative purposes with previous survey areas in the EA Boundary, as well as for the wider Upper Hunter Valley region. **Table 2** identifies the landform elements that were recorded in the survey area.

Table 2: Landform Elements Identified in the Survey Area

Landform Element	Description
Ridgeline	A smoothly convex landform that stands above almost all points in the adjacent terrain. A ridgeline consists of a narrow crest with short adjoining slopes where the crest length is greater than the crest width. The ridgelines within the survey area consist of crests and saddles (refer below).
Spur	A smoothly convex landform that stands above all or almost all of the adjacent terrain and runs off a ridgeline.
Spur (secondary)	A spur that runs off a spur.
Spur Crest	An elongated crest that runs from a ridge crest.
Saddle	A saddle is an area that occurs between two higher points (crests) along the spur.
Upper-slope	Slope element adjacent to and below a crest. This landform is not buried by colluvial deposit and is above the mid-slope.
Mid-slope	Slope element lying between the upper-slope and lower-slope.
Lower-slope	A waning slope, below a mid-slope and above a footslope.
Bench	A short, gently or very gently inclined mid-slope element eroded or aggraded by an agent.
Footslope	Slope element adjacent to and above a floodplain and includes, in some cases, creek banks. The footslope landform element is part of a Simple Slope ATU when it is greater than 30 m from a creek bank. It is within the Drainage Depression ATU when it is within 30 m of a creek bank.
Hillock	A compound landform element comprising a narrow crest and short adjoining slopes, the crest length being less than the crest width.
Floodplain	A flat of gently inclined area associated with a stream channel. There may be active erosion and/or aggradation by channelled and over-bank stream flow.
Creek line	The channel of a creek/watercourse.

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Impact Assessment

10 S

6067101_RPTFinalRev01_28Aug09

Landform Element	Description
Flat	A planar landform that is neither a crest nor a depression and is level or very gently inclined (less than 3% tangent approximately).
Alluvial Terrace	A former floodplain on which erosion and aggradation by channelled and over-bank stream flow is barely active or inactive because deepening or enlargement of the stream channel has lowered the level of flooding. A pattern that has both a former floodplain and a significant active floodplain, or has former floodplains at more than one level, is said to be terraced land.

2.2.3 Aboriginal Site Definition

One of the difficulties in constructing a comparative analysis of the archaeological evidence within the EA Boundary is the lack of a consistent approach to defining an Aboriginal site. Typically Aboriginal sites are defined by the physical extent of visible artefactual evidence, e.g. the physical extent of visible artefacts lying on the ground surface. Prior to Kuskie's (1999) survey at MAN, virtually all archaeological surveys at Mt Arthur Coal defined Aboriginal sites in this way. However, commencing with Kuskie (1999), subsequent surveys at Mt Arthur Coal used a different definition based on a landscape approach, albeit with variations:

- Kuskie's (1999) survey divided the landscape into a series of discrete survey areas², where artefactual evidence and/or potential archaeological deposits (PADs) were located within a survey area, the whole survey area was defined as a "site". In this way large areas of the landscape were identified as sites even though for the majority of the area there was no artefactual evidence or any likelihood of PAD occurring. The locations where artefactual evidence occurred was termed a locus³;
- Umwelt (2007) used the same system of site definition as Kuskie, i.e. the visible extent of artefacts was defined by site loci, whilst the boundary of an Aboriginal site was defined by the boundary of the survey area, regardless of the visible extent of artefacts. The main variation from Kuskie's approach was that Umwelt differentiated between artefact scatters and isolated finds, whereas Kuskie did not; and
- Umwelt (2008) continued to use Kuskie's system of site definition using ATUs, survey areas and site loci. However, for this survey Umwelt recognised the inherent problem with Kuskie's approach regarding large areas of land being defined as a site despite evidence that no likelihood of artefacts existed (Umwelt 2008: 6.5). Instead, they varied the approach so that "sites" were defined by the physical extent of artefacts and any associated PAD. Where there was a PAD between two or more loci, these became part of a broader site. Where a locus was thought to represent the limit of archaeological material in that area, the locus was defined as a site.

² The term "survey area" in this context was defined by Kuskie (1999: 69) as "an area of a single [ATU] that is bounded on all sides by different ATUs." These survey areas are not to be confused with the definition of survey area used in this report meaning the three individual areas surveyed during this Project.

³ The term "locus" refers to "each spatially separate location of heritage evidence within a site" (Kuskie 1999: 71).

These definitions attempted to define sites on a landscape basis based on interpretation of Aboriginal behaviour. Although these major studies attempted to use similar definitions in order to allow a level of comparability, the differing definitions are somewhat confusing and, as a result, it is difficult to compare site by site.

2.2.4 Definition of “Aboriginal Site” used in this Survey

The definition of “Aboriginal site” used in this survey returns to a more conventional definition. A site is defined as the physical extent of visible archaeological material in the present. In this survey, PADs are identified as entities in their own right, not as part of a site. For the purposes of comparability with the Kuskie and Umwelt surveys at Mt Arthur Coal, their site loci are treated as sites. In this way sites identified in this survey can be compared with site loci identified in the previous surveys.

It is acknowledged that, using this definition, the actual extent of the site may be larger than reported due to limited ground surface visibility beyond the edge of ground exposures.

2.2.5 Specific Actions for Fieldwork

The methodology comprised:

- field survey over a twelve-day period by AECOM archaeologists Neville Baker (10 days), Rick Bullers (2 days) and Geordie Oakes (12 days), with members of the local Aboriginal community. The survey covered transects of 40-50 m width, sampling each of the ATU within each survey area;
- recording and significance assessment of any heritage sites or items located during the survey (to the extent possible from surface evidence);
- careful inspection of all ground exposures for evidence of artefacts;
- recording of details of the survey using field notes and DGPS, including survey tracks (transects), individual artefacts within most sites, some exposures, site locations. These were used to develop maps to guide fieldwork;
- use of DECC site cards as guidance, along with DGPS, to relocate previously recorded sites;
- inspection of sandstone outcrops within the survey areas (or immediately adjacent) for axe grinding grooves;
- inspection of mature trees within the survey areas (or immediately adjacent) for evidence of scars; and
- photographing the survey areas and noting environmental and archaeological aspects.

2.3 Discussion

As archaeologists we tend to focus on the material evidence of human occupation. It should be noted, however, that the concept of Aboriginal heritage is not confined to material evidence, i.e. archaeological sites. Instead, it is much broader in scope, encompassing such factors as language, stories and ritual. To investigate Aboriginal heritage values not related to archaeological sites, contact with the local Aboriginal community was relied upon for advice. The method adopted to explore this issue was to consult the local Aboriginal community using DECC’s *Interim Community Consultation Requirements for Applicants* (see **Section 4.0**).

At the Aboriginal community meeting on 3 February 2009 to discuss the survey methodology, and then again during post-survey close-out meetings, Aboriginal community group representatives were asked to provide information on the cultural heritage values of the EA Boundary. Responses from

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Aboriginal community groups did not identify any additional information on cultural heritage values (see **Section 4.0**).

In light of the responses from Aboriginal stakeholders regarding this Project, there was limited information regarding the cultural values of the EA Boundary to the Aboriginal community. Therefore the investigation focused on the identification of Aboriginal heritage values relating to archaeological sites. Field survey methods were adopted to verify existing Aboriginal site records, investigate and record new archaeological sites, ensure their accurate recording and provide sufficient background information to provide an assessment of cultural significance to the extent that surface survey allows.

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Aboriginal Archaeology and Cultural Heritage
Impact Assessment

13 S

6067101_RPTFinalRev01_28Aug09

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Impact Assessment

14 S

6067101_RPTFinalRev01_28Aug09

Environment

3.0 Existing Environment

3.1 Environmental Context

Investigations of the distribution of Aboriginal objects and places include an analysis of information on the natural resources available in a region to gain an understanding of the range of cultural remains that can be expected. Resources are linked to the hydrology, geology and soil types in a region.

Water availability is a major influence on the intensity of Aboriginal occupation. Evidence, usually in the form of flaked stone artefacts, is often associated with permanent or semi-permanent water sources.

Soil types are influential as accumulating sediments can cover cultural remains while areas of sediment removal through erosion can either uncover buried archaeological material or transport small items away from the original depositional context. Soil analysis has important ramifications for archaeological research through the potential impact of different soils on human activity (such as agricultural exploitation) and the impact of the soils on archaeological evidence (such as post-depositional movement). The soils known to occur throughout the EA Boundary are identified in order to delineate their nature and impact on the survival and location of archaeological material.

A detailed section on the ethnographic and archaeological context of the EA Boundary is also presented below in **Sections 3.2 and 3.3** to provide context for this assessment.

Information on the geology and soil landscapes and topography in the region of the EA Boundary is presented below. This data was used in the development of the fieldwork methodology and discussion on the results of the field inspection at the end of this report.

3.1.1 Climate

The prevailing climate for the area is warm temperate with a continental influence. Summers are warm to hot and humid, winters are cool to mild. The maximum mean temperatures occur during the summer months with January being the hottest month (31.7°C). Winter is the coolest time of the year with a minimum mean temperature of 3.8°C occurring in July. The average maximum temperatures for this area range between 30.9 to 31.7°C in summer and 17.4 to 22.8°C in winter, although daily temperatures can reach considerably higher or lower than this. The average annual rainfall for this area is 640 mm (Bureau of Meteorology 2009).

3.1.2 Topography and Hydrology

The EA Boundary lies near the western boundary of the Central Lowlands environmental zone within the Hunter River Valley. Hughes (cited in Umwelt 2008: 4.2) describes Central Lowlands topography as:

...belt of lowlands developed on relatively weak sedimentary rocks. These lowlands continue down to the coast. While the general altitude gradually rises inland from sea level to 500 m at Murrurundi, the local relief in any one locality rarely exceeds 60 m. The landscape is undulating or gently hilly with an abrupt transition to the steep country on either side. A line of alluvial flats between 0.5 and 2.5 km wide extends along the Hunter River and its major tributaries where they flow through the lowland belt.

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15 S

6067101_RPTFinalRev01_28Aug09

Mount Arthur forms the most significant topographic feature in the EA Boundary, standing significantly higher than the surrounding landscape. A high ridge bisects the western half of the EA Boundary, from within the Bayswater No. 3 operation and running westwards through MAU to culminate at Mount Ogilvie (468 m) just to the west of the EA Boundary, forming high ground between two sections of the Hunter River which bends around the western side of the EA Boundary. Thus, the landscape ascends from the alluvial flats of the Hunter River to the north, west and south (or more accurately from Saddlers Creek, a tributary of the Hunter River), rising through gently to moderately inclined slopes and hills, before rising steeply to the high ridges.

The local relief within the EA Boundary is some 350 m, ranging from 130 m above mean sea level in the vicinity of Denman Road at "Windmill" to the summit of Mount Arthur at 483 m. These central ridges and mountains form the main drainage divide across the EA Boundary, with drainage lines and water courses generally flowing northwards to the Hunter River from the northern side of the ridge line, and southwards to Saddlers Creek (and thence to Hunter River) from the southern side.

Major watercourses in the EA Boundary include (refer **Figure 2**):

Whites Creek

Whites Creek was originally a fourth-order creek which formerly flowed from the south eastern corner of MAN, from the slopes of Mount Arthur, running north westerly through MAN to drain into the Hunter River. The majority of the original creek no longer exists, as it was diverted in accordance with the MAN development consent and subsequently mined.

Fairford Creek

Fairford Creek is a fourth-order creek that drains northwards from the northern slopes of Mount Arthur meeting the Hunter River just west of the original Whites Creek outlet. It lies close to the western boundary of the Mt Arthur North mining lease.

Ramrod Creek

Ramrod Creek is a third-order creek running from the Drayton Mine and flowing generally northwards along the eastern side of Thomas Mitchell Drive, through the Offset survey area, and draining into the Hunter River. The creek is characterised generally by terraces (including low, mid and high terraces) and high banks, particularly on the western side. The banks on the eastern side are generally lower-lying.

The fluvial dynamics of the creek are largely dictated by the flood dynamics of the Hunter River, with water from the Hunter backing up Ramrod Creek and creating conditions for alluvial deposition.

The creek is generally in fair to good condition, though areas of stream bank erosion are evident, particularly on the western side, where a series of high banks and terracing occurs. However, contour banks have been constructed on the slopes adjacent to the creek to control and assist in the remediation of sheet erosion, which is evident throughout much of the catchment.

Quarry Creek

Quarry Creek is a third-order creek running generally north westwards from the Bayswater No. 3 operation to the Hunter River, crossing the northern boundary of the EA Boundary in the vicinity of "Windmill". The headwaters of the creek have been severely impacted by the development of open-cut mine pits and the creek is dammed in the vicinity of the "Windmill" property.

The creek is generally in poor condition. The majority of riparian vegetation has been cleared leaving only isolated pockets of vegetation along the creek. Vegetation clearance has resulted in, or at least largely contributed to, erosion of the creek bed and banks. However management of stock access restrictions by Mt Arthur Coal immediately downstream of Edderton Road has resulted in some recovery of the creek in that area (Umwelt 2008: 4.3).

Saddlers Creek

Within the EA Boundary Saddlers Creek runs from the eastern boundary, where it is a second-order creek and flows south westwards forming part of the southern boundary before crossing Edderton Road as a fourth-order creek, and eventually into the Hunter River. A large tributary system also flows off the western side of Mount Arthur flowing south into Saddlers Creek. The headwaters of that tributary have been severely impacted (destroyed or diverted) by the development of Saddlers Pit and McDonalds Pit in the Bayswater No. 3 mining area.

The creek has been dammed in places, the largest being less than 1 km upstream of Edderton Road. The creek retains large areas of riparian vegetation, particularly at the eastern end, however in places significant erosion scarps are evident and significant creek bank and channel erosion is evident in both the creek and its tributaries (Umwelt 2008: 4.4).

Un-named (Western) Creek

There is a large third-order creek that flows westwards into the Hunter River from the ridges west of Edderton Road. Umwelt (2008: 4.3) called this creek Western Creek in their heritage assessment for the MAU. The majority of vegetation has been cleared along the creek's tributaries, but some riparian vegetation remains along the main creek channel. Clearance of vegetation and grazing has contributed to significant gully and bank erosion along the mid- to lower-reaches of the creek and tributaries (the upper reaches are generally stable). Contour banks have been constructed on the slopes adjacent to the creek to control and assist in the remediation of sheet erosion, which is evident throughout much of the catchment (Umwelt 2008: 4.3).

Un-named (Eastern) Creek

There is another third-order creek that flows generally northwards from around the Drayton Mine, running parallel to Ramrod Creek, and flowing through the eastern portion of the Offset survey area. This creek joins Ramrod Creek just south of the Muswellbrook Shire Council sewerage treatment works in South Muswellbrook. For the purposes of this report, it is termed Eastern Creek.

The fluvial dynamics of this creek are similar to Ramrod Creek. The creek is generally in fair to good condition, though areas of stream bank erosion are evident, however there is less vegetation clearance along the creek banks than along Ramrod Creek. Contour banks have been constructed on the slopes adjacent to the creek to control and assist in the remediation of sheet erosion.

Tributaries

The creeks named above are the principal watercourses within the EA Boundary. However, there are also numerous first-, second- and third-order tributaries associated with these watercourses. The tributaries range from minor drainage depressions to formed stream channels.

3.1.3 Geology and Soils

The EA Boundary lies predominantly on the Wittingham Coal Measures with the majority lying over the Jerrys Plains Subgroup, which consists of coal seams, claystone, tuff, siltstone, sandstone and conglomerate. Both the Edderton Road realignment and Mount Arthur survey areas lie within this area. Much of MAN lies over long thin belts of the Vane Subgroup and Saltwater Creek formations, as well as the Mulbring Siltstones of the Maitland Group. These consist largely of coal seams, siltstone, lithic sandstone, shale and conglomerate. East of Thomas Mitchell Drive, the Offset survey area lies on the older conglomerates, sandstone and siltstones of the Branxton Formation. Small crops of the younger Wollombi formation occur at Mount Arthur and Mount Ogilvie (DMR 1988).

The EA Boundary traverses seven soil landscapes (Kovac 1991; Kovac & Lawrie 1991):

Bayswater Soil Landscape (bz)

This soil landscape is associated with drainage lines and occurs in the north east portion of the EA Boundary (occupying most of MAN and part of the Offset survey area), the northern and southern portions of MAU (particularly associated with Saddlers Creek) and in the southern section of Bayswater No. 3 (associated with several higher-order drainage lines emanating from Mount Arthur and draining into Saddlers Creek).

Soils in this landscape are comprised of Alluvial Soils within drainage lines, which are generally of uniform character throughout the profile. Soils are duplex in character on slopes, with the degree of contrast increasing as distance from the drainage lines increases. Soils on footslopes adjacent to the creeklines are Yellow and Brown Earths, which are weakly structured brown sandy clay loams with a gradual change to sandy medium clay, or Prairie Soils, which are weakly structured sandy clay loam overlying strongly structured brownish gray light clay.

Mid-slopes are generally comprised of Yellow Solodic Soils, which are weak-structured brown sandy clay loams overlying yellow-brown clay, or Brown Podzolic Soils, which are brown loam to clay loam clearly changing to strongly structured brown light medium clay. Higher slopes are comprised of Red and Yellow Podzolic Soils, which consist of moderately structured brown loam to clay loam, clearly changing to bright or dark reddish brown light clay. There may also be Yellow Solodic Soil-Red-Brown Earth intergrades present.

These soils are susceptible to moderate sheet and gully erosion, particularly on mid to upper-slopes. Gully erosion is particularly common with highly erodible Yellow Solodic Soils on mid-slopes. Salt scalds and associated erosion are common in some areas. Mass movement hazard is low throughout the soil landscape.

Liddell Soil Landscape (ld)

This soil landscape occurs in a belt across the centre of the EA Boundary, occupying the central section of MAU, the southern section of MAN and the central section of Bayswater No. 3, within undulating terrain, particularly on slopes.

Soils are generally duplex in character with varying degrees of change between A and B horizons. Lower-slopes are comprised of Yellow Solodic Soils, which consist of weakly structured dark brown

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Impact Assessment

18 S

6067101_RPTFinalRev01_28Aug09

loam A₁ horizons over bleached orange clay loam A₂ over a clearly changed, blocky bright reddish brown light clay, becoming more yellow at depth.

Mid-slopes are comprised of Earthy/Siliceous Sands, which consist of brown sand/loamy sand to brown sandy loams, gradually changing to dull yellow-brown sandy loam or bright brown loamy sand in the B horizon. Upper-slopes are comprised of Yellow Soloths, which consist of Brown loamy sand to sandy loam over a bleached light grey/yellow orange sandy loam or sandy clay loam, clearly changing to bright brown/dull orange sandy clay in the B horizon.

Soils on the lower and upper-slopes (Soloths and Solodics) are susceptible to moderate to high erosion, particularly sheet, gully and, to a lesser extent, rill erosion. Soils on the mid-slopes (Sands) have a low potential for erosion. Mass movement hazard is low throughout the soil landscape.

Brays Hill Soil Landscape (br)

This soil landscape occurs in two areas in the southern section of the EA Boundary, south of Mount Arthur. It occurs in the southern portion of MAU and the south eastern portion of Bayswater No. 3, associated with the northern slopes of Saddlers Creek.

The soil landscape is comprised of a variety of soil types, all either gradually or sharply duplex in character. Soils are alluvial layered clays in the drainage lines, Yellow Solodic Soils on lower to mid-slopes or Grey Clays/Brown Clays or Red Clays on mid-slopes, Black Earths on mid to upper-slopes and Red-brown Earths on upper-slopes and crests.

Soil erodibility varies from low to moderate throughout the soil landscape, although Alluvial subsoils have a high level of erodibility. Soils on cleared hillslopes are susceptible to minor sheet erosion and drainage lines may have moderate gullying. Gilgai depressions with Red and Grey Clays may have minor rilling. Potential for mass movement is moderate to low.

Ogilvie Soil Landscape (ol)

This soil landscape is associated with steep hills and escarpments with sandstone and conglomerate outcrops forming cliffs. It occurs in two locations within the EA Boundary – Mount Arthur in the centre and Mount Ogilvie in the south west portion of MAU. Soils consist of Silicious Sands and Brown Earths in drainage lines and on the lower slopes of Mount Arthur. Lower-slopes are generally Brown Solodic Soils, with Shallow Soils (Lithosols) occurring on upper slopes. The soils are generally duplex in character with sandy loams to loamy sands overlying brown sandy loams (Brown Earths) or brown medium to heavy clay (Brown Solodic Soils).

Soil erodibility is generally low to moderate, although subsoils within the Brown Earths on lower-slopes have a high erodibility. Mass movement potential is generally low, but some movement may be seen in road cuttings. Minor sheet erosion is common.

Roxburgh Soil Landscape (rx)

This soil landscape occurs at the north eastern corner of the EA Boundary, predominantly in the Offset survey area but also a small contiguous patch on the eastern boundary of MAN. It is associated with undulating low hills.

Soil types in this soil landscape are variable and generally duplex in character. Lithosols (very shallow red-brown fine sandy clay loam (10 cm depth) loam overlying loamy sand, and bedrock at ~35 cm depth) occur on crests. Yellow Podzolic Soils (brown sandy loams, possibly over a bleached brown-grey fine sandy loam A₂, overlying a sharp change to reddish brown sandy clay-heavy clay) are common on mid- to upper-slopes. Less common soil types include Brown Podzolic Soils on mid to

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Impact Assessment

19 S

6067101_RPTFinalRev01_28Aug09

upper-slopes on conglomerate with associated flat pavements, and Red Solodic Soils on concave upper-slopes. Yellow Soloths may occur in some gullies.

Soils have a generally moderate erodibility, although the Podzolic soils are less erodible in the subsoils. Mass movement potential is low throughout. Minor to moderate sheet erosion is common. Some gullies up to 3 m deep are associated with the dispersible Soloths and Solodic Soils.

Dartbrook Soil Landscape (db)

The Dartbrook Soil Landscape occurs on smooth undulating rises and low hills and, in the EA Boundary, occurs only in a very small section along a creek line between Denman Road and the northern edge of MAU. Soils in this landscape are highly variable, but all are duplex in character. They are predominantly comprised of Brown Clays with some Black Earths on mid to upper-slopes, Euchrozems (red-brown sandy clay loams over sharply contrasting red-brown light clay) and Non-calci Brown Soils on mid to lower-slopes, and Prairie Soils on the alluvial flats.

Soils generally have a low level of erodibility, although subsoils of the Brown Clays and Euchrozems are moderately erodible. Potential for mass movement is low. Minor to moderate sheet erosion occurs on some hillslopes.

Hunter Soil Landscape (db)

The Hunter Soil Landscape occurs on the floodplains of the Hunter River and its tributaries and, in the EA Boundary, occurs only in two very small patches at the northern end of MAN. The main soils are all formed from alluvium and include light medium clay or brown silty clay overlying medium clay to light medium clay. Bedrock generally lies between 40 and 300 cm.

Soil erodibility is generally moderate and the landscape is aggrading. Minor stream bank erosion occurs in water courses, and minor sheet and gully erosion occurs on adjacent terraces.

3.1.4 Vegetation

The vegetation within the EA Boundary has been recorded during various EA studies (Cumberland Ecology 2009). A summary of the vegetation communities present in the EA Boundary is presented in Table 3.

Table 3: Vegetation Communities Recorded in the EA Boundary

Vegetation Community	Description
Central Hunter Ironbark-Spotted Gum-Grey Box Forest	Spotted gum (<i>Corymbia maculata</i>); grey gum (<i>Eucalyptus punctata</i>); grey box (<i>E. moluccana</i>); narrow-leaved ironbark (<i>E. crebra</i>)
Mount Arthur Forest Complex	Grey gum (<i>E. punctata</i>); grey box (<i>E. moluccana</i>); kurrajong (<i>Brachychiton populneus</i> ssp. <i>populneus</i>); and forest oak (<i>Allocasuarina torulosa</i>). Also Blakely's red gum (<i>E. blakelyi</i>); rough-barked apple (<i>Angophora floribunda</i>); Port Jackson fig (<i>Ficus rubiginosa</i> f. <i>rubiginosa</i>); black cypress pine (<i>Callitris endlicheri</i>) and white box- grey box intergrade (<i>E. albens</i> x <i>E. moluccana</i>)
Spotted Gum Forest	Spotted gum (<i>Corymbia maculata</i>). Occasional kurrajong (<i>Brachychiton populneus</i>); narrow-leaved ironbark (<i>E. crebra</i>); forest red gum (<i>E. tereticornis</i>) and slaty gum (<i>E. dawsonii</i>).

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Impact Assessment

20 S

6067101_RPTFinalRev01_28Aug09

Vegetation Community	Description
Central Hunter Box-Ironbark Woodland	Narrow-leaved ironbark (<i>E. crebra</i>); white box- grey box intergrade (<i>E. albens</i> x <i>E. moluccana</i>). Also buloak (<i>Allocasuarina luehmannii</i>); rough-barked apple (<i>Angophora floribunda</i>); black cypress pine (<i>Callitris endlicheri</i>); hickory wattle (<i>Acacia implexa</i>); cooba (<i>A. salicina</i>) and shiny-leaved canthium (<i>Canthium odoratum</i>)
Blakely's Red Gum Woodland	Pure stands of Blakely's red gum (<i>E. blakelyi</i>).
Hunter Floodplain Red Gum Woodland complex	Narrow-leaved ironbark (<i>E. crebra</i>); forest red gum (<i>E. tereticornis</i>); grey box (<i>E. moluccana</i>); rough-barked apple (<i>Angophora floribunda</i>)
Narabeen Foothills Slaty Box Woodland	Slaty gum (<i>E. dawsonii</i>) and grey box (<i>E. moluccana</i>). Also kurrajong (<i>Brachychiton populneus</i> ssp. <i>populneus</i>); buloak (<i>Allocasuarina luehmannii</i>); black cypress pine (<i>Callitris endlicheri</i>); cooba (<i>A. salicina</i>); narrow-leaved ironbark (<i>E. crebra</i>) and grey gum (<i>E. punctata</i>)
Upper Hunter Hills Exposed – Ironbark Woodland	Ubiquitous narrow-leaved ironbark (<i>E. crebra</i>). Also in low numbers Blakely's red gum (<i>E. blakelyi</i>); white box (<i>E. albens</i>); grey box (<i>E. moluccana</i>); rough-barked apple (<i>Angophora floribunda</i>) and kurrajong (<i>Brachychiton populneus</i> ssp. <i>populneus</i>)
Upper Hunter White Box – Ironbark Grassy Woodland	Narrow-leaved ironbark (<i>E. crebra</i>); white box (<i>E. albens</i>); and/or white box- grey box intergrade (<i>E. albens</i> x <i>E. moluccana</i>); Also slaty gum (<i>E. dawsonii</i>); Blakely's red gum (<i>E. blakelyi</i>); kurrajong (<i>Brachychiton populneus</i> ssp. <i>populneus</i>) and spotted gum (<i>Corymbia maculata</i>)
Central Hunter Bull Oak Regeneration	Buloak (<i>Allocasuarina luehmannii</i>). Occasional narrow-leaved ironbark (<i>E. crebra</i>); rough-barked apple (<i>Angophora floribunda</i>) and swamp oak (<i>Casuarina glauca</i>)
Derived Grassland	Kangaroo grass (<i>Themeda australis</i>); barbed wire grass (<i>Cymbopogon refractus</i>); slender bamboo grass (<i>Austrostipa verticillata</i>); plump windmill grass (<i>Chloris vetricosa</i>); windmill grass (<i>C. truncata</i>); slender rat's tail grass (<i>Sporobolus creber</i>); ; threeawn speargrass (<i>Aristida vagrans</i>); yellow buttons (<i>Chrysocephalum apiculatum</i>); climbing saltbush (<i>Einadia nutans</i>)
Planted Vegetation	Various introduced species

Source: Cumberland Ecology 2009

Disturbance has occurred as result of European land management practices (e.g. clearing, grazing and extensive open cut mining activity). However the remnant vegetation may give an adequate indication of the floristic composition of the landscape prior to European settlement. In other words, the surveys offer a glimpse of the vegetative resources available to Aboriginal hunter-gatherers.

3.1.5 Fauna

The Atlas of NSW Wildlife lists 207 fauna species located within a 17 x 16 km search area centred on the EA Boundary, including 10 species of amphibians, 22 species of reptiles, 49 species of mammal and 126 species of birds. Of these, four mammal species and two bird species were introduced since European settlement and were not available to Aboriginal hunter-gatherers as a possible food source.

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Impact Assessment

Table 4 lists fauna species that were identified within the EA Boundary from previous surveys which are known, from ethnographic sources, to have been hunted by Aboriginal people.

The species list shows that the forests and woodlands that once covered the EA Boundary (see **Section 3.1.4**) provided suitable habitat for a broad range of fauna species, both large and small. A range of small mammal species are known to occur in the region of the EA Boundary (NSW Wildlife Atlas) including yellow-footed antechinus (*Antechinus flavipes*), brown antechinus (*A. stuartii*) spotted-tailed quolls (*Dasyurus maculates*), long-nosed bandicoots (*Perameles nasuta*), as well as various species of small bats.

Ethnographic sources also list other species that were hunted in the Hunter and Goulburn Valley areas, but have not been identified in fauna surveys of the EA Boundary. For example, in 1827 Cunningham (Brayshaw 1986: 19) mentions Aborigines hunting wild turkeys around the Patrick Plains area of Singleton, and Fawcett (cited in Brayshaw 1986: 79) mentions hunting of emus (as well as kangaroos and wallabies) using nets in forest areas.

Sources of reliable freshwater, such as Saddlers Creek, Quarry Creek and Western Creek, are likely to have provided habitat for fish and eels, which would also have been a food resource for Aboriginal people.

Table 4: Aboriginal Prey Species in the EA Boundary

Class	Common Name	Scientific Name
Amphibia t	urtle	<i>Chelodina</i> sp.
Mammalia	eastern grey kangaroo	<i>Macropus giganteus</i>
	common wallaroo	<i>Macropus robustus</i>
	red-necked wallaby	<i>Macropus rufogriseus</i>
	brush-tailed rock wallaby	<i>Petrogale penicillata</i>
	swamp wallaby	<i>Wallabia bicolour</i>
	sugar glider	<i>Petaurus breviceps</i>
	squirrel glider	<i>Petaurus norfolcensis</i>
	common ringtail possum	<i>Pseudocheirus peregrinus</i>
	common brushtail possum	<i>Trichosurus vulpecular</i>
Reptilia	red-bellied black snake	<i>Pseudechis porphyriacus</i>
	red-naped snake	<i>Furina diadema</i>
	lace monitor	<i>Varanus varius</i>
Aves	stubble quail	<i>Coturnix pectoralis</i>
	black swan	<i>Cygnus atratus</i>
	Australian wood duck	<i>Chenonnetta jubata</i>
	Pacific black duck	<i>Anas superciliosa</i>
	grey teal	<i>Anas gracilis</i>
	hardhead (duck)	<i>Aythya australis</i>
	Australasian grebe	<i>Tachybaptus novaehollandie</i>
	dusky moorhen	<i>Gallinula tenebrosa</i>

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Impact Assessment

Class	Common Name	Scientific Name
	Eurasian coot	<i>Fulica atra</i>
	masked lapwing	<i>Vanellus miles</i>
	crested pigeon	<i>Ocyphaps lophotes</i>
Fish ee	I	<i>Anguillidae</i> sp.

Source: NSW Wildlife Atlas; Umwelt 2007, 2008.

3.1.6 Past Land Use Practices and Disturbance

Past land use and associated disturbance may have a marked effect on the potential for identifying and locating Aboriginal archaeological deposits and material, and the kinds of information those deposits may offer archaeologists. For example, vegetation clearance may result in the destruction of scarred or carved trees and can exacerbate erosion (particularly sheet and gully erosion). Erosion may transport archaeological material away from its original site of deposition, thus removing much contextual information. On the other hand, erosion may also result in uncovering archaeological deposits and an increase in ground surface visibility in some areas; thus artefacts may be found where they might otherwise have remained undetected.

Land use in the Hunter Valley since European settlement has predominantly been for various pastoral and or agricultural pursuits, mainly grazing.

Post-contact settlement in the Central Lowlands of the Hunter Valley began in the early 1820s when the valley was opened for settlement. Settlers typically moved from existing settlements at Newcastle, and overland from Sydney. The best agricultural land was granted in a period from 1823-1827 when approximately 25% of the land was converted to freehold title by grant (Burley 1962). The initial pattern was for freehold estates to be established along the major tributaries of the Hunter and for the Crown Land in between to be grazed (legally or by squatting). These estates formed the base for squatting settlement of the Liverpool Plains and New England.

Muswellbrook (or Muscle Brook as it was then called) was discovered during the early Colonial period by Chief Constable John Howe in 1819 with major parcels of land being surveyed by Henry Dangar along the banks of the Hunter River for allocation to early settlers by 1824. The rich soils surveyed by Dangar resulted in Muswellbrook being established as a farming centre, with the well known settlements of James Bowman, Robert Lethbridge and William Ogilvie all appearing by 1826 in the general vicinity. The first railway was completed in 1869 and the town experienced significant expansion within this period.

The impact of these pastoral establishments on the environment was initially comparatively minor as they were largely grazing sheep and cattle, and cropping was found lower down in the Valley on the flats near Maitland. There was, however, some impact from the construction of infrastructure such as fences, houses and farm buildings and small gardens to supply farm workers.

Major clearing would have occurred after the land was subdivided in the 1830s. The primary impact of clearing is likely to have been erosion and changes in hydrology as more sediment was dumped into the system. It is likely, following Prosser (1992), that the impacts would build up with little apparent evidence of change followed by a single catastrophic event during which there would be a period of rapid erosion and degradation. The erosion would continue unless the catchment reached equilibrium.

The general area around Muswellbrook was developed into small dairy farms of probably 50-150 acres supplying dairy factories in the major towns such as Muswellbrook or Singleton. After the First World War the larger properties were broken up into smaller farms with dairying supplanting wool and wheat. Dairying came to replace wool and grazing for meat as the main rural industry.

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It seems likely that in the EA Boundary there was a period of increased erosion after subdivision and clearing for small scale farming but that this would have stabilised over the next 100 years as grass production was promoted as part of grazing.

The extent of the impact of 170 years of post-contact settlement on Aboriginal sites is an important question. The major impact would probably have been on carved and scarred trees, which would have been removed as part of clearing. However, the experience from other parts of the Hunter is that many Aboriginal sites survive long periods of sustained grazing provided that erosion is controlled.

Construction of infrastructure such as buildings, earthworks, roads, and railways is likely to have had an impact on any Aboriginal sites in their vicinity, but some of these impacts may be superficial as the actual impact on the ground may be comparatively small and shallow.

Within the past half-century, open cut coal mining has, arguably, created the greatest source of disturbance to the Hunter Valley landscape. However, conservation offsets have been established to offset the disturbance to Aboriginal heritage values.

3.1.7 Summary of Environmental Conditions and Implications for Aboriginal Archaeology

Although the current flora and fauna inhabiting the EA Boundary are not necessarily representative of the range and quantity present prior to non-Indigenous settlement, the composition of flora and fauna species present in modern times are indicative that there were probably sufficient resources to support a moderate-sized population of hunter-gatherers within the EA Boundary.

The soils are not generally prone to high degrees of erodibility and potential for mass movement is also low to moderate. Therefore, the potential for movement of subsurface Aboriginal artefacts within soils, followed by secondary deposition as “lag” deposits, is considered to be fairly low. However, loss of any soil has the potential to reduce the integrity of a site and therefore lower its scientific significance.

The Hunter River floodplain is subject to periodic flooding and this flooding may also impact Hunter tributaries such as Ramrod Creek. Therefore, alluvial deposits are likely to occur in the creek flats associated with such watercourses, which were popular areas for settlement by Aboriginal people in the past. Alluvial deposits are essentially of depositional origin and may have a high potential for retention of stratified archaeological deposits. However Kuskie and Clarke’s (2004: 452-455) excavations along Whites Creek demonstrated that artefact densities actually decreased along the creek as proximity to the Hunter River increased. Conversely, artefact densities along the adjacent ridgelines increased as proximity to the Hunter River decreased. It may be inferred that flooding of Whites Creek was an issue and Aboriginal people preferred to use the ridgelines closer to the Hunter River and the creeklines further upstream away from the flood zone.

3.2 Ethnographic Context

Prior to European settlement, the Muswellbrook district was inhabited by people of the Wonnarua language group (many spelling variations include Wanaruwa, Wanarua, Wannarawa, Wannerawa, Wonarua, Wonnah Kuah, Wonnaruah). This language group covered a relatively small area of some 5,200 km² which, according to Tindale (1974: map supplements), straddled the Upper Hunter Valley and extended from just west of Maitland and Kurri Kurri west to the Dividing Range (just west of Widden Brook). The Wonnarua’s lands border the Darkinjang 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.

The EA Boundary lies near the northern limits of the Wonnarua’s territory and the area may also have been influenced by the neighbouring Geawegal group to the north. According to Brayshaw (1987: 38) both the Wonnarua and the Geawegal were closely affiliated with the Kamilaroi people of the Liverpool

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Plains. Indeed, Brayshaw (1984) concludes that the Kamilaroi were the dominant cultural influence throughout the Upper Hunter region. Their social systems covered both the Goulburn Valley and Hunter Valley as far south as Wollombi Brook. Brayshaw (1987: 51) considers that the Wonnarua, Geawegal and probably the Gringai (Worimi) were all part of the “Kamilaroi Nation.”

The Wonnarua peoples’ social structure was comprised of many self-governing units consisting of the smallest residential units known as ‘hearth groups’ of perhaps 10 people consisting of a man, his wife or wives and their dependent children. Several hearth-groups camped together temporarily forming slightly larger residential units called bands of perhaps 40-60 people (Lourandos 1977). The largest residential groupings consisted of either seasonal (summer) band aggregations or irregular ceremonial band aggregations forming local ‘communities’ of at least 150 people.

Spiritual authority was vested in a large number of supernatural beings. One of the most important was *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: 173). Society was divided into two matrilineal moieties and based their political organisation on a council of Elders (Djekic 1984: 2).

A variety of foods, particularly animals, were consumed. Unlike other areas of Australia, plant foods were not as readily consumed except for grass-seed, especially in the form of seed-cakes. Kangaroo grass, as well as other grass types, was gathered in large quantities and ground between flat stones and baked in hot ovens (Gardiner, cited in O’Rourke 1997:150-154) and this is demonstrated archaeologically by the presence of grinding stones at the Moore Creek complex near Tamworth (McBryde 1977). The people of the lower slopes and plains were known to erect complex huts of grass and tree branches, or grass and mud over a frame of boughs (Allen, cited in O’Rourke 1997: 148). These huts were often erected in large, semi-permanent summer camps, especially along river margins of the plains country. These communities usually dispersed into the smaller hearth-groups during winter.

The 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: 46-48), suggest relatively low numbers for that language group. For example, five individuals were observed by John Howe near Jerry’s 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 population numbers based on the social groupings discussed above. However Brayshaw (1987: 47) suggests that actual numbers were higher than this with reports of groups of 200 and 300 able-bodied men observed in separate groups. Curr (1886: 352) stated that the Wonnarua numbered 500 individuals in 1841, but by the 1880s population numbers had seriously declined, citing various diseases as the principal cause.

Present-day descendants of the Wonnarua live throughout the Hunter Valley region and take a deep pride in their cultural heritage.

3.3 Archaeological Context

3.3.1 Previous Research and Archaeology of the EA Boundary

The Aboriginal archaeology of the lands encompassing Mt Arthur Coal is well researched, having been the subject of many Aboriginal heritage assessments and archaeological salvage since 1980, to varying levels of detail. Those studies include Cook (1981), Curran (1994), Davidson et al (1993), Dyal (1976; 1980; 1981), ERM (1994), Hughes et al (1982), Koettig (1984), Koettig and Hughes (1985), Kuskie (1999a, b), Kuskie & Clarke (2004), James (1993; 1994), McDonald and Davidson (1997), Moore (1987), Purcell (1995), Pursche (1996), Umwelt (2007; 2008) and Wilson (1995).

A summary of the methodology, survey coverage and results of a selection of the most important survey reports are presented below. The survey areas conducted in more recent archaeological

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surveys (Kuskie 1999a; Kuskie and Clarke 2004; MacDonald and Davidson 1999, 2005; Umwelt 2007, 2008) are shown in **Figure 6**.

Dyall (1980): Mount Arthur North

Dyall (1980) conducted one of the early archaeological surveys of the area north of Mt Arthur, and identified 20 artefact scatters, two grinding grooves and a low-density scatter of artefacts. The grinding grooves were contained within a stone boulder of a creek bed. Six of the artefact scatters were large complexes, containing over 100 artefacts each. All archaeological materials were identified along two of the main creek lines of the area.

Dyall (1981): Mount Arthur South

Dyall (1981) conducted one of the first surveys of the area south of Mount Arthur. This survey identified a total of 24 artefact scatters along the creek lines of the survey area. This evidence was interpreted as representing larger campsites on the lower valleys and small camps on the minor streams resulting from occasional visits.

Koettig and Hughes (1985): Mount Arthur North, Mount Arthur South

Koettig and Hughes (1985) conducted a large study of the Mt Arthur lease area, which comprised the investigation of Mt Arthur North, Mt Arthur South and Plashett Dam through a combination of landscape survey, salvage collections and excavation. Plashett Dam is located outside of the EA Boundary on land now owned by Macquarie Generation.

Mt Arthur North (MAN)

Koettig and Hughes (1985) described the landscape as being traversed by a major creek with minor tributaries extending into undulating to gently hilly terrain. The assessment of the MAN lease area was essentially restricted to the watercourses of the area, being Whites Creek, Fairford Creek, Quarry Creek and their associated tributaries. These areas were identified prior to the field survey to be of a higher archaeological potential than the remaining landform areas (based on previous research), and ground surface visibility conditions were higher along these creek lines. Survey coverage of hillslopes and ridge crests was limited, despite the fact they comprise the majority of the survey area (69%).

Ground surface visibility conditions were relatively low during the landscape survey due to the cover of pasture grasses.

Sites were defined as localities where artefacts occurred at a greater density than the 'background scatter' (being areas with less than 0.01 artefacts per square metre). This survey identified 93 artefact scatters along the watercourses of the Whites Creek, Fairford Creek, Quarry Creek and their associated tributaries. A total of 22 knapping floors were identified at 19 sites.

Koettig and Hughes noted that sites tended to correspond in area to the surface exposures in which they were identified. Very few sites were recorded on hill slopes or ridges, or along the upper portions of some creek lines where there were large areas of eroded ground.

The following artefact distribution across the terrain units of MAN was recorded.

Table 5: Artefact Distribution at MAN Recorded by Koettig and Hughes (1985)

Scope	Landform Element	No. of Sites
Survey: Mount Arthur North	Ridge crest	0
	Hillslope 1	

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Aboriginal Archaeology and Cultural Heritage
Impact Assessment

26 S

6067101_RPTFinalRev01_28Aug09

Scope	Landform Element	No. of Sites
	Lower order streams	66
	Upper order streams	26

Note: the above numbers have been derived from analysis of maps within Koettig and Hughes (1985: Vol. 1).

Sites were found in higher densities along Fairford Creek compared with one of the main tributaries of Whites Creek. Koettig and Hughes (1985) concluded that artefact scatters occur along all creek lines, but fewer are located along the headwaters of minor creeks. Koettig and Hughes (1985) also concluded that while artefacts occur on ridge crests and hillslopes, they tend to decline along the lower section of Whites Creek.

Following a detailed artefactual analysis, Koettig and Hughes (1985) proposed that artefact scatters can be subdivided into two types at MAN:

- isolated knapping floors with few other artefacts apart from low density background scatter; and
- concentrations of artefacts that often extend over large areas and do not contain obvious or distinct knapping floors.

Mt Arthur South (MAS)

As above, the initial landscape survey of MAS focused almost entirely on the creek lines of the survey area (Saddlers Creek and its tributaries), with minimal coverage of other landscape elements. The terrain of this area was again described as being traversed by a major creek with minor tributaries extending into undulating to gently hilly terrain. Ground surface visibility was much higher along the creek lines than in the adjacent hillslopes and ridges, with erosion exposures estimated at approximately 20% along Saddlers Creek and other creek lines.

The survey identified 135 artefact scatters and one grinding groove site within the survey area. Of these, only 28 sites were fully recorded.

The following artefact distribution across the terrain units of MAS was recorded.

Table 6: Artefact Distributions at MAS recorded by Koettig and Hughes (1985)

Scope	Landform Element	No. of Sites
Survey: MAS	Ridge crest	0
	Hillslope 1	
	Lower order streams	32
	Upper order streams	102

Note: the above numbers have been derived from analysis of maps within Koettig and Hughes (1985: Vol. 1).

Artefact densities were relatively high within all surveyed areas. Koettig and Hughes identified a background scatter of artefacts ranging between 0.05 – 0.02/m². Artefact densities were noted to be higher in the lower sections of Saltwater Creek than in the upper sections.

Davidson, James and Fife (1993): Bayswater Colliery No. 3

Davidson *et al* (1993) conducted an archaeological survey at Bayswater Colliery No. 3 (**Figure 6**) as part of the Bayswater No. 3 EIS. The total survey area was 47 km², although a small sample of only 112 ha (0.024%) was actually surveyed.

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Aboriginal Archaeology and Cultural Heritage
Impact Assessment

27 S

6067101_RPTFinalRev01_28Aug09

Davidson *et al* (1993) defined the following landform elements within the survey area:

- ridge crests;
- hilltop knolls;
- slopes;
- headwaters;
- creeks / gullies;
- creek flats; and
- plains.

The survey strategy primarily concentrated on two of the drainage lines within the survey area that had not been previously examined – a major tributary of Saddlers Creek and its associated gullies, and Quarry Creek and two of its tributaries. Almost half of the survey sample was focused on the creek lines of the area (41%). The remaining 59% of the survey area was allocated to transects extending away from the creek lines. The survey strategy targeted exposed areas of the landscape. This followed an initial assessment that indicated major visibility constraints due to dense grasses throughout the area.

Aboriginal sites were located in 84 locations, including 78 artefact scatters, four scarred trees and two axe-grinding grooves. Thirty-one per cent of the land surface in drainage lines revealed artefacts. Land surfaces away from drainages revealed less (25%) archaeological material. Seven open artefact scatters were investigated in more detail during the survey.

The site areas ranged from 1 to 62,500 m² in area. Artefact densities at sites ranged between 0.0007 and 0.72 per m². However, these densities refer to the gross area of the survey area and not the levels of effective coverage or effective site area, and therefore are not readily comparable with other studies.

A total of 224 artefacts were identified in the survey, of which there were 76 flakes, 62 broken flakes, 52 flaked pieces, five cores, 24 flakes with tranchet retouch and five backed artefacts. Mudstone was the dominant stone material utilised in manufacture, with silcrete as the next most common. Flaked pieces and flakes were the most common artefact types, with retouched flakes and cores also present.

This survey identified that there was only a minor decrease in artefact density away from creek lines, with a moderate level of materials identified within hillslopes and ridge crests.

ERM Resource Planning (1994): Bayswater Colliery No. 3

ERM Resource Planning (1994) conducted an archaeological survey at Bayswater Colliery No. 3, for the development of a haul road and bulk sample program. A total of 31 sites were identified within the 123 ha study area. Mudstone was the dominant stone material utilised in manufacture, with silcrete as the next most common. Flaked pieces and flakes were the most common artefact types, with flaked pieces, retouched flakes and cores also present.

A full copy of this report was not available at the time of writing.

McDonald (1997) and McDonald and Davidson (n.d.): Bayswater Colliery No. 3

As part of the Development Consent conditions for the Bayswater No. 3 mine, Mt Arthur Coal was required to conduct further archaeological assessment of the Bayswater No. 3 lease area. Consequently, McDonald and Davidson (n.d. (no date)) conducted an assessment under the auspices of the Bayswater Archaeological Resources Project (BARP), which was conducted over a six year

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period between 1993 and 1998 (see also **Table 41**). This assessment used a combination of landscape survey and test excavation to examine an area of approximately 47 km², centred along the eastern and southern slopes of Mount Arthur.

The landscape assessment of the lease area identified a total of 35 sites, most of which were in proximity to tributary watercourses. These areas were of a high visibility, due to the large numbers of exposures.

The survey recorded a total of 1,200 artefacts including broken flakes (56.25%), flakes (19%), flaked pieces (9.75%), tools and tool fragments (8.91%), core and core fragments (4.83%) and other (1.26%). Silcrete was the most common raw material used (50.1 %) with indurated mudstone the next most common (29.8 %). There were also lesser quantities of quartz, chert, basalt, porcelanite, fossilised wood, quartzite, chalcedony, hornfels, siltstone and silicified sandstone found.

The project excavated a total of 158 m² across the Bayswater No. 3 lease area. Excavation centred on sites in four different areas – one adjacent to a major creek line (MacDonald Creek), one located on a ridge crest, one adjacent to a spring fed waterhole, and several test pits across a large area associated with MacDonald Road South. In addition, 'several' charcoal patches and a single stone feature were excavated, only to be revealed as of natural origin.

The site adjacent the creekline exhibited a large, low-density artefact surface scatter, and excavation consisted of total of 155 test pits each measuring 0.25 m². A total of 70 subsurface artefacts were recovered, and were observed to be at a comparable density as the surface deposit. The ridge crest site involved the excavation of a 15 m² area, again excavated in 0.25 m² units. This site revealed a large subsurface deposit, with 840 artefacts recovered. The third excavation, located adjacent the site of a waterhole with known grinding grooves, also proved to contain a substantial subsurface deposit. A total of 283 artefacts were recovered from a 5 m² trench. The excavations at MacDonald Road South included test pits at three locations. A backhoe was used to excavate 120 units, each 1 m². A mechanical sieve was used, and as a result, a total of 587 artefacts were recovered. A minimum of 60 artefacts were recovered from each unit.

The results of the excavation indicate a number of interesting patterns. Of initial interest is that all excavated sites and areas contained some subsurface archaeological material. It was considered that even where artefacts were found at a low density (such as the creek site), this nevertheless indicates a relatively high potential for sub-surface archaeological material in the local area. The high numbers of subsurface artefacts recovered in an excavation of the ridge crest site (the largest site excavated) also indicates that this landform unit is potentially under-rated in archaeological predictions.

Kuskie (1999a): Mt Arthur North (MAN)

Kuskie (1999a) conducted an assessment of the MAN lease area (**Figure 6**), prior to proposed mining activities. This assessment examined 244 ha (6.6%) of the total MAN lease area (3,700 ha).

Unlike previous surveys, Kuskie based his survey on a system of 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 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). ATUs defined by Kuskie, together with their relative composition of the EA Boundary, are shown in **Table 7**.

Surface visibility varied between 0 and 100% throughout the area, and archaeological visibility varied between 0 and 90% throughout the area. The level of effective surface visibility throughout all landform units averaged 1%. The level of effective survey sample was identified as 0.69%.

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Aboriginal Archaeology and Cultural Heritage
Impact Assessment

29 S

6067101_RPTFinalRev01_28Aug09

The assessment identified a total of 305 sites within the survey area, 112 of which were previously known. Of these sites, 304 were occupation sites (stone artefact scatters) and one was a grinding groove site – the same site (#37-2-0111 – Fairford 1) recorded by Dyll (1980). The sites were recorded in 1,188 separate site loci, which ranged in size from 0.3 m² to 60,000 m², averaging 334 m². Sites comprised 1 – 21 site loci, but averaged two separate site loci. Total site size ranged from 540 m² to 1,444,487 m². Kuskie calculated that the sites occupied 81% of the whole MAN 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. The figure illustrates the disadvantages of the 'landscape approach' to site definition, because it suggests that much larger areas of the landscape are "sites" than the material evidence indicates.

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/ha, and the number of artefacts recorded within each site ranged from 1 – 2,602. Within individual loci, recorded artefacts ranged from 1 – 670. Site loci had artefact densities of between 0.0004 and 850 artefacts/m², with a mean of 0.183 artefacts/m². This is 2.6 times higher than the average artefact density for all exposures, including those that did not contain artefacts.

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

The majority of recorded artefacts (86%) were recorded 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.

Kuskie recorded the following artefact distribution across the terrain units of MAN.

Table 7: Artefact Distributions Recorded at MAN by Kuskie (1999)

Landform	No. Artefacts	Effective Site Loci Area (m ²)	Artefact Density (No./m ²)
Ridge crest (3.6%)	405	10,944	0.037
Spur crest (9%)	1,045	8,435	0.124
Simple slope (56.6%)	4,470	57,056	0.078
Bench (0.01%)	153	660	0.232
Flat (1%)	4	2	2.000
Valley flat (8.9%)	8,608	8,021	1.073
Drainage depression (18.4%)	2,645 9,6	47	0.274
Totals	17,330	94,765	0.183

Note: the percentage in brackets refers to the relative percentage of that landform unit to the whole study area.

Overall, artefact densities were relatively low throughout the study area, although artefacts were identified within a virtual continuum to varying densities. All the landforms or variables sampled (geology, soils) contained archaeological materials.

Although sites were widely distributed throughout the MAN landscape, Kuskie 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 the level / 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). Artefact densities also tended to be higher on aggrading surfaces.

This distribution pattern led Kuskie 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 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.

Kuskie 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 field 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 preferred for occupation. Campsites tended to be positioned within 50 m of a watercourse, particularly on the third and fourth order streams. However, Kuskie also noted the importance of vantage points within the landscape. The results indicated that the entire landscape was utilised to varying extents.

Kuskie recommended the establishment of two conservation zones in the adjoining Bayswater No. 3 ML, measuring 344 ha in total, and a 122 ha conservation zone west of Edderton Road (see **Section 3.5**). The two Bayswater No. 3 conservation zones were designed to conserve a sample of 24 of the representative environmental/cultural contexts in the MAN study area, while the Edderton Road conservation zone encompassed eight representative environmental/cultural contexts. The remaining 42 representative environmental/cultural contexts were recommended for salvage, which was carried out by Kuskie (2004).

Kuskie (1999b): Bayswater Rail Loading Facility

Kuskie (1999b) produced reports for an EIS for both Drayton Coal and Coal Operations Australia (now Hunter Valley Energy Coal), in preparation of a proposed rail loop and coal loading facility. This assessment examined 16.6 ha (10.7%) of the total study area (Authorisation 171 adjacent to Bayswater No. 2 Colliery) and 2.7 km of rail loop area (173 ha). The alignment of the rail route was designed with the objective of minimising impacts to areas of heritage potential along Ramrod Creek.

ATUs defined by Kuskie, together with their relative composition of the study area, are shown in **Table 8**. These were sampled using 64 archaeological sampling units.

Surface visibility throughout the area varied between 1 and 90%, and archaeological visibility varied between 1 and 65% (Kuskie 1999b: 63). The level of effective visibility throughout all landform units was on average 1%. The level of effective survey sample was identified as 0.7% however the ridge crest landform has the greatest level of effective survey coverage at 1.5% while flats had the lowest at 0.1%. The landform with the greatest effective visibility did not have the greatest number of sites in it.

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Aboriginal Archaeology and Cultural Heritage
Impact Assessment

31 S

6067101_RPTFinalRev01_28Aug09

Kuskie recorded artefactual materials in terms of *sites* (location of evidence of Aboriginal occupation, commonly refers to an artefact scatter) and *site loci* (spatially separate location of evidence within a site). The nature of archaeological material across the landscape is, however, discussed in terms of *artefact density* which is defined as mean number of artefacts within each square metre of visible ground surface (Kuskie 1999b: 118).

The assessment identified a total of 14 sites, all of which were open artefact scatters. The artefacts were distributed across the landscape as follows:

Table 8: Artefact Distribution at Drayton Rail Loop Recorded by Kuskie (1999b)

Landform Element	Percentage of Study Area	No. of Artefacts	Artefact Density (No./m ²)
Ridge crest	7.4	21	0.0108
Spur crest	6.2	3	0.0028
Simple slope	60.6	91	0.0221
Flat 1.	5	0	0
Drainage depression	24.3	156	0.0858
Totals	100%	271	0.0223

Artefact density across the entire study area was 0.0223 artefacts/m². Artefact densities tended to be higher along watercourses.

The most common raw material recorded was indurated mudstone (49.4%) followed by silcrete (27%) and then porcellenite (6.3%), other volcanics (5.9%), quartzite (4.8%), quartz (3.3%) chert (1.5%) and banded rhyolite (1.1%) (2000: 86).

The recorded assemblage contained 18 different types of artefacts, dominated by flakes (36.9%), lithic fragments (12.9%) proximal portions of flakes (10.7%), distal flake portions (7.7%), cores (6.3%) and flaked pieces (5.2%), other types were a smaller percentage of the assemblage. The dominance of flakes, flaked portions and flaked pieces (62.7% in all) was seen as indicating that the majority of the evidence relates to general or non-specific knapping activities. Evidence of microblade manufacturing composed 13.7% of the assemblage (Kuskie 1999b: 87).

Kuskie concluded by arguing that the evidence “is typical of that from the Central Lowlands of the Hunter Valley, although specific differences may exist with evidence reported from other localities. Taken individually, none of the items or contexts located within the study area appears to be unique in the region” (Kuskie 1999b: 87).

Kuskie and Clarke (2004): Mt Arthur North Salvage

As a result of the MAN Aboriginal heritage assessment by Kuskie (1999) and the limited scope for avoiding impacts to the sites that were identified, a program of salvage excavation was conducted at MAN by Kuskie and Clarke (2004).

The salvage excavations were conducted in four phases comprised 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

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Aboriginal Archaeology and Cultural Heritage
Impact Assessment

32 S

6067101_RPTFinalRev01_28Aug09

scrapes were completed, resulting in a total of 138.7 m³ of soil being excavated and sieved. Furthermore a total of 779.75 m² was excavated by hand.

In all, the excavations retrieved a total of 32,866 stone artefacts within a total of 43 stone artefact types. Kuskie and Clarke 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 characterise much of the assemblage was attributed by Kuskie and Clarke to backed-blade production activity. However these specific-activity attributes accounted for a small proportion of the overall assemblage – non-specific knapping items accounted for more than 97% of the assemblage (knapping debris).

A total of 16 stone materials were identified with silcrete being the most common (59.4%) followed by tuff or indurated mudstone (19.4%) and porcellanite (10%), quartz (4.3%) and petrified wood (3.5%). Other raw materials recorded (at much lower frequencies) include 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/m³ at the Ridge to Hunter River Upper Section to 271.7 artefacts/m³ in the Whites Creek Upper Section, with a mean of 106.8 artefacts/m³.

Kuskie and Clarke 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, 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 Mount Arthur to the Hunter River.

Kuskie and Clarke conclude 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, whereas the evidence along the ridge from Mount Arthur to the Hunter River 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 (i.e. <5,000 years Before Present (BP)).

Umwelt (2007): MAN South Pit Extension

In 2005 Umwelt conducted an archaeological assessment of the south eastern corner of the Mt Arthur Coal operations in preparation for an extension to MAN's South Pit (**Figure 6**). The study area covered a total of approximately 327 ha, although Umwelt's field survey area covered approximated 252 ha (the remaining 75 ha was within lands previously surveyed by Kuskie (1999) which was considered sufficient). The summary provided below is based on Umwelt's survey area only.

In an effort to obtain comparative data, Umwelt (2007) used a slightly modified version of the same methodology as Kuskie (1999) basing the survey on comparative ATUs and landform elements. However, the definition used to describe 'sites' differed slightly in that isolated finds were differentiated from artefact scatters. ATUs, together with their relative composition of the survey area, are shown in **Table 9**.

Surface visibility varied from 1 – 95% throughout the area, and archaeological visibility varied from 1 – 90% throughout the area. Survey coverage within Umwelt's field survey area was based on the ATUs surveyed and ranged from 6% of the ATU (simple slope gentle) to 74% (drainage depression moderate to steep). In all, Umwelt's field survey covered 57 ha (22.6%) of the total survey area. Survey effort was biased towards watercourses on the basis of a predictive model.

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Like Kuskie (1999), Umwelt recorded artefactual material in terms of *sites* (location of evidence of Aboriginal occupation; the boundary of a site was defined by the boundary of a survey area) and *site loci* (the visible extent of artefacts).

The survey identified a total of eight sites which consisted of 42 site loci within eight ATUs. All site loci were occupation sites (stone artefact scatters) with the majority (n=27) being low density artefact scatters and the remainder (n=15) being isolated finds. No other site types were recorded. Total site size (i.e. survey area size) ranged from 540 m² to 1,444,487 m². The sites were recorded in 1,188 separate site loci, which ranged in size from 0.3 m² to 60,000 m², averaging 334 m². Sites comprised 1 – 21 site loci, but averaged two separate site loci. Umwelt calculated that the sites occupied 81% of the whole survey area (197 ha).

A total of 810 stone artefacts were identified during this assessment. Site loci were found at an average density of 1 site loci/ 6 ha, and the number of artefacts recorded within each site loci ranged from 1 – 500.

The recorded assemblage contained several different types of artefacts, dominated by flakes. Other types recorded include broken flakes, flaked pieces, cores, flakes used as cores and choppers. Actual numbers of each artefact type were not recorded. Evidence of utilised and/or retouched artefacts was not recorded within the assemblage. There was very little evidence of microblade manufacturing recorded in the assemblage. The primary raw materials utilised were indurated mudstone, followed by silcrete, with much lower proportions of grey siltstone, basalt, quartzite, porcellanite, heat-treated petrified wood and flaked volcanic river pebble (percentages not recorded).

Umwelt (2007: 7.9) state that the results of the survey fit with the predictive model developed from previous archaeological work. However, it may also be a result of focussed sampling within the watercourses.

Table 9: Artefact Distributions Recorded at South Pit Extension by Umwelt (2007)

Landform	No. Artefacts	Effective Site Loci Area (m ²)	Artefact Density (No./m ²)
Ridge crest (gentle)	0	0	0
Spur crest	6	5	1.2
Simple slope (v. gentle)	2	35	0.0571
Simple slope (gentle)	50	6,672	0.0075
Simple slope (moderate – steep)	2 2		1.0000
Drainage depression (gentle)	722 2	9,586	0.0244
Drainage depression (moderate – steep)	2 N/	A	N/A
Modified terrain	26	186	0.1398
Totals	810	36,479	0.0222

Umwelt (2008): Mt Arthur Underground Project

Umwelt (2008) conducted an assessment of the MAU (**Figure 6**), to support an EA for the project. This assessment examined approximately 1,233 ha (32.7%) of the MAU project area (3,800 ha).

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Aboriginal Archaeology and Cultural Heritage
Impact Assessment

34 S

6067101_RPTFinalRev01_28Aug09

Like Umwelt's (2007) South Pit Extension survey, Umwelt (2008) used a modified version of the methodology used by Kuskie (1999), 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 (1999) and Umwelt's (2007) methodologies in that isolated finds were differentiated from artefact scatters and, more significantly, sites were defined on the basis of PADs connecting two or more loci or just loci if no PADs were defined. ATUs, together with their relative composition of the study area, are shown in **Table 10**.

Surface visibility varied between 0% and 90% throughout the area (excluding exposures) and between 5% and 90% within exposures. The level of *effective* survey coverage was not calculated.

The assessment identified a total of 77 sites comprising a total of 509 site loci within the survey area. Of these sites, 76 were occupation sites (46 stone artefact scatters and 30 isolated finds) and one was a scarred tree site. The sizes of separate site loci were not recorded. Sites comprised 1 – 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/ha and loci were found at an average density of 0.1 loci/ha. The number of artefacts recorded within each site ranged from 1 – 2,768. Within individual loci, recorded artefacts ranged from 1 – 2000, though <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 was not common within the assemblage. Evidence of microblade manufacturing comprised a very small proportion of the assemblage. The primary raw materials utilised were mudstone, followed by silcrete, with lower use 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.

Umwelt recorded the following artefact distribution across the terrain units of MAU.

Table 10: Artefact Distributions Recorded at MAU by Umwelt (2008)

Landform	No. Artefacts	Effective Site Loci Area (m ²)	Artefact Density (No./m ²)
Simple slope (level – v. gentle)	199 1,7	34	0.1148
Simple slope (gentle)	391	15,691	0.0249
Simple slope (moderate – steep)	817 4	5,493	0.0699
Drainage depression (level – v. gentle)	1,912 2	24,808	0.0085
Drainage depression (gentle)	4,592 5	0,593	0.0908
Drainage depression (moderate – steep)	973 232	97	0.0418
Ridge crest Ridge Line	82	11,682	0.0070
Spur crest	447	2,472	0.1808

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Aboriginal Archaeology and Cultural Heritage
Impact Assessment

35 S

6067101_RPTFinalRev01_28Aug09

Landform	No. Artefacts	Effective Site Loci Area (m ²)	Artefact Density (No./m ²)
Modified terrain	190	3,199	0.0594
Totals	9,603	378,969	0.0253

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 the level to very gentle slopes.

Although sites were widely distributed throughout the MAU 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 and Umwelt attributes their use to the use of outlook by Aboriginal people. 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-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 (all classes of slope). Although Kuskie (1999) 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.

3.3.2 Registered Aboriginal Sites

A search of the DECC AHIMS database was conducted in two phases:

- a search of the whole EA Boundary. This was done to obtain a general overview of the recorded sites within the whole EA Boundary and required an Aboriginal Heritage Information Licence Agreement (AHILA) due to the large number of sites involved; and
- a search of the three individual survey areas where field survey was undertaken during this Project.

1. EA Boundary

A search of the AHIMS database was conducted in January 2009, for a 17 x 16 km search area which included the entire EA Boundary. A total of 958 registered sites are recorded for the search area and access to the data was approved under AHILA No. 122 (**Appendix A**) and data received April 2009. Of the 958 Aboriginal sites recorded in the AHIMS search area, 663 sites are located within the EA Boundary (**Table 11; Figure 7**).

Many of the sites within the MAN and Bayswater No. 3 areas were salvaged under Section 90 Consents to Destroy issued under the NSW National Parks and Wildlife Act 1974. Section 90 Permit No. SZ347 was issued on 16 July 2001; this permit allowed for the salvage of 295 Aboriginal sites located within the MAN survey area. Salvage was carried out as part of the excavation work carried out by Kuskie and Clarke (2004).

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Table 11: AHIMS Registered Aboriginal Sites within the EA Boundary

Site Type	Features	No. of Sites
Axe Grinding Groove	Grinding Groove (GDG)	2 (3)*
Isolated Find	Stone artefact (AFT)	41
None (Site type not defined)***	AFT (86); Scarred Tree (TRE) (1); Stone Arrangement (STA) (1)	88
Open Camp Site	AFT (523); AFT & PAD (1)	524 (523)*
Scarred Tree	TRE	7
Shelter with Deposit**	AFT	1
Total		663

* the figures in brackets reflect the actual number of site types allowing for the recognition of site 37-2-0731 as primarily a grinding groove site which also has an open stone artefact scatter.

** this site (37-1-0097) may be erroneously positioned due to incorrect coordinates within the AHIMS database. See below for further discussion.

*** the AHIMS database does not always define the site type and a site type is often categorised as 'None'. However it is often possible to determine the toe of site from the listed site features. For example, there are seven sites categorised as scarred trees within the EA Boundary. However one site categorised as 'None' has a scarred tree listed as its feature. Therefore there a total of eight previously recorded scarred trees within the EA Boundary.

Note that **Table 11** shows 88 sites are defined as 'None' in the AHIMS database. This means that there was no specific site type specified on the Site Card. For clarity, these sites are indicated in the **Figures** section as 'Type Not Defined.' However it is usually possible to extrapolate the site type from the features recorded. For example, a site with only stone artefacts (AFT) may be considered to be an open camp site (either an artefact scatter or isolated find).

The results show that the overwhelming majority of recorded sites in the EA Boundary are open camp sites containing either single stone artefacts (41 sites) or artefact scatters. Artefact scatters accounted for a total of 610 sites⁴ including 524 sites identified as open camp sites and 86 sites that were not assigned a site type but contained stone artefact features.

There were also a total of eight scarred trees identified including one that was not assigned a site type. Two axe grinding groove sites and a stone arrangement were also recorded. However, an axe grinding groove site (37-2-0731) was categorised in the AHIMS database as an open camp site, altering the figures to three grinding groove sites and 523 open camp sites.

2. Field Survey Areas

Due to the timeframes involved in organising the AHILA, three smaller AHIMS searches were conducted covering the three field survey areas that were physically inspected by AECOM archaeologists and representatives of the Aboriginal groups:

- 1 292000-293000E; 6420000-6422000N – 1 x 2 km area centred over the proposed Edderton Road realignment (1 site, see **Figure 8**);

⁴ Note that Kuskie's (1999a) survey did not differentiate between isolated finds and artefact scatters (all were identified as artefact scatters), so in actuality there is likely to be many more isolated finds than those identified in the AHIMS database (and correspondingly fewer artefact scatters).

- 2 297000-300000E; 6417500-6419000N – 3 x 1.5 km area centred over the central Mount Arthur survey area (65 sites, see **Figure 9**); and
- 3 299000-305000E; 64190 00-6425000N – 6 x 6 km area, centred over the Offset survey area (111 sites, see **Figure 10**).

The AHIMS search revealed that, within the three search areas, there are 177 registered Aboriginal sites (**Table 12** and **Appendix A**). Within the Edderton Road search area there was only one site, but this was not within the survey area itself. There were a total of 65 Aboriginal sites recorded in the Mount Arthur search area but, again, no sites were identified within the survey area itself, although several open camps sites and a set of grinding grooves are located close to the eastern boundary of the survey area.

A total of 111 Aboriginal sites were identified in the Offset search area, the majority of which are open camp sites, with isolated occurrences of PAD and a single occurrence of a scarred tree. However, only nine sites occur within the Offset survey area itself. Of those, eight are open camp sites and one is a PAD. All the recorded sites within the Offset survey area occur within 50 m of Ramrod Creek. A total of 31 sites in the Offset search area were not formally categorised into site type, although the artefact features for the sites allow them to be categorised: one site can be identified as a scarred tree, one site as a PAD and 29 sites can be categorised as open camp sites (two of which also have PADs identified).

Table 12: AHIMS Registered Aboriginal Sites within the Edderton Road, Mount Arthur and Offset Search Areas

Site Type	Site Feature(s)	Number of Sites (Search Area)		
		Edderton Road	Mount Arthur	Offset Area
Shelter with Deposit	AFT	1		
Axe Grinding Groove	GDG		1	
Open Camp Site	AFT		56	74
Isolated Find	AFT		8	6
None (Site type not defined)	AFT			27
None (Site type not defined)	PAD			1
None (Site type not defined)	TRE			1
None (Site type not defined)	AFT; PAD			2
Total		1	65	111

The results indicate that the most common site type recorded in and around the survey areas are open camp sites comprising stone artefacts, accounting for 159 (90%) of the total number of registered sites. The remaining sites include isolated finds or single stone artefacts (n=14), and single occurrences of shelter with deposit (see below), axe grinding grooves, and PAD (without associated artefacts). **Section 5.2** provides a description of sites previously recorded in the survey areas.

One site (#27-1-0097) was identified in the AHIMS search as a shelter with deposit. Although rockshelters do occur along the Hunter River, this record appears to be erroneous. As can be seen in **Figure 8**, the landscape is gently sloping open paddock with no rock outcrops in the area. Therefore the record appears to have erroneous position coordinates.

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Aboriginal Archaeology and Cultural Heritage
Impact Assessment

38 S

6067101_RPTFinalRev01_28Aug09

3.4 Archaeological Summary of the Mt Arthur Coal Lease Areas

From the details of the archaeological investigations provided above, a synthesis on the nature of the archaeological context of the EA Boundary can be constructed. Archaeological characteristics such as location and distribution of sites within landscape units, site type, site integrity, stone artefact attributes including raw material, implement type and density can be deduced. These features are necessary for determining the survey methodology to be undertaken, and for predicting the nature of site types and site distribution within the EA Boundary.

The most significant archaeological assessments relevant to this Project are:

- Mount Arthur North EIS Survey (Kuskie 1999a);
- Mount Arthur North Archaeological Salvage (Kuskie and Clarke 2004);
- South Pit Extension EA Survey (Umwelt 2007); and
- Mt Arthur Underground EA Survey (Umwelt 2008).

The survey boundaries for these previous surveys are shown in **Figure 6**.

The greatest majority of sites within the EA Boundary are located <50 m from creeks or watercourses. However, a high proportion of sites may also be located on simple slopes of hills. A smaller number are located on ridges and crests. It is recognised that the previously recorded site distributions within the area reflect both archaeological sampling bias and the potential downslope movement of archaeological remains from higher slopes into lower lying catchment areas. Downslope movement in the area is primarily caused by erosion processes (e.g. sheetwash, gully and scouring), resulting in the removal of A horizon sediments and *in situ* archaeological remains.

The end result of this process is the relocation of archaeological artefacts, such as stone artefacts, to lower areas amongst disturbed A and B horizon sediments. Furthermore, such 'sites' need to be carefully assessed from the perspective of depositional and post-depositional processes as they are likely to represent "lag" gravels, i.e. secondary deposition artefact scatters. However, given that the soils in the area are subject to relatively low levels of movement (**Section 3.1.7**), secondary deposition is likely to be of lower prevalence than primary deposition.

Prior to Kuskie's (1999) survey at MAN, archaeological sampling methods primarily focused surveys along major creeks and creek tributaries, which appears to be an apparent reflection of both prior research suggesting that these areas are of higher archaeological importance as well as a lack of surface visibility in the EA Boundary. Although vegetation clearance in the area has contributed to erosion processes, the nature of the modern vegetation coverage (predominantly consisting of weed and pasture grasses) severely inhibits surface visibility throughout most of the area. Exposed and eroded areas along creeks provided areas with optimal visibility making artefact identification possible. However, more recent surveys (c.f. Kuskie 1999a; Kuskie and Clarke 2004; Umwelt 2007, 2008) which were conducted on a landscape basis (i.e. all landforms were sampled) has tended to agree with earlier assumptions that the majority of Aboriginal sites in the EA Boundary will occur within 50 m of the major creek lines that offer ephemeral or permanent water resources, although it may be argued that artefacts occur as a continuum along creeks.

The nature of previously recorded sites in the area indicates that, where visibility conditions permit, survey of hill slopes, crests and ridges may also yield significant numbers of archaeological sites. For example, Umwelt (2008) identified relatively high proportions of sites on ridges and crests and in moderate to steep slopes and drainage depressions, a result that was unexpected. Test excavations at MAN by Kuskie (2004) concluded that the tributary creeks of the Hunter River were more important archaeologically than proximity to the river itself.

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Aboriginal Archaeology and Cultural Heritage
Impact Assessment

39 S

6067101_RPTFinalRev01_28Aug09

The most dominant type of archaeological site within the EA Boundary is likely to be stone artefact scatters of relatively low density, although grinding grooves, stone arrangements, quarries and scarred trees are also archaeological features of the region. Of stone artefacts, flakes are by far the most common and flaked pieces are also common. Of lesser frequency are flake portions (broken flakes), microblades, microblade cores and cores. Retouched artefacts are relatively uncommon and occur in close proximity to the creeks. Stone tools such as hatchet heads, grindstones and hammerstones are also present in very low numbers and are completely restricted to within 50 m of reliable watercourses.

Artefact density is also likely to be higher in locations where sites occur in close proximity to environmental resource zones, such as fresh water sources. This was demonstrated by Kuskie's (1999) survey and (2004) excavations, which showed that artefact densities were at their greatest within 50 m of a reliable watercourse. Furthermore, artefact densities actually decreased along Whites Creek as proximity to the Hunter River increased. Conversely, artefact densities along the adjacent ridgelines increased as distance to the Hunter River decreased. From this, it may be inferred that flooding of Whites Creek was an issue and Aboriginal people preferred to use the ridgelines closer to the Hunter River and the creek lines further upstream away from the flood zone. This hypothesis may also be investigated in the Offset survey area with Ramrod Creek and adjacent ridges.

Although proximity to water is important, sites may not be restricted to terrain that offers flat, comfortable and dry areas for Aboriginal campsites. Umwelt's (2008) survey demonstrated that moderate to steep drainage depressions may also yield high numbers of sites. In that survey more than 25% of site loci were identified in moderate to steep drainage depressions.

The dominant raw material for stone artefact production in the area is mudstone and silcrete. Much smaller proportions of stone artefacts from other raw materials including porcellanite, quartz, quartzite, hornfels, silicified sandstone, petrified wood, chalcedony, tuff and a fine grained volcanic stone are also present.

Stone artefact assemblages in the area comprise significant proportions of small amorphous flakes, flaked pieces and broken flakes. Cores are recorded as present in much lower numbers. Other implements defined as blades, axes and scrapers occur in negligible quantities throughout the area. There area also river pebbles of various raw material types that have been manually imported into the area (i.e. manuports).

What has not been particularly well documented is how site contents are patterned and what the assemblages of artefacts mean in terms of Aboriginal use of the landscape. Archaeologists have identified "knapping floors" within sites. These are areas where discrete concentrations of microblade production debris have been identified. Where knapping floors have been excavated, it has been possible to reconstruct the knapping process by analysis of debitage and refitting of flakes on cores (e.g. Koettig 1994). This has led to the identification of a large number of reduction sequences but little attempt has been made to explain why there are differing sequences or how these relate to past Aboriginal occupation of the Hunter Valley (see Moore 2000; Witter n.d.).

Witter has undertaken an analysis of assemblages from various sites at the lower end of Bowmans Creek and concluded that most of these assemblages were dominated by microblade technology using indurated mudstone or silcrete and varying reduction techniques, but that there were some sites where this technology did not dominate the assemblages (Witter 2002: 15-26). Witter's comparison did not however, extend to assemblages from sites at the top of valley catchments as this was out of his study area. It is logical however to suggest that the upper reaches of a catchment may be utilised in a different way from the lower reaches and that the use of the landforms along streams might be different from the use of crest landforms. However, this hypothesis remains untested. All that is known is that knapping floors occur near creeks rather than at a distance from creeks.

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Impact Assessment

40 S

6067101_RPTFinalRev01_28Aug09

3.4.1 Predictive Model of Aboriginal Site Location

From the above, the following predictive model of site location was established:

- stone artefact sites would be the most common site type identified;
- stone artefact sites and associated subsurface deposit would occur most commonly within 50 m of a reliable watercourse;
- stone artefact sites and associated deposits may also occur on slopes, but in lower densities than along creek margins;
- artefact density would be greatest in landforms within 50 m of watercourses, and dropping in density progressively as proximity to water decreases;
- stone artefact sites would definitely occur on ridge crests, at low densities far from the Hunter River, but possibly in higher numbers within close proximity to the Hunter River floodplain. Subsurface deposits may also be expected to reflect these changing proximities to the Hunter River;
- land clearing is likely to have removed the majority of scarred and carved trees;
- grinding grooves may occur on sandstone bedrock exposures near reliable watercourses; and
- rock shelters are known in the area and may be evident where sandstone outcrops occur.

3.5 Conservation Areas and Heritage Management Zones

Lands may be set aside and specifically managed for their natural and/or cultural heritage values. There are two categories of management area established within the EA Boundary for this purpose. The principle differences between the two types of management areas relate to the level and timeframe for protection afforded the areas:

- 1 *Conservation Areas (CA)*: CAs are statutory-listed areas that are established in perpetuity because those areas demonstrate high levels of natural and/or cultural heritage value.
- 2 *Heritage Management Zones (HMZ)*: HMZs are set aside as conservation offsets, rather than for the actual heritage values of the area. In other words, there is no specific scientific reason for the HMZs to be established where they are. HMZs are established for the life of a particular project only rather than in perpetuity, and have no statutory protection.

Although Kuskie (1999: v) concluded that the 'identified and potential Aboriginal heritage evidence located within the MAN study area is not considered to be of sufficient significance or uniqueness within regional context to warrant its total conservation', he recommended the establishment of "two conservation zones in the adjoining Bayswater No. 3 ML, measuring 344 ha in total." In addition he recommended the establishment of a 122 ha "conservation zone" west of Edderton Road.

The two proposed Bayswater conservation zones were never created, however the MAN development consent required the creation of two other areas within the MAN ML, in lieu of the recommended areas, and in addition required the creation of a CA on Mount Arthur.

Under the terms of the various approvals, Mt Arthur Coal currently has the following areas for the management and protection of Aboriginal archaeology and cultural heritage (**Figure 11**):

- Under the MAN development consent (Section 3.3 (a) (i)):

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- a) Mount Arthur Conservation Area (proposed);
- b) Edderton Road Heritage Management Zone (HMZ), as per Kuskie's (1999) recommendation;
- c) Macleans Hill HMZ; and
- d) North West Slopes HMZ
- Under the MAU development consent:
 - e) Saddlers Creek CA (proposed)

In addition, as a result of the MAU Aboriginal heritage assessment (Umwelt 2008), Mt Arthur Coal committed to:

- funding and construction of a keeping place for Aboriginal artefacts;
- collections training for five Aboriginal stakeholders;
- construction of a facility suitable for use by the Aboriginal community for teaching purposes; and
- training one member of each registered Aboriginal stakeholder group in site recording and basic analysis.

As part of the Project, proposed extensions to the open cut mining area at Mt Arthur Coal will impact the three HMZs to various degrees.

There is no defined record of the cultural heritage values of the three HMZs in any consent conditions, Commission of Enquiry documentation or the Department of Urban Affairs and Planning (DUAP) assessment report. The MAN EIS and the archaeological assessment of that report (Kuskie 1999a) provides only brief assessment of the West of Edderton Road HMZ in terms of significance of ATUs and very little assessment of heritage values for the areas that became Macleans Hill and Mount Arthur North West Slopes HMZs.

It appears that the three HMZ were established primarily on the basis that they were areas that were not intended for mining rather than for any specific heritage values. A review of their heritage values is presented in **Section 6.5**, and demonstrates that the sites within the HMZs have little capacity to demonstrate high heritage values for their scientific, aesthetic or educational significance. The proposed impacts to these conservation areas are discussed in more detail in **Section 7.1**, and proposed mitigation strategies are described in **Section 9.0**.

4.0 Aboriginal Community Consultation

This section details the process and outcome of Aboriginal community consultation for this Project. It was prepared by Melissa Walker of Hansen Bailey Pty Ltd.

4.1 Notification and Registration

The Aboriginal stakeholder consultation program was conducted in accordance with the Department of Environment and Climate Change's (DECC) guidelines, "*Draft Guidelines for Aboriginal Cultural Heritage Impact Assessment and Community Consultation*" (2005) and "*Interim Community Consultation Requirements for Applicants*" (2004).

Notification of the Project was provided in local newspapers in order to identify Aboriginal stakeholders who wished to be consulted in regard to the Archaeological survey and Cultural Heritage assessment. Mt Arthur Coal placed one identical Public Notice in both the *Hunter Valley News* and the *Muswellbrook Chronicle* on the 1 October and 3 October 2008 respectively seeking registration of interest for participation in the consultation program.

Nine local Aboriginal groups (Aboriginal Native Title Consultants, Cacatua Cultural Consultants, Upper Hunter Wonnarua Council, Upper Hunter Heritage Consultants, Hunter Valley Natural & Cultural Resources Management, Wanaruah Local Aboriginal Land Council, Ungooroo Cultural and Community Services, Yarrawalk, and Culturally Aware) registered their expression of interest in regard to the Project verbally or in writing in response to the October 2008 newspaper advertisements. Each group indicated they would like to participate in the Cultural Heritage Assessment and Archaeological survey aspects of the Project.

Muswellbrook Shire Council (MSC), New South Wales Native Title Services, NSW Department of Aboriginal Affairs – Office of the Registrar, Wanaruah Local Aboriginal Land Council (WLALC) and DECC were all notified by letter on 9 October 2008 informing them of the Project and requesting information regarding the contact details of known Aboriginal stakeholder groups in the locality for consultation.

In response, DECC and MSC provided an extensive list consisting of the contact details for 34 known Aboriginal stakeholder groups in the Muswellbrook Local Government Area (LGA) and Hunter Valley Region on 20 and 22 October, 2008 respectively. Due to the large number of groups identified by DECC and MSC, an expression of interest letter and invitation to attend the Project planning meeting was faxed and posted to each identified group (including groups that had previously registered an expression of interest in response to the newspaper advertisements). The expression of interest letter and invitation outlined the details of the Project and invited each stakeholder group be consulted in relation to Aboriginal and Cultural Heritage matters.

A full list of all known Aboriginal stakeholder groups that were invited to register interest in the project by Hansen Bailey is presented in **Table 13**.

Table 13: Consulted Aboriginal Stakeholder Groups

Name of Group	Primary Contacts
Aboriginal Native Title Consultants (ANTC)	John and Margaret Matthews
Awabakal Descendants Traditional Owners Aboriginal Corporation (ADTOAC)	Shane Frost
Awabakal Traditional Owners Aboriginal Corporation (ATOAC)	Kerrie Brauer and Dene Hawkin

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Aboriginal Archaeology and Cultural Heritage
Impact Assessment

43 S

6067101_RPTFinalRev01_28Aug09

Name of Group	Primary Contacts
Black Creek Aboriginal Corporation (BCAC)	N/A
Bullen Bullen Consultants (BBC)	Lloyd Matthews
Cacatua Cultural Consultants (CCC)	George Sampson
Culturally Aware (CA)	Tracey Skene
Gidawaa Walang Cultural Heritage Consultancy (GWCHC)	Annie Hickey
Giwiirr Consultants (GC)	Rodney Matthews
Hunter Valley Aboriginal Corporation (HVAC)	Barry Stair
Hunter Valley Cultural Consultants (HVCC)	Christine Matthews
Hunter Valley Cultural Surveying (HVCS)	Luke and Pansy Hickey
Hunter Traditional Owners Environmental Management (HTOEM)	Rick and Cara Coles
Hunter Valley Natural & Cultural Resources Management (HVNCRM)	David French
Lower Hunter Wonnarua Council Inc. (LHWC)	Tom Miller
Lower Wonnaruah Tribal Consultancy (LWTC)	Barry Anderson
Mimagen Wajaar (MW)	N/A
Mingga Consultants (MC)	Mick Clifford
Mur-Roo-Ma (MRM)	N/A
Muswellbrook Cultural Consultants (MCC)	Brian Horton
Nur-Run-Gee (NRG)	N/A
St Clair Singleton Aboriginal Corporation (SCSAC)	N/A
Ungooroo Cultural and Community Services (UCCS)	Rhonda Ward
Upper Hunter Heritage Consultants (UHC)	Melissa Matthews
Upper Hunter Wonnarua Council (UHC)	Rhoda Perry
Valley Culture (VC)	Larry Van Vliet
Wanaruah Aboriginal Custodians Corporation (WACC)	Barbara Foot
Wanaruah Local Aboriginal Land Council (WLALC)	Suzie Worth
Wattaka Wonnarua CC Service (WWCCS)	Des Hickey
Wonn1 Contracting (W1C)	Arthur Fletcher
Wonnarua Culture Heritage (WCH)	Gordon Griffith
Wonnarua Nations Aboriginal Corporation (WNAC)	Sandra Miller
Wonnaruah Elders Council (WEC)	Rhoda Perry
Yamuloong Group Initiatives (YGI)	Sean Gordon
Yarrowalk (Y)	Barry McTaggart
Yinarr Cultural Services (YCS)	Kathleen Steward-Kinchela

N/A: Contact unknown.

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Impact Assessment

4.2 Consultation Regarding Survey Strategy and Conservation Values

Hansen Bailey, on behalf of Mt Arthur Coal, invited 34 of the 36 Aboriginal groups listed in **Table 13** (BBC and HTOEM were not known at that time) to participate in the initial planning meeting for the Project held at Mt Arthur Coal Administration Building, Thomas Mitchell Drive, Muswellbrook, on 3 February 2009. Two groups (ATOAC and WACC) indicated they did not wish to participate in the consultation process as Mt Arthur Coal is outside their traditional area. A total of 14 of the known registered Aboriginal community groups were represented at the planning meeting including: ANTC, CCC, GC, HVAC, HVCC, HVNCRM, MC, MCC, UCCC, UHHC, UHWC, WLALC, Y and YCS.

At the planning meeting, a description of the Project was presented by Julie McNaughton from Mt Arthur Coal along with a background description into Mt Arthur Coal's operations. A background overview of previous archaeological studies, conservation and offset areas was presented by Melissa Walker (Environmental Scientist) from Hansen Bailey. The proposed survey methodology for the Archaeological survey was presented by Neville Baker (Principal Archaeologist) and Rick Bullers (Senior Archaeologist) from AECOM. A copy of the Aboriginal and Cultural Heritage stakeholder presentation on the 3 February 2009 can be found in **Appendix B**. Aboriginal stakeholder group representatives were encouraged to discuss any comments and raise any concerns they may have in relation to the Project in regard to cultural heritage or survey methodology. No initial comments were received from any group at the meeting.

Representatives from each of the groups present at the meeting were provided with a copy of the proposed survey methodology to take away for their examination and further comment (see **Appendix B**). A letter presenting the proposed survey methodology, requesting comments or acceptance of the proposed methodology and requesting formal expression of interest in field work was sent on 3 February 2009 to the remaining 22 known Aboriginal stakeholder groups listed in **Table 13** not present at the initial planning meeting (HTOEM was not known at this time).

Two new Aboriginal stakeholder groups (BBC and HTOEM) arose from the initial planning meeting and registered their expression of interest in the Project in early February 2009. BBC was provided a copy of the methodology with all the other Aboriginal stakeholder groups on 3 February 2009. HTOEM was not known until 13 February, however was provided with a copy of the methodology and invited to participate in archaeological survey on 12 March 2009. Both additional groups were consulted with and participated in the archaeological survey.

As a result of the invitations to register interest and the planning meeting in February 2009, a total of 24 Aboriginal groups formally registered interest and accepted the methodology. These groups were deemed to be the Project stakeholder groups going forward.

4.3 Summary of Responses

In total, 26 written responses and acceptances of the proposed methodology (including BBC and HTOEM) were received in response to the proposed survey methodology and field work. Eleven Aboriginal groups chose to decline the invitation to participate in the Archaeological survey including ADTOAC, ATOAC, BCAC, LHWC, MW, MRM, NRG, SCSAC, WACC, WEC and YGI. All written responses and acceptances of the methodology are provided in **Appendix B**.

All except one group (CCC) accepted the proposed methodology – CCC believed that the 5 m spacing between representatives was too great and should be reduced to 2 m intervals. Upon consideration of the extensive size of the survey area and time considerations, the potential reduction in spacing's to 2 m was assessed by Neville Baker and colleagues and it was considered to be inefficient to reduce the spacings and they would remain at 5 m between representatives. No additional concerns or comments were raised by any Aboriginal stakeholder group in relation to the Project or methodology.

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Aboriginal Archaeology and Cultural Heritage
Impact Assessment

4.4 Fieldwork Involvement

A total of 26 Aboriginal stakeholder groups registered their acceptance of the survey methodology and indicated they would like to participate in the fieldwork component of the Aboriginal Archaeology and Cultural Heritage Assessment. On 20 February 2009, a letter was sent to all 26 groups providing dates and general information for each individual group's attendance at the field work. The field survey was originally developed to be conducted over a period of 11 working days. However, due to the number of groups involved it was extended to 12 days, ensuring an even amount of work was provided to each Aboriginal group. The 26 groups were split into three groups of six (Groups 1, 2 and 3) and one group of seven (Group 4). Each group was allocated three successive days field work, and after providing Work Cover Certificates of Currency, representatives from each Aboriginal group were able to participate.

Prior to undertaking each day of field work, all groups were contacted by telephone and reminded of their designated field work days and the need to provide Work Cover certificates, to ensure there were sufficient representatives present to conduct the survey each day.

Archaeologists Neville Baker, Rick Bullers and Geordie Oakes from AECOM were present at one or more days to conduct the archaeological survey. Field work was conducted over the 12 working days from 2 March to 17 March 2009, within the three survey areas. All survey areas defined in the methodology were covered with a total of 89 ha of land previously unsurveyed (Mount Arthur and Edderton Road survey areas) and a further 495 ha of the Offset survey area being assessed for its Archaeological and Cultural Heritage significance.

Several groups failed to attend their allocated field days on one or more occasions, including UHWC, HVCS, WNAC and WLALC. MCC failed to provide evidence of work cover insurance and as a result was unable to participate in the field work. HVNCRM also was unable to participate in field work as the nominated representative was absent. Information regarding the attendance of each Aboriginal stakeholder group and representatives who participated in the archaeological survey is presented in **Table 14**.

At the completion of each group's field work allocation, AECOM archaeologists and Julie McNaughton from Mt Arthur Coal discussed the findings with the groups and sought any comments or suggestions in relation to Cultural Heritage significance of the areas surveyed. As a result of the debriefs, no additional suggestions or recommendations regarding Cultural Heritage were forthcoming. However, specific discussions were held regarding the proposed offset area. During these discussions some groups voiced support for the proposed offset area, saying it was a better outcome than the existing HMZs.

Table 14: Registered Aboriginal Stakeholder Groups that Participated in Archaeological Survey

Field Work	Aboriginal Stakeholder Group	Representative/s
Group 1 2, 3 & 4 March 2009	Giwiirr Consultants	Michael Matthews
	Hunter Valley Cultural Consultants	Colleen & Barry Stair
	Bullen Bullen Consultants	Lloyd Matthews
	Aboriginal Native Title Consultants	Margaret Matthews
	Upper Hunter Heritage Consultants	John Matthews
	Ungooroo Cultural and Community Services	Rhonda Ward, Jamie-Lee Stair

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Aboriginal Archaeology and Cultural Heritage
Impact Assessment

Field Work	Aboriginal Stakeholder Group	Representative/s
Group 2 5, 6 & 9 March 2009	Lower Wonnaruah Tribal Consultancy Pty Ltd	Barry Anderson
	Culturally Aware	Justin Matthews
	Hunter Valley Aboriginal Corporation	Katrina Cavanagh
	Hunter Valley Cultural Surveying	Luke Hickey
	Yinarr Cultural Services	Kathleen Steward-Kinchela
Group 3 10, 11 & 12 March 2009	Valley Culture	Elizabeth Howard
	Wonn1 Contracting	Arthur Fletcher & Tony Matthews
	Wonnarua Culture Heritage	Shannon Griffiths
	Cacatua Cultural Consultants	George Sampson
	Mingga Consultants	Dean Miller
Group 4 13, 16 & 17 March 2009	Yarrowalk B	arry French
	Wattaka Wonnarua CC Service	Des Hickey
	Gidawaa Walang Cultural Heritage Consultancy	Ann Hickey
	Wonnarua Nations Aboriginal Corporation	Maree Waugh
	Upper Hunter Wonnarua Council	Georgina Berry
	Hunter Traditional Owners Environmental Management	Katrina Cavanagh
	Wanaruah Local Aboriginal Land Council	Jade Bauer

4.5 Draft Aboriginal Archaeological Assessment Review

Hansen Bailey, on behalf of Mt Arthur Coal, invited the 26 Aboriginal stakeholder groups to participate in an assessment review meeting for the Project held at Mt Arthur Coal Administration Building, Thomas Mitchell Drive, Muswellbrook, on 12 June 2009. A total of eight of the registered Aboriginal community groups were represented at the assessment review meeting.

At the assessment review meeting, the results of the draft assessment were presented by Rick Bullers from AECOM. In addition, a review of the proposed management commitments for the grinding groove site near Saddlers Pit (#37-2-0731) was presented by Neville Baker from AECOM. A site visit to the grinding groove site was also conducted. During the meeting it was made clear to the Aboriginal groups that the current, approved mine plan will result in the grinding groove site being surrounded on nearly all sides an overburden emplacement area, in effect resulting in a deep, steep-sided "valley". The groups were asked for their opinion on different management options for the grinding grooves, mainly, managing the grooves in situ or relocation of the grooves to a dedicated Keeping Place.

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Aboriginal Archaeology and Cultural Heritage
Impact Assessment

47 S

6067101_RPTFinalRev01_28Aug09

A copy of the Aboriginal and Cultural Heritage stakeholder presentation on the 12 June 2009 can be found in **Appendix B**. Aboriginal stakeholder group representatives were encouraged to discuss any comments and raise any concerns they may have in relation to the proposed management commitments in regard to cultural heritage. No initial comments were received from any group at the meeting regarding the overall assessment report. The majority of discussion and questions from Aboriginal stakeholder groups concerned the Saddlers Pit grinding grooves.

Representatives from each of the groups present at the meeting were provided with a copy of the draft assessment report to take away for their examination and further comment (see **Appendix B**). Two groups also took hardcopies away to give to two groups that did not attend. A letter accompanying the draft assessment report and seeking Aboriginal stakeholder comments was sent on 15 June 2009 to the remaining 16 Aboriginal stakeholder groups not present at the assessment review meeting. Aboriginal stakeholder groups were also requested to provide specific comments (via a specially-devised response form) regarding the potential relocation of the Saddlers Pit grinding grooves. The response form asked Aboriginal stakeholders to indicate their preference regarding:

- 'Agreement in principle that the Saddlers Pit grinding grooves should be relocated to a new Keeping Place at the expense of Mt Arthur Coal; or
- Managing the grinding grooves in situ rather than moving them to a new Keeping Place'.

These were provided as two specific options with "tick" boxes and there was provision for groups to make specific comments regarding the proposal (see **Appendix B**).

The letter requested all comments on the potential relocation of the Saddlers Pit grinding grooves and draft report to be submitted by 3 July 2009.

4.6 Consultation during the Review Period and Finalisation of the Aboriginal Archaeological Assessment

Following the assessment review meeting and distribution of the draft assessment report to Aboriginal stakeholders, Hansen Bailey received a total of three written responses regarding the draft assessment report in general, and six written responses regarding the potential relocation of the Saddlers Pit grinding grooves. Written responses from Aboriginal stakeholder groups may be found in **Appendix B**. A review of each response is provided below.

4.6.1 Aboriginal Archaeology and Cultural heritage Impact Assessment Report

Written responses were received from WLALC, GWCHC and CCC. Two of the three responses accepted the findings of the report, whilst the third did not agree with the proposal to revoke the three HMZs. Specifically:

- GWCHC responded via letter on 30 June 2009 (dated 29 June 2009), agreeing with the overall management strategy and the management actions proposed for sites within the MAU, South Pit Extension and Bayswater No. 3 mine areas. GWCHC also agreed with management recommendations regarding all scarred trees and grinding groove sites. There was no specific comment regarding management of sites within the MAN area, nor the proposal to revoke the three HMZs.
- CCC responded by letter dated 2 July 2009 and found that the survey and report was "thorough in covering all landform [sic] so we feel that all attempts to find remaining signs of Aboriginal inhabitation was fulfilled." CCC believes that there is a high level of impact to "significant items" due to the extension of mining at Mt Arthur Coal and salvage of sites should occur to a depth of 30 cm.

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Aboriginal Archaeology and Cultural Heritage
Impact Assessment

WLALC responded by letter dated 23 July 2009, noting that the area surrounding and including Mount Arthur has great cultural and social significance to the Aboriginal people of the area and was an important cultural and economic transit way for thousands of years. WLALC notes that Mount Arthur itself was a site used for teaching, was within easy walking distance of several significant sites and ceremonial grounds, and is in close proximity of the song line between the Hunter Valley and the coast. WLALC does not agree with the proposal to revoke the three HMZs and replace them with a more appropriate offset. WLALC does not accept or agree with the management recommendations for the Project without “guaranteed protection of ALL the existing MAN Heritage Protection Zones [sic].”

4.6.2 Saddlers Pit Grinding Grooves

Written responses were received from six Aboriginal groups: WLALC, GWCHC, W1C, YCS, CA and CCC. Five of the groups were in favour of managing the grinding grooves in situ rather than moving them to a Keeping Place. However, one group did identify that if in situ management is not an option and impacts occur in close proximity, then the grooves should be relocated. One group did not identify either option, rather noting more research is required. Specifically:

- GWCHC responded via the response form on 30 June 2009 (dated 23 June 2009) and did not identify either option as their preferred strategy. Instead specific comments were made including the need for more research into the options and the likely effects on the grinding grooves if they are to be moved. If the grooves were to be managed in situ, questions in regard to the effects of the mining activity and access were raised. They recommended forming a Working Group involving stakeholders to address the above issues.
- CA responded via the response form on 29 June 2009 and identified the management in situ option as the preferred option. Specific comments included the stipulation that if the grooves are not being impacted, then they should be left in original cultural landscape. If in situ management is not an option and impacts will occur within close vicinity [sic], then removal/relocation should be conducted sensitively using a professional, experienced team with Aboriginal community input.
- CCC responded by letter dated 2 July 2009 that they do not agree with moving the grinding grooves because the location is just as significant as the grooves. The large number of grooves is suggestive of the significance of the site to Aboriginal people. CCC were also under the impression that the grinding grooves “would be the lowest point of the regeneration this would cause a swamp area with no run off if this is true it is not acceptable as it would create a different ecosystem to be created from the one that is there” [sic]. This is understood to mean that if the grinding groove site becomes the lowest point (as would be the case given the overburden emplacement area around it), then the site would become inundated as a wetland, creating a different environment. Specific recommendations from CCC included:
 - “the regeneration of the land around the fence should be as close as possible to what it was before excavation;
 - the water is to run on and off the land like it did before;
 - the area is to have no large build up of water so that it creates a swamp area;
 - weed control is to be undertaken under Aboriginal management;
 - Aboriginal consultation while drafting of the new Aboriginal plan; and

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Aboriginal Archaeology and Cultural Heritage
Impact Assessment

49 S

6067101_RPTFinalRev01_28Aug09

- no closing of access to this area if appropriate notification and time is given to the mines”.
- W1C responded via the response form on 9 July 2009 and identified the management in situ option as the preferred option. No other specific comments were given.
- YCS responded via the response form on 10 July 2009 and identified the management in situ option as the preferred option. The YC commented that the Saddlers Pit grooves are of high significance and therefore are to remain in situ, monitored and provided with a fence around the site.
- WLALC responded via the response form on 23 July 2009 and identified the management in situ option as the preferred option. No other specific comments were given.

Where possible and appropriate, these comments were incorporated into the management commitments presented in **Section 9.0**. All comments regarding the Saddlers Pit grinding grooves were incorporated into the management commitments and also listed as separate Aboriginal stakeholder comments (see **Section 9.4.2**). There were few comments regarding the overall draft archaeological report and these ranged from full agreement (GWCHC) to opposition (WLALC). All comments were incorporated into the management commitments with the exception of WLALC's wish to keep all existing HMZs intact, although all comments were listed as separate Aboriginal stakeholder comments. As discussed in **Section 3.5**, the HMZs are not statutory areas and were only intended for the life of the project. Furthermore, two of the existing HMZs were not recommended for conservation in the original assessment report and none of the HMZs were established for any significance values (see **Section 6.5** for further discussion). The proposed Offset area is considered to hold higher site significance values, and provide a more effective conservation offset by way of contiguous extent and access arrangements for the Aboriginal community (see **Section 6.4.2**).

4.7 Summary / Conclusion

Thirty six registered Aboriginal stakeholder groups in the Upper Hunter Valley region were consulted for this Project in accordance with DECC's guidelines, "*Draft Guidelines for Aboriginal Cultural Heritage Impact Assessment and Community Consultation*" (2005) and "*Interim Community Consultation Requirements for Applicants*" (2004). These groups included the local Land Council (WLALC) responsible for the land within and surrounding the EA Boundary. BB and HTOEM were unknown to Hansen Bailey before the planning meeting on 3 February 2009; however, after providing the Project methodology to other stakeholder groups, both groups became known, were consulted with and participated in the archaeological field survey.

Of the 36 registered Aboriginal stakeholder groups contacted to register their interest in the Project, 25 written responses were received outlining each group's desire to be consulted with and participate in the Project. All 25 groups were invited to participate in three days field work during the field survey conducted between the 2 March 2009 and 17 March 2009 (see **Table 14**). All 36 registered Aboriginal stakeholder groups were invited to attend a site meeting at Mt Arthur Coal to discuss report findings and recommendations and undertake a site visit of the Saddlers Pit grinding grooves. All 36 registered Aboriginal stakeholder groups were provided a hard copy of the draft report for comment.

Table 15 provides a summary of all Aboriginal consultation for the Project with further detail provided in **Appendix B**.

Table 15: Summary of Aboriginal Consultation

Date	Method of Consultation	Aboriginal Stakeholder Groups Contacted
1 October 2008	Public Notice in the <i>Hunter Valley News</i> , advertising expression of interest for proposed Archaeological Survey and Cultural Heritage Assessment at Mt Arthur Coal.	N/A
3 October 2008	Public Notice in the <i>Muswellbrook Chronicle</i> , advertising expression of interest for proposed Archaeological Survey and Cultural Heritage Assessment at Mt Arthur Coal.	N/A
2 October 2008	Fax received indicating expression of interest in proposed Archaeological Survey and Cultural Heritage Assessment at Mt Arthur Coal.	ANTC
2 October 2008	Telephone call made confirming expression of interest received.	ANTC
3 October 2008	Fax received indicating expression of interest in proposed Archaeological Survey and Cultural Heritage Assessment at Mt Arthur Coal.	CCC
3 October 2008	Telephone call received confirming expression of interest.	UHWC
4 October 2008	Fax received indicating expression of interest in proposed Archaeological Survey and Cultural Heritage assessment at Mt Arthur Coal.	UHC
7 October 2008	Fax received indicating expression of interest in proposed Archaeological Survey and Cultural Heritage assessment at Mt Arthur Coal.	HVNCRM, WLALC
8 October 2008	Fax received indicating expression of interest in proposed Archaeological Survey and Cultural Heritage assessment at Mt Arthur Coal.	UCCS
8 October 2008	Email received indicating expression of interest in proposed Archaeological Survey and Cultural Heritage assessment at Mt Arthur Coal.	CA
8 October 2008	Email sent confirming expression of interest in proposed Archaeological Survey and Cultural Heritage assessment at Mt Arthur Coal.	CA
9 October	Letter sent describing the Aboriginal Stakeholder process for Mt Arthur Coal Archaeological Survey and Cultural Heritage assessment.	DECC Planning and Aboriginal Heritage, NSW Department of Aboriginal Affairs Office of the Registrar, Muswellbrook Shire Council, WLALC and Native Title Services

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Commercial in Confidence

Aboriginal Archaeology and Cultural Heritage
Impact Assessment

51 S

6067101_RPTFinalRev01_28Aug09

Date	Method of Consultation	Aboriginal Stakeholder Groups Contacted
14 October 2008	Letter received expressing interest in Mt Arthur Coal Archaeological Survey and Cultural Heritage assessment	UCCS
14 October 2008	Telephone call received expressing interest in Mt Arthur Coal Archaeological Survey and Cultural Heritage assessment.	Y
20 October 2008	Letter received stating that the lands at Mt Arthur Coal do not have Aboriginal Owners registered under the <i>Aboriginal Land Rights Act 1983</i> .	Office of the Registrar
20 October 2008	Letter received providing a list of Aboriginal stakeholder groups and contact details that may wish to be consulted in regard to the Project.	DECC
20 October 2008	Letter received registering expression of interest	WLALC
22 January 2009	Telephone call made to discuss Project, declined work as it was out of native area.	ATOAC, WAC
22 January 2009	Fax received indicating intention to attend Planning Meeting.	UCCS, CCC, Y, WWCCS,
22 January 2009	Hansen Bailey sent an invitation to 34 known registered Aboriginal stakeholder groups to participate in the consultation program for Mt Arthur Coal, commencing with a planning meeting held at Mt Arthur Coal administration buildings to present the proposed methodology on 3 February 2009.	YCS, CA, WNAC, BCAC, GC, HVAC, HVCC, HVCS, LHWC, LWTC, MW, MC, MRM, MCC, NRG, SCSAC, VC, WACC, WC, WCH, WNAC, WEC, YGI, ANTC, CCC, UHWC, UHHC, HVNCRM, WLALC, UCCS, Y, WWCCS, ADTOAC, BNC.
23 January 2009	Fax received indicating intention to attend Planning Meeting.	CA, HVAC, MC, UHWC
24 January 2009	Fax received indicating intention to attend Planning Meeting.	YCS
27 January 2009	Fax received indicating intention to attend Planning Meeting.	HVCS, ANTC, GC, WCH, GWCHC
28 January 2009	Fax received indicating intention to attend Planning Meeting.	WLALC
29 January 2009	Fax received confirming attendance at Planning Meeting.	WLALC
30 January 2009	Email stating representative unable to attend meeting however would like to participate in field work.	W1C

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Impact Assessment

52 S

6067101_RPTFinalRev01_28Aug09

Date	Method of Consultation	Aboriginal Stakeholder Groups Contacted
2 February 2009	Telephone call made indicating representative unable to attend meeting however would like information pack and minutes.	LWTC
2 February 2009	Fax received indicating representative unable to attend meeting however would like information sent for further work at Mt Arthur.	WNAC
2 February 2009	Telephone call confirming attendance of representative from group at planning meeting.	VC
3 February 2009	Planning meeting at Mt Arthur Coal – Aboriginal Cultural Heritage and Archaeology Presentation. Proposed methodology provided to groups.	UHWC, YCS, MCC, UHHC, G, HVCC, CCC, MC, Y, UCCS, WLALC, BHP Billiton, AECOM, Hansen Bailey, HVNCRM, HVAC and ANTC
3 February 2009	Letter sent containing proposed methodology and return attendance confirmation form.	ANTC, CCC, UHWC, UHHC, HVNCRM, WLALC, UCCS, Y, WWCCS, ADTOAC, ATOAC, GWCHC, BLAC, CA, GC, HVAC, HVCC, HVCS, YCS, LHWC, LWTC, MW, MC, MRM, MCC, NRG, SCSAC, VC, WACC, W1C, WCH, WNAC, WEC, YGI and BBC
3 February 2009	Fax received confirming acceptance of methodology and intention to attend.	HVAC
4 February 2009	Fax received confirming acceptance of methodology and intention to attend field work.	GC, UCCS, UHHC, BBC, HVCC, Y, MC, ANTC,
4 February 2009	Fax received detailing a possible modification to the proposed methodology. Intention to attend field work.	CCC
5 February 2009	Fax received confirming acceptance of methodology and intention to attend field work.	HVNCRM, WCH, WWCCS, GWCHC,
6 February 2009	Provided methodology for review.	CA
6 February 2009	Fax received confirming acceptance of methodology and intention to attend field work.	CA, MCC
7 February 2009	Fax received confirming acceptance of methodology and intention to attend field work.	YCS
9 February 2009	Phone call received confirming that fax had been received and confirm acceptance to methodology.	HVNCRM

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Aboriginal Archaeology and Cultural Heritage
Impact Assessment

53 S

6067101_RPTFinalRev01_28Aug09

Date	Method of Consultation	Aboriginal Stakeholder Groups Contacted
10 February 2009	Phone call made and message left on phone indicating comments on proposed methodology had been received.	YCS
10 February 2009	Fax received confirming acceptance of methodology and intention to attend field work.	WLALC
12 February 2009	Fax received confirming acceptance of methodology and intention to attend field work.	HVCS, W1C
13 February 2009	Fax received confirming acceptance of methodology and intention to attend field work. Fax was not signed by group and source of fax (i.e. group) was unknown at the time. Hansen Bailey later became aware the fax was from HTO Environmental Management.	HTO Environmental Management
15 February 2009	Fax received confirming acceptance of methodology and intention to attend field work.	VC
20 February 2009	Fax and letter sent to all Aboriginal Groups who replied to methodology and intention to attend field, detailing attendance dates of field work for interested Aboriginal Groups.	GWCHC, CA, GC, HVAC, HVCC, HVCS, YCS, MC, MCC, VC, W1C, WCH, BBC, ANTC, CCC, UHHC, HVNCRM, UCCS, Y and WWCCS.
24 February 2009	Sent fax detailing field work dates at Mt Arthur Coal along with the proposed methodology although they had not yet returned a confirmation fax.	UHWC and WNAC
25 February 2009	Contacted Aboriginal Groups in Group 1 to confirm attendance and to ensure Certificate of Currency was received.	GC, HVCC, BBC, ANTC, UHHC and UCCS
25 February 2009	Provided a map of directions to get to Mt Arthur Coal	W1C
27 February 2009	Received Certificates of Currency.	WCH, HVAC, ANTC, BB, GC, GWCHC, HVCC, LWTC, UHHC, W1C, CA, UCCS, Y, HVCS, CCC and YCS
3 March 2009	Received fax confirming acceptance of methodology and intention to attend field work.	WNAC
3 March 2009	Received Certificate of Currency	WWCCS
3 March 2009	Received telephone call indicating intention to send a representative to Mt Arthur Coal Field Work.	WNAC
3 March 2009	Received Certificate of Currency.	WNAC (Sandra Miller), UHWC

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Impact Assessment

Date	Method of Consultation	Aboriginal Stakeholder Groups Contacted
4 March 2009	Contacted Aboriginal Groups in Group 2 to confirm attendance and to ensure Certificate of Currency was received.	LWTC, CA, HVAC, HVCS, YCS and HVNCRM
4 March 2009	Emailed request sent to David French for Certificate of Currency to attend the field work	HVNCRM
4 March 2009	Received Certificate of Currency	WLALC
9 March 2009	Contacted Aboriginal Groups in Group 3 to confirm attendance and to ensure Certificate of Currency was received.	MCC, VC, W1C, WCH, CCC and MC
9 March 2009	Received Certificate of Currency	VC and MC
9 March 2009	Faxed field work letter and reminder to provide Certificate of Currency	MCC
9 March 2009	Phone call received expressing interest in field work. Emailed field work letter and requested Certificate of Currency for inclusion in the field work.	LHWC
9 March 2009	Received Certificate of Currency via email.	LHWC
11 March 2009	Contacted Aboriginal Groups in Group 4 to confirm attendance and to ensure Certificate of Currency was received.	WLALC, Y, WWCCS, GWCHC, WNAC, UHWC and HTOEM
12 March 2009	Hansen Bailey made a phone call in order to provide details about Mt Arthur field work.	Hunter Traditional Owners Environmental Management (HTOEM)
12 March 2009	Email sent detailing Aboriginal Archaeological and Cultural Heritage Assessment at Mt Arthur Coal.	HTOEM
12 March 2009	Email received with Certificate of Currency.	HTOEM
13 March 2009	Contacted groups about being absent from first day of Group 4 field work to find out if they were interested in working on the last two days or not.	WNAC and UHWC (Rhoda Perry)
13 March 2009	Sent through a copy of the field work letter and methodology upon request.	WNAC
13 March 2009	Telephone call made to confirm a representative's attendance on the final two days of field work at Mt Arthur.	WNAC and UHWC
16 March 2009	Telephone call made to confirm a representative's attendance on the final day of field work at Mt Arthur.	UHWC
29 May 2009	Fax and letter sent to all Aboriginal Groups who replied to the methodology or expressed an interest in the Project, outlining details of proposed meeting to discuss the draft report findings and undertake a site visit of the Saddlers Pit grinding grooves.	ANTC, BBC, CA, CCC, GC, GWCHC, HTOEM, HVAC, HVCC, HVCS, HVNCRM, LWTC, MCC, MC, UCCS, UHHC, UHWC, VC, WCH, WLALC, WNAC, W1C, WWCCS, Y and YCS.

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Aboriginal Archaeology and Cultural Heritage
Impact Assessment

Date	Method of Consultation	Aboriginal Stakeholder Groups Contacted
1 June 2009	Telephone call made to confirm a representative's attendance at upcoming Mt Arthur Coal EA report meeting visit on Friday 12 th June 2009. Noel Downs wanted to move the meeting however was informed that no other date was available and that he would still receive a copy of the report.	WLALC
1 June 2009	Telephone call made to confirm a representative's attendance at upcoming Mt Arthur Coal EA report meeting visit on Friday 12 th June 2009. Kathleen Stewart-Kinchella mentioned she was unable to attend however was going to try and send another representative.	YCS
1 June 2009	Telephone call made to confirm a representative's attendance at upcoming Mt Arthur Coal EA report meeting visit on Friday 12 th June 2009. George Sampson confirmed that Donna and himself would be attending.	CCC
1 June 2009	Fax received confirming attendance at upcoming Mt Arthur Coal EA Report meeting and site visit on Friday 12 th June 2009.	CCC
2 June 2009	Telephone call made to confirm a representative's attendance at upcoming Mt Arthur Coal EA report meeting visit on Friday 12 th June 2009. Spoke to Barry McTaggart and he confirmed he was going to send a representative.	Y
2 June 2009	Telephone call made to confirm a representative's attendance at upcoming Mt Arthur Coal EA report meeting visit on Friday 12 th June 2009. Annie Hickey confirmed she was going to send a representative.	GWCHC
2 June 2009	Telephone call made to confirm a representative's attendance at upcoming Mt Arthur Coal EA report meeting visit on Friday 12 th June 2009. Rhonda Ward confirmed she was going to send a representative.	UCCS
2 June 2009	Telephone call made to confirm a representative's attendance at upcoming Mt Arthur Coal EA report meeting visit on Friday 12 th June 2009. Rhonda Ward confirmed she was going to send a representative.	GC
2 June 2009	Fax received confirming attendance at upcoming Mt Arthur Coal EA Report meeting and site visit on Friday 12 th June 2009.	GC, GWCHC, UHHC
2 June 2009	Fax received confirming unable to attend meeting and site visit on Friday 12 th June 2009, but will provide comment on draft EA once report is received.	YCS

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Aboriginal Archaeology and Cultural Heritage
Impact Assessment

56 S

6067101_RPTFinalRev01_28Aug09

Date	Method of Consultation	Aboriginal Stakeholder Groups Contacted
3 June 2009	Telephone call made to confirm a representative's attendance at upcoming Mt Arthur Coal EA report meeting visit on Friday 12 th June 2009. Margaret Matthews confirmed she was going to attend along with John Matthews.	ANTC
3 June 2009	Telephone call made to confirm a representative's attendance at upcoming Mt Arthur Coal EA report meeting visit on Friday 12 th June 2009. Karen Matthews confirmed she was going to send a representative.	BBC
3 June 2009	Telephone call made to confirm a representative's attendance at upcoming Mt Arthur Coal EA report meeting visit on Friday 12 th June 2009. Colleen Stair confirmed she was going to send a representative.	HVCC
3 June 2009	Telephone call made to confirm a representative's attendance at upcoming Mt Arthur Coal EA report meeting visit on Friday 12 th June 2009. Barry Stair confirmed he was going to send a representative.	HVAC
3 June 2009	Telephone call made to confirm a representative's attendance at upcoming Mt Arthur Coal EA report meeting visit on Friday 12 th June 2009. Melissa Matthews confirmed she was going to send a representative.	UHC
3 June 2009	Telephone call made to confirm a representative's attendance at upcoming Mt Arthur Coal EA report meeting visit on Friday 12 th June 2009. Arthur Fletcher confirmed he was going to attend.	W1C
3 June 2009	Fax received confirming attendance at upcoming Mt Arthur Coal EA Report meeting and site visit on Friday 12 th June 2009.	ANTC, BBC, HVAC, HVCC, W1C,
4 June 2009	Telephone call made to confirm a representative's attendance at upcoming Mt Arthur Coal EA report meeting visit on Friday 12 th June 2009. Maree Waugh confirmed she was going to attend.	WNAC
4 June 2009	Fax received confirming attendance at upcoming Mt Arthur Coal EA Report meeting and site visit on Friday 12 th June 2009.	WNAC
5 June 2009	Telephone call made to confirm a representative's attendance at upcoming Mt Arthur Coal EA report meeting visit on Friday 12 th June 2009. Tracy Skene confirmed she was going to attend or was going to send Justin Drover if she was unavailable.	CA
5 June 2009	Telephone call made to confirm a representative's attendance at upcoming Mt Arthur Coal EA report meeting visit on Friday 12 th June 2009. Rick Coles confirmed that he or Cara would attend.	HTOEM

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Aboriginal Archaeology and Cultural Heritage
Impact Assessment

Date	Method of Consultation	Aboriginal Stakeholder Groups Contacted
5 June 2009	Telephone call made to confirm a representative's attendance at upcoming Mt Arthur Coal EA report meeting visit on Friday 12 th June 2009. Sent through details of the meeting to Rick's email and Rick Coles confirmed that either he or Cara would attend.	HVCS
5 June 2009	Telephone call made to confirm a representative's attendance at upcoming Mt Arthur Coal EA report meeting visit on Friday 12 th June 2009. Spoke to Luke Hickey and he wanted another copy of the meeting details. Sent through details of the meeting to Luke Hickey's email and Luke confirmed that he would attend.	HVCS
5 June 2009	Telephone call made to confirm a representative's attendance at upcoming Mt Arthur Coal EA report meeting visit on Friday 12 th June 2009. Spoke to Barry Anderson and he mentioned he was unable to attend and would like a copy of the report.	LWTC
5 June 2009	Telephone call made to confirm a representative's attendance at upcoming Mt Arthur Coal EA report meeting visit on Friday 12 th June 2009. Spoke to Rhoda Perry and she mentioned she was unable to attend and would like to send her apology.	UHWC
5 June 2009	Telephone call made to confirm a representative's attendance at upcoming Mt Arthur Coal EA report meeting visit on Friday 12 th June 2009. Spoke to Larry Van Vliet and he mentioned he would like to attend and would send through a return fax.	VC
5 June 2009	Telephone call made to confirm a representative's attendance at upcoming Mt Arthur Coal EA report meeting visit on Friday 12 th June 2009. Spoke to Gordon Griffith and he mentioned he would like to attend.	WCH
5 June 2009	Telephone call made to confirm a representative's attendance at upcoming Mt Arthur Coal EA report meeting visit on Friday 12 th June 2009. Spoke to Des Hickey and he mentioned he would like to attend.	WWCCS
9 June 2009	Fax received confirming attendance at upcoming Mt Arthur Coal EA Report meeting and site visit on Friday 12 th June 2009.	VC
9 June 2009	Fax received confirming unable to attend meeting and site visit on Friday 12 th June 2009. Fax noted intention to have site visit following assessment of draft report at a later date.	WLALC

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Aboriginal Archaeology and Cultural Heritage
Impact Assessment

58 S

6067101_RPTFinalRev01_28Aug09

Date	Method of Consultation	Aboriginal Stakeholder Groups Contacted
11 June 2009	Hansen Bailey rang Suzie Worth regarding fax received on 9 June 2009 to discuss presentation and proposed site visit on 12 June 2009 at Mt Arthur Coal. Suzie noted that unfortunately she had an appointment which could not be changed, but would like to meet up once she had reviewed the report to undertake the site visit of the Saddlers Pit grinding grooves offered on the 12th June 2009. MW from Hansen Bailey confirmed that Mt Arthur Coal would like to arrange for a meeting and site visit at a time suitable to Suzie.	WLALC
1 June 2009 to 11 June 2009	Telephone call made to several Aboriginal Groups during the week trying to get in contact with them regarding their Groups attendance at the upcoming Mt Arthur Coal EA report meeting visit on Friday 12 th June 2009. Was unable to get in telephone contact and confirm their attendance.	HVNCRM, LHWC, MCC and MC
12 June 2009	Meeting held at Mt Arthur Coal administration offices from Midday to present findings of draft EA report and respond and discuss any questions. Site visit to Saddlers Pit grinding grooves also undertaken to ensure all groups were offered the opportunity to visit the grooves and understand the context in which they are proposed to remain insitu for the Project. Hard copy of draft EA report provided to all groups which attended meeting. Some groups also collected copies of the draft EA on behalf of other groups.	W1C, CCC, GWCHC, CA, WNAC, UHHC, BBC, ANTC (also collected draft EA hard copies for HVCC and GC), BHP Billiton, AECOM and Hansen Bailey.
15 June 2009	Hard copy of draft EA report along with a corresponding letter express posted to all groups who didn't attended meeting for their comment.	UHWC, HVNCRM, WLALC, UCCS, Y, WWCCS, GC, HVAC, HVCC, HVCS, YCS, LHWC, LWTC, MC, MCC, VC, HTOEM,
18 June 2009	Hard copy of draft EA report express posted to a group that had changed address and had not received the first EA report sent out.	HVCS
29 June to 2 July 2009	Telephone called made to all contactable Aboriginal stakeholder groups who have been provided a copy of the EA report confirming they had received the report and that if they had any comments they were due back on Friday 3 July 2009.	ANTC, CCC, UHWC, UHHC, WLALC, UCCS, Y, GWCHC, CA, BBC, HVCC, HVCS, YCS, LHWC, LWTC, MC, VC, WNAC, HVNCRM, WWCCS, GC, HVAC, MCC, W1C, WCH and HTOEM

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Aboriginal Archaeology and Cultural Heritage
Impact Assessment

59 S

6067101_RPTFinalRev01_28Aug09

Date	Method of Consultation	Aboriginal Stakeholder Groups Contacted
23 June 2009		GWCHC
29 June 2009	Fax received from Tracy Skene providing comment on the EA report and stating she would prefer to leave the grinding grooves in situ and if they were to be removed should be conducted with consultation with Aboriginal stakeholder groups.	CA
30 June 2009	Fax received from Annie Hickey providing comment on the EA report stating she agreed with the content (letter dated 29 June 2009). Also attached was a response form (dated 23 June 2006) regarding the Saddlers Pit grinding grooves. Annie noted she would prefer to see more work done on the Saddlers Pit grinding grooves in regard to either leaving or relocating the grinding grooves. Suggested a working group be developed to find the best possible solution.	GWCHC
2 July 2009	Letter received from George Sampson providing comment on the EA report and stating that his group satisfied that all attempts to find signs of Aboriginal inhabitation was fulfilled. Also noted that he would prefer to leave the grinding grooves in situ.	CCC
9 July 2009	Fax received from Arthur Fletcher providing comment on the EA report and stating she would prefer to leave the grinding grooves in situ.	W1C
9 July 2009	Telephone call received from Noel Downs on behalf of Suzie Worth who was sick and requested an extension to provide comment on the EA report to 15 July 2009. MW from Hansen Bailey confirmed this was fine. Noel noted he was unhappy with the removal of HMZs. Noel was informed that the proposed offset area offers greater improved management outcome. Noel was not satisfied and wanted to note it was unacceptable.	WLALC
10 July 2009	Fax received from Kathleen Stewart Kinchella providing comment on the EA report and stating she would prefer to leave the grinding grooves in situ and have them surrounded with a fence.	YCS
23 July 2009	Letter received from Noel Downs providing response to the EA report. Noel noted Aboriginal Cultural Heritage was not limited to relics and artefacts and included landform, habitat zones and waterholes and peoples. It was noted that he was unhappy with the desire to destroy an area set aside as a cultural offset and does not agree with the management recommendations for the Project. Also noted he would rather leave the grinding grooves in situ.	WLALC

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Impact Assessment

60 S

6067101_RPTFinalRev01_28Aug09

Date	Method of Consultation	Aboriginal Stakeholder Groups Contacted
28 July 2009	All comments received from Aboriginal stakeholder groups have been incorporated into the EA report where relevant.	N/A

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Impact Assessment

61 S

6067101_RPTFinalRev01_28Aug09

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Impact Assessment

62 S

6067101_RPTFinalRev01_28Aug09

Environment

5.0 Survey Results

5.1 Fieldwork Conditions

Constraints for archaeologists include the extent to which human activity is represented by preserved evidence, the degree to which post-depositional processes have affected the archaeological record, the extent to which land-use (e.g. cultivation or development) has altered the archaeological landscape, the time of year and the conditions under which a survey is conducted.

5.1.1 Ground Surface Visibility, Erosion and Disturbance

The survey areas were generally located in gently undulating landscapes, with the exception of the Mount Arthur survey area, which contained moderate to steep slopes and valleys. Vegetation cover, in all survey areas, consisted largely of cleared grazing lands with pasture grass cover to a height of up to 0.5 m and with near 100% ground cover over much of the landscape (**Plates 1 and 2**) as a result of recent rainfall in the region. Some areas – notably ridge crests – had ground surface cover as low as 50% (**Plate 3**), allowing a greater chance of detecting artefacts. Smaller patches of taller vegetation strata, often in thick patches, occurred in both the Mount Arthur and Offset survey areas making ground surface visibility difficult (**Plate 4**), particularly where a shrub layer exists. Where canopy species occur without a noticeable shrub layer, ground surface visibility is often good due to the canopy hampering growth of ground cover.

Archaeological visibility was, for the most part, constrained to areas of ground surface exposure resulting from a range of erosive forces and/or natural or human-induced disturbance. Like previous archaeological surveys, the greatest level of erosion occurred in the form of gully, rill and stream bank erosion associated with the major creek lines and their tributaries, most notably Ramrod Creek (**Plate 5**). Animal activity is also particularly evident in these areas with tracks and ant nests featuring prominently, and offering near 100% ground surface visibility over small areas (<50 m²) of ground. Artefact scatters or isolated finds were often found in association with ant nests.

Erosion on slopes, ridges and spurs were more often in the form of sheetwash with exposures ranging from very small (<1 m²) to quite large (up to 500 m²) (**Plate 6**). Smaller occurrences of gully and rill erosion were also evident in these landforms, but ant nests and animal tracks were less prevalent.

5.1.2 Survey Coverage and Effective Coverage

This section provides a description of both survey coverage and effective coverage⁵ for the survey.

As stated in **Section 2.2**, 100% coverage of the survey areas was not considered feasible due to difficulties in terrain and vegetation cover. A series of transects were designed to sample the various ATUs. The total survey coverage for the survey area was 71.6%. This survey coverage includes all well-vegetated areas with low to zero ground surface visibility as well as all available exposures within the survey areas.

An assessment of effective coverage, required by DECC guidelines, is an estimate of the area in which archaeological materials are “detectable”, i.e. exposed ground surface area. Obviously, some Aboriginal site types – such as rock art, scarred trees or rockshelters – are more easily observed because they are not often obscured by vegetation cover.

⁵ For the purposes of this report survey coverage means the area actually traversed within transects. Conversely, effective coverage means the area of “detectability” where ground surface visibility is sufficient to detect surface artefacts.

By comparison, detection of some other Aboriginal site types, such as open camp sites (stone artefact scatters) or isolated finds (single stone artefacts), is often dependent on the nature of ground surface visibility. Such visibility is often hampered by thick vegetation cover and/or lack of erosion exposures. **Table 16 to Table 18** provides a tabulated estimate of the effective survey coverage for the three survey areas in this Project. Rather than present the data in one table, they have been presented as separate survey areas due to the differences in landform elements and vegetation, which affects the level of archaeological visibility.

Although the total survey coverage was relatively high (71.6%), the tables show that effective coverage ranged from 0.65% to 2.11% due to the poor ground surface visibility over the majority of the survey areas which was generally between 0 and 10%. Exposures accounted for little more than 2% of the survey areas and visibility within exposures ranged from 50-100%, providing an effective coverage of 0.67% in the Edderton Road survey area, 1.73% in the Mount Arthur survey area and 2.11% in the Offset survey area.

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Impact Assessment

64 S

6067101_RPTFinalRev01_28Aug09

Table 16: Effective Coverage for the Edderton Road Survey Area

Landform	Survey Area (Ha)	Transect Area (Ha)	Survey Coverage (%)	Exposure (%)	Exposure (Ha)	Visibility (%)	Detection Area (Ha)	Effective Coverage (%)
Simple Slope (Level-Very Gentle)	8.25	8.15	98.79	0.36	0.03	90	0.03	0.33
Simple Slope (Gentle)	26.17	12.11	46.27	0.88	0.23	90	0.21	0.79
Simple Slope (Moderate-Steep)	2.89	1.97	68.17	0.35	0.01	70	0.01	0.24
Total	37.31	22.23	59.58		0.27		0.25	0.67

Table 17: Effective Coverage for the Mount Arthur Survey Area

Landform	Survey Area (Ha)	Transect Area (Ha)	Survey Coverage (%)	Exposure (%)	Exposure (Ha)	Visibility (%)	Detection Area (Ha)	Effective Coverage (%)
Simple Slope (Moderate-Steep)	51.22	37.33	72.88	1.00	0.51	70	0.36	0.70
Ridge Crest/ Ridgeline	8.91	8.71	97.76	0.45	0.04	90	0.04	0.40
Spur Crest	4.84	3.18 65	.70 0.	00	0	0	0.00	0.00
Drainage Depression (Gentle)	12.94	7.72 59	.66 3.	09	0.4	90	0.36	2.78
Drainage Depression (Moderate-Steep)	7.81	3.27 41	.87 2.	56	0.2	80	0.16	2.05
Modified 0	.57	0.57	100.00	100.00	0.57	100	0.57	100.00
Total	86.29	60.78	70.44		1.72		1.49	1.73

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Table 18: Effective Coverage for the Offset survey area

Landform	Survey Area (Ha)	Transect Area (Ha)	Survey Coverage (%)	Exposure (%)	Exposure (Ha)	Visibility (%)	Detection Area (Ha)	Effective Coverage (%)
Simple Slope (Gentle)	258.35	187.99	72.77 1.12		2.89	90.00 2.60		1.01
Simple Slope (Moderate-Steep)	7.40	6.59 8	9.02	0.27	0.02 90.00		0.02	0.24
Ridge Crest/Ridgeline	44.27	37.83	85.45 2.44		1.08	80.00 0.86		1.95
Spur Crest	15.16	11.42	75.33 0.26		0.04	80.00 0.03		0.21
Drainage Depression (Level-V. Gentle)	115.38 8	0.02	69.35	3.76	4.34 95.00		4.12	3.57
Drainage Depression (Gentle)	53.87	36.24	67.27 2.71		1.46	95.00 1.39		2.57
Modified Terrain	1.46	0.56	38.36 98	.63	1.44 100.0	0 1.44		98.63
Total	495.89	360.65	72.73		11.27		10.46	2.11

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5.2 Previously Recorded Sites in the Survey Areas

There are nine previously recorded Aboriginal sites recorded in the Offset survey area (see **Section 3.3.2**), but none in either the Edderton Road or Mount Arthur survey areas. **Table 19** provides a list of those sites in the Offset survey area including a comparison of original recorded artefact numbers with the number of artefacts located during this survey. Six of the nine sites were re-identified during the present survey, but three sites could not be re-identified due to dense vegetation cover. However one site – 37-2-0113 is in close proximity to another large artefact scatter identified during the survey (MAC78) where 23 artefacts were recorded (**Figure 14**). It is possible that they are the same site, with the discrepancy attributed to differences in coordinate recording.

To avoid confusion AHIMS registered site names were retained – where sites were re-identified they were not given a sequential site number for the present survey.

Table 19: Previously Recorded Aboriginal Sites in the Survey Areas (Offset survey area)

AHIMS Site No.	AHIMS Site Name	Site Type	No. Artefacts (Original Recording)	No. Artefacts (Relocated 2009)
37-2-0001	Yammanie; Muswellbrook	Open Camp Site	3 (Brayshaw 1985)	Not re-identified
37-2-0032	Ramrod Creek (R1)	Open Camp Site	19 (Dyall 1976)	Not re-identified. Salvaged by Dyall
37-2-0113	Ramrod Creek (R2)	Open Camp Site	200+ (Dyall 1981); 94 (French 2002)	Not re-identified, but may be same as MAC78
37-2-0170	Bayswater Site 4	Open Camp Site	5 (Hughes 1981)	1
37-2-0171	Bayswater Site 3	Open Camp Site	Not specific	11
37-2-0182	Ramrod Creek (B1)	Open Camp Site	10 (Brayshaw 1982)	16
37-2-0183	Ramrod Creek (B2)	Open Camp Site	10 (Brayshaw 1982)	9
37-2-0185	Ramrod Creek Site B4	Open Camp Site	9 (Brayshaw 1982); 12 (French 2002)	80+
37-2-2559	Thomas Mitchell Drive PAD 1	PAD 0		This site was determined not to be a PAD

The following provides a brief description of sites, together with revised details following re-identification during the current survey:

- Site 37-2-0001 (Yammanie), consisting of three stone artefacts, was originally recorded by Brayshaw (1985) 4 m from the eastern bank of Ramrod Creek on a 6 x 5 m area which was said to be highly eroded. Attempts to re-identify this site were unsuccessful. The stated location was inspected and found to be covered by thick grass.

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Aboriginal Archaeology and Cultural Heritage
Impact Assessment

67 S

6067101_RPTFinalRev01_28Aug09

- Site 37-2-0032 (Ramrod Creek) was originally recorded by Dyll (1976) as two separate scatters totalling 19 stone artefacts, which were collected at that time and lodged with the Australian Museum. As a result, attempts to locate any additional artefacts not collected in 1976 were unsuccessful.
- Site 37-2-0113 (Ramrod Creek) was recorded by Dyll (1976) as a scatter of more than 200 stone artefacts along 700 m of both sides of the Ramrod Creek. The number and spatial extent indicates that many of the discreet sites identified in the present survey are likely to be components of Dyll's original site. In 2002 Barry French and John Matthews of WLALC re-identified the site and described it as a scatter of 94 stone artefacts over an area of 50 x 12 m on the western side of Ramrod Creek. The site was re-identified during the present survey but only five artefacts were recorded.
- Site 37-2-0170 (Bayswater Site 4) was identified by Hughes (1981) as a small scatter of five silcrete flakes and flaked pieces on a partially eroded area measuring 20 x 5 m at an average density of 1 artefact per 20 m². The site was re-identified during the present survey but only one artefact was identified.
- Site 37-2-0171 (Bayswater Site 3), was originally recorded by Hughes (1981) as a scatter of artefacts over an area of 15 x 15 m at a density of 1 artefact per 5 m². Actual artefact numbers were not specified but the density and extent figures suggest a total of 45 artefacts. When re-identified, the sheetwash exposure was found to cover 30 x 15 m but only 11 artefacts were evident. The soil has eroded to the B horizon.
- Site 37-2-0182 (B1) was originally identified by Brayshaw (1982) as an open camp site consisting of 10 artefacts on a 60 x 30 m exposure, 60 m from Ramrod Creek. The site was re-identified and a total of 16 artefacts were recorded.
- Site 37-2-0183 (B2) was originally identified by Brayshaw (1982) in two parts: two artefacts on a 4 x 3 m exposure, plus another eight artefacts located 35 m to the south on a 15 x 15 m exposure. A total of nine artefacts were re-identified during this survey.
- Site 37-2-0185 (Ramrod Creek Site B4) was originally recorded by Brayshaw (1982) as a scatter of nine stone artefacts on an exposure measuring 50 x 12 m on the western side of Ramrod Creek. It was subsequently resurveyed by Barry French and John Matthews of WLALC in 2002 and 12 artefacts were identified. The site was re-identified during the present survey and a total of more than 80 artefacts were identified in an area measuring 30 x 5 m.
- Site 37-2-2559 was originally recorded as a PAD by McCardle (2007) and reinspected during the present survey. It is located adjacent to Ramrod Creek on a middle terrace. The site was assessed as recent alluvial fill in a dynamic middle terrace context with no archaeological potential, and therefore its designation as a PAD is subsequently considered to be unwarranted. It is recommended that this site be deleted from AHIMS.
- In summary, there are nine previously-recorded sites on the AHIMS database. However, one site (37-2-0032) has been salvaged and one site (37-2-2559) was recorded as a PAD but was subsequently deemed to be unwarranted. Therefore, it is considered that there are a total of seven previously recorded sites extant in the Offset survey area.

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68 S

6067101_RPTFinalRev01_28Aug09

5.3 New Sites Recorded During the Present Survey

A total of 94 new sites were recorded during the present survey – one site within the Edderton Road survey area, 26 sites in the Mount Arthur survey area and 67 within the Offset survey area. Of these sites 49 (52.1%) were isolated finds, 40 (42.6%) were artefact scatters, two (2.1%) were isolated finds with associated PADs, two (2.1%) were scarred trees and one was a PAD (1.1%). A breakdown of site types and survey areas is shown in **Table 20**.

Table 20: Site Types Identified within the Survey Areas

	Edderton Road	Mount Arthur	Potential Offset Area	Total
Artefact scatter		12	28	40
Isolated find	1	13	35	49
Isolated find and PAD	1		1	2
PAD			1	1
Scarred tree			2	2
Total	1	26	67	94

Full descriptions of all 94 sites recorded during the survey are provided in **Appendix C**, including landform, erosion details, and site integrity. The numbers of artefacts at each site were recorded along with basic artefact attributes (type, material and length).

This section provides an overview of the sites located within each survey area.

5.3.1 Edderton Road Survey Area

One site was identified within the Edderton Road survey area. The site is located on a farm track on the property "Windmill". **Table 21** provides a summary of the site, site area, extent of associated PAD (if predicted during the survey) and site contents. The site is shown graphically in **Figure 12**.

Table 21: Summary of Sites Recorded within the Edderton Survey Area

Site ID	Site Type	PAD Associated with Site (Yes/No)	Archaeological Terrain Units within Site	Description of Site
MAC15 I	isolated Find	No	Simple Slope (Level to Very Gentle)	The site consists of 1 hornfels retouched tool, possibly a broken hatchet head.

5.3.2 Mount Arthur Survey Area

A total of 26 sites were identified during the survey of the Mount Arthur area (**Figure 13**), although six sites were subsequently found to be outside of the Mount Arthur survey area itself. The number of isolated finds and artefact scatters were roughly equal within the survey area with isolated finds (with or without associated PAD) forming 53.8% of sites and artefact scatters forming 46.2% of sites (**Table 20**).

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69 S

6067101_RPTFinalRev01_28Aug09

Isolated finds were the predominant site type on the steep slopes south of the main ridge line. In contrast the slightly less steep slopes north and east of the ridgeline contained mainly very low density artefact scatters.

Of the six sites located outside the survey area, four are located within broad sites defined by Kuskie (1999), although most appear to be different loci to those he identified (see **Table 22**). One site (MAC7) may be the same as Kuskie's Site BC7, although this is not conclusive. Another site (MAC11) may be part of the same site as Kuskie's Site PK40. This site is within the boundary of the Mt Arthur North West Slopes HMZ and is within the proposed the Project disturbance area (see **Section 7.1.2**).

Table 22: Summary of Sites Identified within the Mount Arthur Survey Area

Site ID	Site Type	PAD Associated with Site (Yes/No)	Archaeological Terrain Units within Site	Description of Site
MAC1 A	Artefact scatter	No	Simple Slope (Moderate-Steep)	Site consists of two mudstone flakes and a mudstone broken flake at the head of a 1 st order drainage line.
MAC2 A	Artefact scatter	No	Simple Slope (Moderate-Steep)	Site consists of two mudstone cores located outside the survey area. It lies within Kuskie's (1999) Site BC12, but is not recorded as a locus.
MAC3 A	Artefact scatter	No	Ridge Crest/Ridge Line	Site consists of two silcrete flakes and a volcanic material flake (site extent 5 x 5 m) on a large exposure measuring 100 x 20 m.
MAC4 A	Artefact scatter	No	Simple Slope (Moderate-Steep)	Site consists of three silcrete flakes, a silcrete retouched flake and a core and flake, both of volcanic material. It lies within Kuskie's (1999) Site BC11, but is not recorded as a locus.
MAC5	Artefact scatter	No	Spur Crest	Site consists of a silcrete retouched flake and a mudstone broken flake, 3 m apart. Although it lies within the survey area, it may form part of Kuskie's (1999) Site BC8 Locus A.
MAC6 A	Artefact scatter	No	Drainage Depression (Moderate-Steep)	Site consists of two mudstone flakes. Site is on the boundary of the survey area and is contiguous with Kuskie's (1999) Site BC7, although the nearest locus (A) is 50 m down slope.

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Impact Assessment

70 S

6067101_RPTFinalRev01_28Aug09

Site ID	Site Type	PAD Associated with Site (Yes/No)	Archaeological Terrain Units within Site	Description of Site
MAC7 Is	olated find	No	Drainage Depression (Moderate-Steep)	Site consists of one mudstone flake. It is outside the survey area and may be part of Kuskie's (1999) Site BC7.
MAC8 Is	olated find	No	Simple Slope (Moderate-Steep)	Site consists of one flake of volcanic material. It is outside the survey area and may be an extension of Kuskie's (1999) BC9.
MAC9 A	rtefact scatter	No	Ridge Crest/Ridge Line	Site consists of two silcrete flakes and a quartz flake on a 40 x 10 m elliptical exposure.
MAC10	Artefact scatter	No	Spur Crest	Site consists of a silcrete core and a silcrete flake.
MAC11 A	rtefact scatter	No	Ridge Crest/Ridge Line	Site consists of silcrete flake, flaked piece and retouched flake, a quartz flake and a silcrete flaked piece. The site is in the general vicinity of Kuskie's site PK40 and may be the same. The site is also within the North West Slopes HMZ and within Mine Extension Area 2.
MAC12 A	rtefact scatter	No	Simple Slope (Moderate-Steep)	Site consists of a quartz flake and a mudstone flake.
MAC13 A	rtefact scatter	No	Simple Slope (Moderate-Steep)	Site consists of a quartz flake and a mudstone shatter.
MAC14 Is	olated find	No	Ridge Crest/Ridge Line	Site consists of one large silcrete core with unidirectional large flake scars.
MAC26 Is	olated find	No	Drainage Depression (Level to Very Gentle)	Site consists of one retouched flake tool made from volcanic material.
MAC27	Isolated find and PAD	Yes	Ridge Crest/Ridge Line	Site consists of one quartzite flake.
MAC28 Is	olated find	No	Simple Slope (Moderate-Steep)	Site consists of one mudstone flaked piece.
MAC29 Is	olated find	No	Drainage Depression (Level to Very Gentle)	Site consists of one silcrete core.

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Impact Assessment

71 S

6067101_RPTFinalRev01_28Aug09

Environment

Site ID	Site Type	PAD Associated with Site (Yes/No)	Archaeological Terrain Units within Site	Description of Site
MAC30 Is	olated find	No	Drainage Depression (Level to Very Gentle)	Site consists of one silcrete broken flake.
MAC33 Is	olated find	No	Simple Slope (Moderate-Steep)	Site consists of one silcrete broken flake.
MAC34 Is	olated find	No	Simple Slope (Moderate-Steep)	Site consists of one silcrete flaked piece.
MAC35 Is	olated find	No	Spur Crest	Site consists of one silcrete flake.
MAC36 Is	olated find	No Simple	Slope (Moderate-Steep)	Site consists of one quartz flake.
MAC37 Is	olated find	No Simple	Slope (Moderate-Steep)	Site consists of one silcrete retouched flake.
MAC38 A	rtefact scatter	Yes	Drainage Depression (Moderate-Steep)	Site consists of one quartz flake and mudstone flake.
MAC39 Is	olated find	No Simple	Slope (Moderate-Steep)	Site consists of one mudstone flake.

A seventh site was located outside the survey area, which was subsequently identified as being NPWS 37-2-0111. This site is a set of two axe grinding grooves that are discussed further in **Section 5.3.7**.

5.3.3 Offset Survey Area

A total of 67 sites were identified within the Offset survey area, including two scarred trees, 35 isolated finds, 28 artefact scatters, one PAD and one isolated find with PAD. **Table 23** provides a summary of the sites, site area, extent of associated PAD (if predicted during the survey) and site contents.

Table 23: Summary of Sites Recorded within the Offset Survey Area

Site ID	Site Type	PAD Associated with Site (Yes/No)	Archaeological Terrain Units within Site	Description of Site
MAC16	Isolated find and PAD	Yes	Drainage Depression (Level to Very Gentle)	The site consists of one mudstone flake located on 4 m diameter ant nest exposure. Associated PAD extends 50 m to north and west of the site.
MAC17 Is	olated find	No	Simple Slope (Gentle)	The site consists of one mudstone flake.
MAC18 A	rtefact scatter	No	Drainage Depression (Gentle)	The site consists of two mudstone broken flakes on very disturbed introduced soil.

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Site ID	Site Type	PAD Associated with Site (Yes/No)	Archaeological Terrain Units within Site	Description of Site
MAC19 A	Artefact scatter	No	Simple Slope (Gentle)	The site consists of 5 artefacts including one silcrete flake, one silcrete flaked piece, one quartz flaked piece, one 'o rphyry' flaked piece and one hornfels object. The silcrete flake is large and the silcrete is very coarse. Additional silcrete, hornfels and quartzite cobbles are evident in the area.
MAC20 Is	olated find	No	Simple Slope (Gentle)	The site consists of one silcrete flake.
MAC21 Sc	arred tree	No	Simple Slope (Gentle)	Scar on senescent box gum, measuring: length 1500 x width 370 (Q3) 470 (Q2) 560 (Q1) x 320 mm thick. Base of scar is 600 mm above ground surface. The circumference of the tree at 1.5 m is 2700 mm. The scar face is heavily weathered and crumbling at the base.
MAC22 Sc	arred tree	No	Simple Slope (Gentle)	Tree is located 40 m south of MAC21. The scar is on a dead box gum. Measurements: length 580 x width 150 (Q3) 160 (Q2) 150 (Q1) x 90 mm thick. Base of scar is 420 mm above ground. Circumference at 1.5 m is 2640. Very symmetrical scar.
MAC23 A	Artefact scatter	No	Drainage Depression (Gentle)	Site consists of two silcrete flaked pieces.
MAC24 Is	olated find	No	Drainage Depression (Gentle)	Site consists of one hatchet head with ground edge and anvil pitting, made from river pebble with flaked butt using volcanic material. Artefact measures 130 x 95 x 25 mm.
MAC25 Is	olated find	No	Simple Slope (Gentle)	Site consists of one mudstone flake.

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Site ID	Site Type	PAD Associated with Site (Yes/No)	Archaeological Terrain Units within Site	Description of Site
MAC31 Is	olated find	Yes	Simple Slope (Gentle)	Site consists of one grey chert flake associated with sandstone rock outcrop.
MAC32 Is	olated find	Yes	Drainage Depression (Gentle)	Site consists of one silcrete core on a mid-slope gully edge (1 st order drainage line). Artefact is large and obtrusive on poor visibility ground surface.
MAC40 A	rtefact scatter	No	Simple Slope (Gentle)	Site consists of one mudstone flake and one silcrete broken flake.
MAC41 A	rtefact scatter	No	Simple Slope (Gentle)	Site consists of four stone artefacts: silcrete flake and broken flake and mudstone core and flake.
MAC42	Isolated find	No	Spur Crest	Site consists of one silcrete core.
MAC43 Is	olated find	No	Simple Slope (Gentle)	Site consists of one quartz core in an extensive, heavily eroded area extensive gravel cover.
MAC44 Is	olated find	No	Drainage Depression (Gentle)	Site consists of one mudstone flake.
MAC45 A	rtefact scatter	No	Ridge Crest/Ridge Line	Site consists of four silcrete flakes.
MAC46 Is	olated find	No	Ridge Crest/Ridge Line	Site consists of one mudstone flake.
MAC47 Is	olated find	No	Ridge Crest/Ridge Line	Site consists of one silcrete flake.
MAC48 Is	olated find	No	Ridge Crest/Ridge Line	Site consists of one porphyry flake.
MAC49 Is	olated find	No	Ridge Crest/Ridge Line	Site consists of one flake made from volcanic material.
MAC50 Is	olated find	No	Simple Slope (Gentle)	Site consists of one mudstone broken flake.

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Impact Assessment

74 S

6067101_RPTFinalRev01_28Aug09

Site ID	Site Type	PAD Associated with Site (Yes/No)	Archaeological Terrain Units within Site	Description of Site
MAC51 A	Artefact scatter	Yes	Drainage Depression (Level to Very Gentle)	Site consists of 11 stone artefacts, the majority of which are flakes, but includes two retouched flakes, a core and the broken butt of a backed blade. All produced from mudstone and banded mudstone, except for one silcrete retouched flake.
MAC52 Is	Isolated find	Yes	Drainage Depression (Level to Very Gentle)	Site consists of one silcrete flake.
MAC53 A	Artefact scatter	Yes	Drainage Depression (Level to Very Gentle)	Site consists of one silcrete broken flake and one silcrete shatter.
MAC54 Is	Isolated find	Yes	Drainage Depression (Level to Very Gentle)	Site consists of one mudstone flake.
MAC55 Is	Isolated find	Yes	Drainage Depression (Level to Very Gentle)	Site consists of one silcrete core.
MAC56 A	Artefact scatter	Yes	Drainage Depression (Gentle)	Site consists of one silcrete retouched flake and one flake of volcanic material.
MAC57 Is	Isolated find	Yes	Drainage Depression (Gentle)	Site consists of one quartz flake.
MAC58 Is	Isolated find	Yes	Drainage Depression (Level to Very Gentle)	Site consists of one quartz core.
MAC59 Is	Isolated find	Yes	Drainage Depression (Level to Very Gentle)	Site consists of one mudstone retouched flake.
MAC60 A	Artefact scatter	Yes	Drainage Depression (Level to Very Gentle)	Site consists of 13 stone artefacts including 11 flakes and two shatters. Raw materials include mainly mudstone, but also silcrete, quartz and volcanic material.
MAC61 A	Artefact scatter	Yes	Drainage Depression (Level to Very Gentle)	Site consists of seven artefacts including two cores, three flakes one retouched flake and one broken flake. Raw materials include mudstone, silcrete and petrified wood.

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Impact Assessment

75 S

6067101_RPTFinalRev01_28Aug09

Site ID	Site Type	PAD Associated with Site (Yes/No)	Archaeological Terrain Units within Site	Description of Site
MAC62 A	Artefact scatter	Yes	Drainage Depression (Level to Very Gentle)	Site consists of 72 artefacts including mainly flakes, with cores, broken flakes, retouched flakes, and a core tool. Material was mainly silcrete, with mudstone, quartz, petrified wood and volcanic material. Site is highly disturbed.
MAC63 A	Artefact scatter	Yes	Drainage Depression (Level to Very Gentle)	Site consists of seven artefacts including flakes, flaked pieces and a broken flake. Raw material includes mainly mudstone but also silcrete and quartzite.
MAC64 A	Artefact scatter	Yes	Drainage Depression (Level to Very Gentle)	Site consists of four artefacts including flakes, one flaked piece and one broken flake. Raw material includes mainly silcrete but also quartz.
MAC65 Is	Isolated find	Yes	Drainage Depression (Level to Very Gentle)	Site consists of one silcrete flake.
MAC66 Is	Isolated find	Yes	Drainage Depression (Level to Very Gentle)	Site consists of one mudstone flake.
MAC67 Is	Isolated find	Yes	Drainage Depression (Level to Very Gentle)	Site consists of one mudstone broken flake.
MAC68 Is	Isolated find	Yes	Drainage Depression (Level to Very Gentle)	Site consists of one silcrete flake.
MAC69 Is	Isolated find	No	Drainage Depression (Level to Very Gentle)	Site consists of one quartz flake located on a vehicle track.
MAC70 Is	Isolated find	No	Drainage Depression (Level to Very Gentle)	Site consists of one grey chert flake located on a vehicle track.
MAC71 A	Artefact scatter	Yes	Drainage Depression (Level to Very Gentle)	Site consists of 14 artefacts including eight cores and six flakes on mainly quartz material, but also silcrete, mudstone and volcanic material.

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Site ID	Site Type	PAD Associated with Site (Yes/No)	Archaeological Terrain Units within Site	Description of Site
MAC72 Is	olated find	No	Drainage Depression (Gentle)	Site consists of one mudstone retouched flake. There are also occasional quartz cobbles scattered around the area.
MAC73 Is	olated find	Yes	Simple Slope (Gentle)	Site consists of one mudstone cobble core/chipping tool.
MAC74 Is	olated find	No	Simple Slope (Gentle)	Site consists of one (coarse) mudstone retouched flake.
MAC75 A	rtefact scatter	No	Simple Slope (Gentle)	Site consists of three silcrete broken flakes.
MAC76 A	rtefact scatter	Yes	Drainage Depression (Level to Very Gentle)	Site consists of two quartz flakes and a quartz bipolar core. This site indicates the archaeological potential of the middle terrace on Ramrod Creek.
MAC77 A	rtefact scatter	Yes	Drainage Depression (Level to Very Gentle)	This site consists of six artefacts including flakes, a retouched flake (backed blade), a core and a broken flake. Raw materials were equal numbers of mudstone, silcrete and quartz.
MAC78 A	rtefact scatter	Yes	Drainage Depression (Level to Very Gentle)	Site consists of 28 artefacts including flakes, cores, retouched flakes, broken flakes and flaked pieces. Raw materials include mudstone, silcrete, quartz, grey chert and petrified wood.
MAC79 Is	olated find	No	Drainage Depression (Gentle)	Site consists of one silcrete broken flake.
MAC80 Is	olated find	Yes	Drainage Depression (Gentle)	Site consists of one silcrete broken flake.
MAC81 Is	olated find	Yes	Drainage Depression (Gentle)	Site consists of one mudstone flake.
MAC82 A	rtefact scatter	Yes	Simple Slope (Gentle)	Site consists of three cores of mudstone, silcrete and quartz.

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Site ID	Site Type	PAD Associated with Site (Yes/No)	Archaeological Terrain Units within Site	Description of Site
MAC83 A	Artefact scatter	Yes	Drainage Depression (Level to Very Gentle)	Site consists of four flakes and a broken flake of mudstone, silcrete and grey chert.
MAC84 A	Artefact scatter	No	Simple Slope (Gentle)	Site consists of two flakes and one flaked piece of mudstone and silcrete.
MAC85 A	Artefact scatter	No	Ridge Crest/Ridge Line	Site consists of one core, one flake and one broken flake, all made from silcrete.
MAC86 A	Artefact scatter	No	Ridge Crest/Ridge Line	Site consists of one mudstone flake and one broken flake of volcanic material.
MAC87 A	Artefact scatter	No	Ridge Crest/Ridge Line	Site consists of two mudstone cores and one mudstone broken flake.
MAC88 Is	Isolated find	No	Ridge Crest/Ridge Line	Site consists of one silcrete flake.
MAC89 Is	Isolated find	No	Ridge Crest/Ridge Line	Site consists of one silcrete flake.
MAC90 Is	Isolated find	No	Simple Slope (Gentle)	Site consists of one mudstone core with 80% cortex.
MAC91 PAD		Yes	Drainage Depression (Gentle)	This site consists of a PAD measuring approximately 50 x 50 m on a high terrace (above creek flats) in the confluence of 1 st and 3 rd order creeks.
MAC92 A	Artefact scatter	Yes	Drainage Depression (Level to Very Gentle)	Site consists of one silcrete flake and one mudstone retouched flake.
MAC93 A	Artefact scatter	Yes	Drainage Depression (Level to Very Gentle)	Site consists of two mudstone flakes, one silcrete flake and one chert flake.
MAC94 A	Artefact scatter	Yes	Drainage Depression (Level to Very Gentle)	Site consists of 21 artefacts: inc. 20 mudstone flakes and one silcrete flake.

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78 S

6067101_RPTFinalRev01_28Aug09

5.3.4 Stone Artefact Types

A total of 323 stone artefacts were recorded at newly identified sites during the field survey (**Table 24** and **Appendix C**).

Complete flakes were the dominant artefact type accounting for 61.9% of the total. Cores and broken flakes were the next most prevalent types accounting for 12.4% and 12.1% of the total respectively. Flaked pieces accounted for 4.6% of the total. It is also noted that these overall percentages are consistent with the percentages of artefact types found in each survey area.

One backed artefact was identified, a Bondi Point manufactured from mudstone found in the Mount Arthur survey area (**Plate 7**). A common archaeological interpretation of Bondi Point function is that they were hafted to spear shafts using resin as a bonding agent for use as hunting spears. Two hatchet heads were also identified, one in the Edderton Road and one in the Offset survey areas (**Plate 10**).

No hammer stones were identified during the survey. These implements were used to strike lithic flakes from a core and typically demonstrate use-wear on one edge where the core was struck. Tough stone, resistant to flaking, was favoured for hammerstones.

Table 24: Stone Artefacts Found Within the Survey Areas

Artefact Type	Edderton Road	Mount Arthur	Offset Area	Total
Bondi point	1			1
Broken flake		4	35	39
Cobble core/chopping tool			1	1
Core		6	34	40
Core tool			1	1
Flake		29	171	200
Flaked piece		3	12	15
Hatchet head	1 1			2
Retouched flake		5	14	19
Shatter		1	4	5
Total	1	49	273	323

5.3.5 Raw Material for Stone Artefacts

The majority of the stone artefacts in the survey areas were derived from indurated mudstone (**Table 25**) accounting for 40.2% of the total number of artefacts. Silcrete was the second most prevalent material used in the survey areas (37.4%) and quartz (13.3%). There were also minor occurrences of chert, quartzite, petrified wood, hornfels and a type of volcanic material.

The types of raw materials found are consistent with the raw materials identified in previous surveys. The relative quantities of raw material types also appear to be consistent with both of Umwelt's (2007; 2008) surveys, but are inconsistent with the results of the survey and excavation in the MAN consent area (c.f. Kuskie 1999a; Kuskie and Clarke 2004).

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Impact Assessment

79 S

6067101_RPTFinalRev01_28Aug09

Silcrete cobbles were identified at several locations including the Edderton Road area adjacent to Denman Road and in the Offset survey area around site MAC19. This site is an extensive surface scatter of un-worked silcrete gravel and cobbles, and one silcrete core was discovered here, suggesting that the site may be a silcrete quarry.

Table 25: Raw Materials Used for Stone Tool Manufacture in the Survey Areas

Raw Material	Edderton Road	Mount Arthur	Offset Area	Total
Basalt			1	1
Chert			2	2
Grey chert			3	3
Hornfels 1			1	2
Mudstone		16	114	130
Petrified wood			6	6
Porphyry			1	1
Quartz		6	37	43
Quartzite		1	2	3
Silcrete		21	100	121
Volcanic material		5	6	11
Total	1	49	273	323

5.3.6 Scarred Trees

Although the survey areas contain a modest proportion of canopy vegetation, very few mature trees were identified. Those that were found were inspected for evidence of cultural scarring. Two sites (MAC21 and MAC22) exhibited scarring and were recorded as Aboriginal scarred trees (i.e. the scars displayed the diagnostic attributes as defined by Long (2005)). Details of both trees are presented in **Table 23** above, and shown in **Plates 8** and **9**.

Both trees were situated within a gentle slope, at mid-slope, about 40 m apart.

5.3.7 Axe Grinding Grooves/Rock Engravings

The occurrence of sandstone, conglomerate or other sedimentary bedrock exposures in the survey areas also meant that axe grinding grooves/engravings were potentially in the area, but none were located. However site NPWS 37-2-0111, a set of two axe grinding grooves that were first recorded by Dyll (1981), were re-identified approximately 200 m east of the Mount Arthur survey area. These grooves are located within the proposed impact area for the mine extension, however the mine plan will be modified to ensure this site will not be disturbed by the Project (**Section 7.1.2**).

5.3.8 Other Site Types

Although the geological structure of the EA Boundary does not preclude the existence of other Aboriginal sites, none were located within the survey areas. Specifically:

- large sandstone rock outcrops occur in the Mount Arthur survey area, but no Aboriginal rockshelters were identified. Refer to erroneous AHIMS record in **Section 3.3.2**;

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Aboriginal Archaeology and Cultural Heritage
Impact Assessment

80 S

6067101_RPTFinalRev01_28Aug09

- no ceremonial/mythological sites were identified in the EA Boundary;
- a possible quarry site containing raw silcrete material for stone tool manufacture, and a silcrete core, was identified at MAC19;
- several areas where un-worked silcrete cobbles were evident on the ground surface occur along Denman Road; and
- no burial sites were identified in the survey.

5.3.9 Summary

A total of 101 Aboriginal sites were identified in the three survey areas including one in the Edderton Road survey area, 26 sites in the Mount Arthur survey area and 74 sites in the Offset survey area (consisting of 7 previously recorded sites and 67 new sites).

As shown in **Table 21** to **Table 23** the most complex assemblages (i.e. variety of artefact types and raw materials) were identified in sites MAC62, MAC78 and MAC94. All three sites were located along the high creek banks or terraces of Ramrod Creek in the Offset survey area.

The majority of sites located in the survey were isolated finds which were more prevalent on the slopes and ridges of the survey areas than in the watercourses. Artefact scatters were identified in all landforms but were most prevalent along higher order watercourses such as Ramrod Creek.

Two scarred trees – MAC21 and MAC22 – were identified in the Offset survey area. Further discussion of the site results are provided in **Section 5.4**.

5.4 Interpretation of Results and Assessment of Predictive Model

In areas where the soil is bare but not heavily eroded, surface evidence (or lack thereof) can sometimes be an unreliable guide to subsurface archaeological content. The lack of surface lithic material evident in the many surface exposures of the EA Boundary does not necessarily mean that there are no sub-surface artefacts.

5.4.1 Site Location and Artefact Numbers

Following the same methodology as Umwelt (2007; 2008) to allow comparison, **Table 26** to **Table 29** shows the results of the survey in terms of understanding the location of evidence of Aboriginal occupation within the landscape.

Sites were more prevalent along gentle drainage depressions, and most of these occurred along Ramrod Creek in the Offset survey area. In all, 51.1% of sites occurred within 50 m of a drainage depression (**Table 26**), which corresponds with the findings of previous studies and fits the predictive model in **Section 3.4.1**.

Artefact sites were generally either isolated finds or low density artefact scatters with the majority of sites containing less than 10 visible artefacts (**Table 27**). This also conforms to previous surveys such as (Umwelt 2007; 2008). However, the current survey identified no sites with more than 100 visible artefacts compared to Umwelt's (2008) survey of the MAU where 24 of the 509 site loci contained between 100 to 1000 artefacts. Umwelt (2008) concluded that the sites (loci) with the greatest artefact numbers/density were associated with the confluences of creeks or major outlooks. The results of the survey in the Offset survey area confirm these observations where the larger artefact scatters are associated with the confluences of minor tributaries and Ramrod Creek. As with previous surveys, evidence of Aboriginal occupation increases with increasing stream order.

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There is also a decline in the range of raw material within assemblages in areas more distant from watercourses such as Ramrod Creek, which correlates with the findings of Kuskie and Clarke's (2004) excavation results.

Table 28 also shows that there is a relatively equal distribution of sites in all the classes of simple slope. This is largely due to the relative percentage of each ATU in the three different survey areas (see **Table 21** to **Table 23**). For example a total of 17 sites were located on level to very gentle slopes and 12 sites were located on moderate to steep slopes. However, all the sites identified on moderate to steep slopes were located in the Mount Arthur survey area since this is the most prevalent ATU in that area and very little of this ATU occurs in the other survey areas. Likewise, all the sites identified on gentle slopes were located in the Offset survey area, which contains the majority of this ATU.

Like the MAU lands (Umwelt 2008), the ridgeline/ridge crest and spur crest terrain units contain areas of excellent visibility, particularly in the Mount Arthur survey area. However, the increased visibility did not appreciably increase the rate of artefact detection. Indeed, more sites were found on the ridgeline in the Offset survey area than in the Mount Arthur area, despite the fact that the latter provided a more substantial prospect for outlook. The ridge in the Offset survey area is much lower with more gradual associated slopes and was probably covered in relatively dense woodland vegetation offering a much reduced outlook. This fits with the predictive model whereby areas closer to the Hunter River (e.g. Offset survey area) will have more sites on ridgelines than those areas away from the river (e.g. Mount Arthur survey area).

To summarise the major artefact category identified in the survey areas were flakes, which is also consistent with previous studies and the predictive model (**Table 29**). By comparison there is a relatively low number of broken flakes compared with previous studies, especially considering the history of pastoralism in the area.

Overall, the number of artefacts at each site appears to be lower than found during previous surveys. This is probably more a function of decreased ground surface visibility due to thick pasture and shrub layer vegetation resulting from higher rainfall periods. By contrast, the previous surveys appear to have had a higher visibility because of drier conditions.

Like Umwelt's South Pit Extension Area survey (2007) and MAU survey area (2008) mudstone was found to be by far the most prevalent raw material used for stone tool manufacture. However, this is in sharp contrast to Kuskie and Clarke's (2004) excavation results which showed that silcrete was by far the most common material accounting for nearly 60% of artefacts.

Table 26: Sites and their Distance to Nearest Watercourse

Distance to Watercourse	Edderton Rd	Mount Arthur	Offset Area	Total
<50 m		9	38	47
50-100 m		6	12	18
>100 m	1	11	15	27
Total	1	26	65	92*

** the total number of stone tool artefact sites (i.e. the scarred tree sites are not included as distance from a water source is not generally considered a factor in their location).*

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Impact Assessment

82 S

6067101_RPTFinalRev01_28Aug09

Table 27: Assemblage Size

Assemblage Size Class	Edderton Rd	Mount Arthur	Offset Area	Total
<10 artefacts	1	26	58	84
10 to less than 20 artefacts			3	4
20 to less than 50 artefacts			2	2
50 to less than 100 artefacts			1	1
100 to less than 250 artefacts				0
250 to less than 500 artefacts				0
500 to 1000 artefacts				0
Total	1	26	64	91

* the total number of stone tool artefact sites (i.e. the scarred tree sites are not included).

Table 28: Distribution of Sites in Archaeological Terrain Units

Archaeological Terrain Unit	Edderton Rd	Mount Arthur	Offset Area	Total
Modified Terrain				0
Simple Slope (level to very gentle)			17	15
Simple Slope (gentle)	1			1
Simple Slope (moderate to steep)	12			12
Drainage Depression (level to very gentle)			12	12
Drainage Depression (gentle)	3		27	30
Drainage Depression (moderate to steep)	3			3
Ridge Crest/Ridge Line		5	10	15
Spur Crest/Spur		3	1	4
Total	1	26	67	94*

* the total number of sites including both stone tool artefact sites and scarred tree sites.

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Impact Assessment

Table 29: Summary of Site Type and Site Contents

	Edderton Rd	Mount Arthur	Offset Area	Total
Isolated Finds	1	14	36	51
Artefact Scatters		12	28	40
Scarred Trees			2	2
Major Category of Artefact	Hatchet Head	Flake	Flake	Flake
Major Raw Material	Hornfels	Mudstone	Mudstone	Mudstone

5.4.2 Resources

Very few areas containing rock suitable for manufacture of stone tools were noted in the survey areas. A few large silcrete cobbles were noted along the side of Denman Road adjacent to the Edderton Road survey area. A large area of silcrete cobbles together with lesser numbers of mudstone, hornfels and quartzite cobbles and gravel were located in and around site MAC19 approximately mid-slope adjacent to a gentle drainage depression. No outcrops of suitable knapping material were observed.

Sources of raw material for stone tools have been identified in the local area:

- a silcrete quarry on Bengalla ML across the Hunter River from the Mt Arthur Coal (Rich 1993);
- silcrete occurs as cobbles and fragments along the edge of the Hunter floodplain, including throughout Bengalla;
- sources of terrestrial and alluvial silcrete include boulders and cobbles occurring in gravels of the Hunter River and its tributaries (Kuskie and Clarke 2004: 405);
- ochre cake was identified on the banks of Saddlers Creek (Umwelt 2008) and on a spur between Saddlers Creek and Mount Arthur within the South Pit Extension Area (Umwelt 2007);
- mudstone is commonly found within the Upper Hunter Valley with cobbles and gravels occurring within the gravels of the Hunter River and Goulburn River (e.g. at Jerrys Plains); and
- several sources of terrestrial and alluvial mudstone were identified in the MAN consent areas (Kuskie 1999a; Kuskie and Clarke 2004).

No other resources suitable for Aboriginal use were identified in the survey areas, although it is likely that Ramrod Creek provided a reliable source of fresh water and fish and/or eels prior to post-European land practices disturbing the integrity of the creek.

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Impact Assessment

84 S

6067101_RPTFinalRev01_28Aug09

6.0 Significance Assessment

This section provides an assessment of the Aboriginal heritage significance of the survey areas within a local, regional and national framework. This section can be divided into three distinct parts:

- a scientific (archaeological) assessment, which is usually undertaken by an archaeologist and investigates the scientific importance of the sites identified. For this study the scientific assessment comprised all 94 Aboriginal sites listed in **Section 5.3**.
- an Aboriginal cultural assessment of social value is provided by discussions and input from the relevant Aboriginal stakeholders. For this study, all recorded sites were assessed; and
- an overall assessment based on the combined scientific and cultural heritage values, which is summarised in **Table 30**.

In addition a revised significance assessment is made for sites likely to be impacted by the Project within the EA Boundary, in order to make a comparative analysis with sites identified in this survey.

The significance assessment presented here is based on criteria and requirements outlined in NPWS (1997) *Cultural Heritage Standards and Guidelines Kit*, which themselves are based on the Burra Charter⁶.

6.1 Principles of Assessment

Heritage sites, objects and places hold value for communities in many different ways. Not all sites are equally significant and not all are worthy of equal consideration and management (Pearson and Sullivan 1995: 7). The nature of heritage values is an important consideration when deciding how to manage a heritage site, object or place and balance competing land-use options. The many heritage values are summed up in an assessment of "Cultural Significance".

The primary guide to management of heritage places is the Burra Charter, which defines cultural significance as follows:

Cultural significance means aesthetic, historic, scientific, social or spiritual value for past, present or future generations.

Cultural significance is embodied in the place itself, its fabric, setting, use, associations, meanings, records, related places and related objects.

Places may have a range of values for different individuals or groups.

This assessment has sought to identify Aboriginal heritage objects and sites within the EA Boundary and obtain enough information to allow the values of those objects and sites to be determined.

⁶ The Burra Charter – the Australia ICOMOS (International Council on Monuments and Sites) Charter for Places of Cultural Significance – was developed in South Australia in 1979, and considers an assessment of cultural significance needs to include aesthetic, historic, scientific and/or social values.

6.2 Scientific (Archaeological) Value

Scientific value is assessed primarily according to the research potential of a site. However a number of other criteria also need to be considered including *representativeness*, *rarity*, *educational potential* and *aesthetic significance*.

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 Upper Hunter region the key research issues revolve around the chronology of Aboriginal occupation and variability in stone artefact manufacturing technology. Sites with certain backed implements from the Holocene are very common, but sites with definite Pleistocene evidence are extremely rare, and hence of extremely high significance if found.

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

- can the site contribute knowledge which no other resource can?
- is the knowledge relevant to general questions about human history or other substantive subjects?

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.

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

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 (see **Section 3.3**).

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 which provide information on an established research question. Low significance is attributed to sites which 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.

6.3 Approaches to Scientific Significance Assessment

6.3.1 The Landscape Approach

The scientific significance assessment approach used in this assessment used a largely quantitative and qualitative methodology based on the premise that heritage significance is embodied in the *physical evidence* of Aboriginal activity and occupation within the landscape. As archaeologists, we are mostly concerned with the material evidence that is evidence of that activity and occupation. The importance of landscape elements is secondary to the physical evidence.

Conversely, the landscape approach places primary importance on the landscape elements within a given area, suggesting that the landscape itself is the item of heritage significance. This is the approach that was used in Kuskie's (1999) assessment of the MAN survey area. This methodology makes the assumption that because one location in a given ATU was used for a particular activity, then the rest of the ATU was also used for the same type of activity to the same extent. This is a problematical approach because it can be demonstrated that large areas of a given ATU contains neither physical evidence nor any likelihood of subsurface deposits. Furthermore, a single site (loci) with large numbers of artefacts or tool types may bias the total numbers or types for the ATU, e.g. where the majority of site loci consist of a single stone artefact, but one loci contains many artefacts.

The approach also creates problems in terms of comparability of significance values with the majority of other surveys where significance is assessed on a site basis. For example several sites/loci within the existing West of Edderton Road HMZ contain fewer than six artefacts, all of relatively common type and raw material, and yet were afforded a high level of local scientific significance because they were located on an ATU that was considered to have high local scientific significance.

For this reason, this assessment uses a combination of systematic quantitative assessment, together with an overall qualitative assessment based on the actual physical evidence of sites within the survey areas and the proposed impact areas in this Project.

6.3.2 Methodology for Quantitative Assessment of Scientific Significance

The sites identified in the current survey were assessed using a numerical value system to rate their significance at the local and regional level⁷. This method mirrored the methods used in Umwelt (2008: 8.11-8.12) so as to provide a measure of comparability with that and the other surveys (Kuskie 1999a; Umwelt 2006). However it should be noted that this is an unorthodox method of assessment and, although it does not reflect current guidelines, has been accepted as a methodology in more recent surveys. The numeric system ignores the fact that a site may be of high significance for one value only, with other values "low-scoring." Each site was assigned a numerical value for each significance criterion:

- low significance = 1;
- moderate significance = 2;
- high significance = 3.

The definitions of low, moderate and high significance for each criterion is provided in **Appendix D**.

The criterion values for each site could then be summed to provide an overall significance value, which Umwelt (2008) assigned thus:

⁷ For the purposes of this assessment local significance relates to the area within the EA Boundary; regional significance relates to the wider upper Hunter Valley region.

- low significance = 12-15;
- low to moderate significance = 16-19;
- moderate significance = 20-23;
- moderate to high significance = 24-27; and
- high significance = 27+

In attributing significance values, the following principles were adopted:

Local vs Regional

- if a site had low local archaeological significance for any criteria then this aspect of the site was also deemed to be low at the regional level; and
- if the site was assessed as having moderate or high local archaeological significance it was then assessed against other sites known from the experience of AECOM archaeologists and from the literature in the broader Hunter Valley.

High Significance Values

- unlike Umwelt's (2008) assessments that afforded high overall scientific significance only to sites that scored 27 or greater, in the current survey all sites that received a value of 3 for any significance criterion (except potential for deposit) was automatically afforded high overall significance, because it is recognised that a site may be highly significant for only one criterion (i.e. it does not have to rate highly against all criteria); and
- sites that received scores of 3 in the criterion "potential for archaeological deposit" were automatically given a moderate-high overall significance rating. Unlike other criterion, scores of 3 in this criterion were rated lower overall because the observation is subjective only, i.e. not based on any material evidence.

The results of the assessment are presented in **Appendix D, Table 51**, and discussed in detail below. A summary of the results for scientific significance values is shown in **Table 30**.

6.3.3 Research Potential

This refers to the potential of a particular site or group of sites to answer questions about the past through the use of archaeological methodologies. It concerns the potential to interpret past behaviour, rather than simply being a route to champion particular methodologies or to facilitate the recovery of large artefact collections.

The NPWS (1997) *Cultural Heritage Standards and Guideline Kits* further suggest that this section needs to consider the integrity of sites, connectivity to other sites, and the potential for providing a chronology.

The EA Boundary revealed a total of 94 previously unrecorded Aboriginal archaeological sites. The majority of these sites were isolated finds (52.1%) followed by artefact scatters (42.6%) with two additional isolated finds associated with PAD, indicating that more than 95% of sites in the EA Boundary are stone artefact assemblages or "open sites". Scarred trees form only 2.1% of sites, with the remaining site consisting of a PAD only. These overall figures are typical of the general site distribution patterning revealed by archaeological surveys in the Hunter Valley.

The research potential of the open sites has been compromised by the following:

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- the soils and geomorphology indicate that the landscape has undergone erosive processes with sheet erosion common throughout the landscape, and gully, stream bank and rill erosion also evident. These processes, including soil creep and deflation, have in places truncated the soil profiles sometimes to the B horizon, thus affecting archaeological integrity; and
- land use such as pastoralism, with the associated impacts of vegetation clearing, tracks, dam construction, fencing, and general rural activities, may have further compromised the integrity of Aboriginal sites within the EA Boundary, although subsurface deposits are often only minimally affected by farming practices.

Only a few of the sites in the survey areas were considered to have further research potential. These were MAC16, MAC51, MAC54, MAC55, MAC60, MAC61, MAC62, MAC63, MAC64, MAC71, MAC76, MAC77, MAC78, MAC83, MAC94, which consist of a higher concentrations (for the EA Boundary) of artefacts potentially coming from intact subsurface deposits. While the provenance of the artefacts could not be clearly made due to their distribution in areas of erosion (sheetwash, stream bank, rills, gullies and/or disturbed animal track/ant nests) should they originate from subsurface origins, there is potential for both stratigraphic/temporal information and technological information. Sites with stratigraphic integrity are rare in the Hunter Valley (HLA 2007: 44) and can contribute considerably to the chronology and past use of this area.

Furthermore, as can be seen in **Figure 14**, there is a higher proportion of higher density artefact scatters concentrated along virtually the entire length of Ramrod Creek, and particularly around confluences with its tributaries. This points to higher-use activity areas with potential connectivity between sites, although lack of chronological sequence data hampers the determination of connectivity (see **Section 6.3.7**).

The two scarred trees found in the Offset survey area may contribute to research potential based on their relative rarity in the Hunter Valley region (see **Section 6.3.4**). Scarred trees typically imply an activity is occurring in the area – day to day (e.g. canoe building or *koolaman* making).

The remaining sites are commonly found in the Hunter Valley, and hence have little potential to provide technological and tool information for the local and regional area. Those sites that were felt to provide potential for further research opportunities are presented as moderate-high in **Table 30** based on this and additional criteria outlined below.

6.3.4 Rarity

The criterion of rarity reflects whether the nature of the archaeological site being investigated is common or rare.

MAC21 and MAC22 (both identified in the EA Boundary) are scarred trees that were assessed as having high significance for rarity on both a local and regional scale, despite the scars being heavily decayed. Scarred trees are rare in the Hunter Valley due to historical and current land practises (HLA 2007: 44). Only five other scarred trees were identified in the EA Boundary – a scarred tree within the MAU survey area (Umwelt 2008) and four in the Bayswater No. 3 ML (**Figure 7**). Therefore they are considered to be of high local and regional value (**Table 30**). MAC15 and MAC24 contain stone hatchet heads that are also considered rare in the region.

The majority of the remaining sites located during this survey are not considered rare, although several sites – MAC19, MAC48 and MAC51 exhibited characteristics that were not evident elsewhere in the survey areas. These sites were assessed as having moderate significance on a rarity basis. The survey areas, in general, contain sites that are commonly found during archaeological surveys in the Hunter Valley – namely isolated finds and low-density artefact scatters.

In summary, 90 (95.7%) of the previously unrecorded sites identified during the current survey are commonly found within the Hunter Valley and as such do not represent 'rare' sites. The fact that the landscape has been adversely impacted by erosion, land practices and minor construction activities further compromises the rarity of the EA Boundary and the archaeological sites found within it, aside from those mentioned above.

6.3.5 Representativeness

This category has primary meaning in the context of conservation objectives. In defining a site as 'representative' of a particular type or class, we are seeking to assess whether it should be conserved in order to ensure that we retain a representative sample of the archaeological record as a whole.

The 94 sites listed in **Section 5.3** (excluding the scarred trees MAC21 and MAC22) are open sites consisting of isolated finds or low-density artefact scatters, although MAC62, MAC78 and MAC94 are higher-density artefact scatters compared to the rest of the EA Boundary and have potential to be representative of sub-surface deposits. However, this site type is commonly found within the Hunter Valley. They are, therefore, well-represented in the local and regional picture.

Notable exceptions include the Aboriginal scarred trees MAC21 and MAC22, as these are not common in the Hunter Valley today, largely as a consequence of historical pastoralism and associated vegetation clearance, and more recently through large-scale open-cut mining activities (HLA 2007: 44).

Sites that are not common in the region are represented in moderate or higher categories in **Table 30**.

6.3.6 Archaeological Integrity

The criterion archaeological integrity provides an evaluation of the degree to which a site has been disturbed by natural or human-caused disturbance. Sites with minimal disturbance are more likely to contain intact and in situ subsurface archaeological material, which can provide a higher level of information about site formation processes and cultural sequences and behaviours than sites that have been disturbed by erosion, bioturbation and/or human disturbance such as pastoralism, timber-getting, mining and other settlement or industrial land use.

Sites MAC16, MAC17, MAC27, MAC32, MAC54, MAC55, MAC57, MAC58, MAC59, MAC60, MAC61, MAC62, MAC63, MAC64, MAC71, MAC73, MAC77, MAC78, MAC82, MAC83, MAC93 and MAC94 were assessed as having moderate significance in a local context and largely low significance in a regional context because:

- site location is situated along high order streams on high creek banks in areas that are typically associated with higher artefact densities and therefore interpreted as favoured locations for repeated camping;
- sites are higher density artefact scatters suggesting the presence of subsurface archaeological deposits resulting from open camp sites, rather than accidental or deliberate discard areas; and/or
- erosion forces at these sites appear to be less destructive than elsewhere in the survey areas.

All other sites in the survey areas were assessed as having low significance for archaeological integrity due to:

- higher levels of disturbance from erosion, where large components of the soil's A horizon have been removed; and/or

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Impact Assessment

90 S

6067101_RPTFinalRev01_28Aug09

- higher levels of ant activity are evident and bioturbation, or movement of subsurface artefacts within the soil profile as a result of animal activity, has altered the integrity of the site; and/or
- in the case of the scarred trees, the damage by decay and weathering has reduced the amount of information that may have been obtained.

6.3.7 Connectivity

The criterion of connectivity refers to the relationship between the archaeological sites within an area. This criterion is often difficult to apply for surface sites because the chronological sequence of use of a site cannot be established without further subsurface testing. Therefore connectedness must be established between other features within sites and/or assemblages or between sites and/or their assemblages. For example it may be possible to establish a connection between a local raw material quarry with a stone axe head of the same material, and further establish a connection with a nearby set of axe grinding grooves.

However, it is problematic to simply use features of an assemblage (e.g. artefact type or raw material), their location in the landscape (e.g. same landform element or terrain unit), or behaviours (reduction strategies, activity areas) to establish connectedness. This is because sites may be used over several thousand years and establishing that two sites were used during the same time period is difficult from surface surveys alone. It could be reasonably surmised that all archaeological sites in an area are in some way connected. It is only when a distinctive trait is present between two or more sites that connectedness could be said to contribute to a site's significance.

Within the survey area, all open sites were assessed as having low significance for connectedness on both a local and regional level. The scarred trees – MAC21 and MAC22 – were also assessed as having low significance for connectedness on a local and regional scale.

6.3.8 Complexity

The complexity of a site is an indication of its ability to contribute information about the local Aboriginal culture, and may be a function of the site's size (number of artefacts and/or spatial extent), the number of different raw materials used and their source, the number and types of features (e.g. stone artefacts, scarred trees and grinding grooves) and the reduction strategies and/or knapping methods used.

The artefact scatter sites MAC61, MAC62, MAC71, MAC77, MAC78 and MAC94 were assessed as having moderate significance for complexity within a local context and of low significance in a regional context. This assessment is based on:

- all six sites have a diversity of artefact types and raw materials; and
- all six sites have potential to retain a complex and largely intact subsurface assemblage.

All other sites were assessed as having low significance for complexity within a local and regional context because:

- the sites contain very low numbers of artefacts and raw material types; and/or
- there is little likelihood of intact or sufficient subsurface artefacts to be present to increase the complexity of the site.

No sites were assessed as having high significance value for complexity.

6.3.9 Educational Potential

This refers to the potential of a site or suite of sites to educate the general public about the Aboriginal past. While there is clearly research potential with the possible presence of stratified sites (e.g. MAC62, MAC78 and MAC94), their education potential to the general public is relatively limited.

The identified sites are not rockshelters containing art or extensive engravings; they are, in most cases, artefactual material situated on or in disturbed contexts, and while interesting to those within the heritage industry and significant to Aboriginal communities, they are of limited value to engage the interest of the general public. Furthermore, the sites within the Mount Arthur survey area are situated within the Mt Arthur Coal's mining leases and OH&S and security requirements make public access to these sites problematic.

The sites found in the Offset survey area are outside the Mt Arthur Coal mining lease and are therefore more readily accessible, particularly to members of the local Aboriginal community.

While there is moderate research potential in places, the education potential of these sites to the general public is limited.

6.3.10 Aesthetic Significance

Aesthetic significance is generally taken to mean the visual qualities of a place. This value is not considered to be 'inherent' in a place but arises from people's individual perception of a particular place. Furthermore, different cultures can have very different expectations of what constitutes an 'aesthetically pleasing' aspect of a site or landscape.

While this report has discussed the scarred trees from a scientific perspective they also demonstrate some local aesthetic significance.

From an archaeological and earth science perspective, the EA Boundary has been impacted by previous land use and processes that have adversely impacted aesthetic values.

6.4 Assessment

6.4.1 Quantitative Assessment

The sections above discuss the significance of the more interesting sites located during the assessment of the survey areas. Assessments of each site, based on a quantitative system similar to previous Umwelt surveys in the EA Boundary, are presented in **Appendix C**. A summarised table showing the classification assigned to each site is presented in **Table 30**.

To summarise, the scientific (archaeological) significance assessment identified four sites as having high scientific significance. Two sites – MAC21 and MAC22 – are scarred trees and two sites – MAC15 and MAC24 – are stone hatchet heads. The significance rating is based on the rarity of their type in the region and their potential for research value. All four sites are considered to have high significance in the local context and moderate significance in the regional context.

Fourteen sites (14.9%) were assessed as having a moderate-high local scientific significance (**Table 30**) based on the criteria discussed in **Section 6.3.2** due to their assessment as having high potential for intact archaeological deposit. These sites were all artefact scatters having higher numbers of stone artefacts and/or higher degree of complexity (i.e. artefact types and/or raw material types), and were all located on the high creek banks of Ramrod Creek within the level to very gentle drainage depression ATU. It should be noted that these sites did not rate highly in other significance criterion and were manually attributed moderate-high significance rather than as a result of the calculation system.

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Six of the 94 sites (or 6.4%) were considered to have low-moderate significance (**Table 30**), largely due to their potential for subsurface deposits, although their integrity could not be considered as high such as those discussed above due to the effects of erosion.

The remaining 70 sites (or 74.4%) were considered to have low scientific significance being unable to provide any satisfactory values to the required criteria (outlined above), or showing association or connectivity to other sites of moderate or high significance (**Table 30**).

Table 30: Summary of Scientific Significance Assessment for the EA Boundary

Significance Assessment	Site ID Number
High MAC15	, MAC21, MAC22, MAC24
Moderate-High	MAC51, MAC54, MAC55, MAC60, MAC61, MAC62, MAC63, MAC64, MAC71, MAC76, MAC77, MAC78, MAC83, MAC94
Moderate Ni	I
Low-Moderate	MAC 16, MAC19, MAC27, MAC57, MAC58, MAC93
Low	All other sites, except those listed above.

6.4.2 Qualitative Assessment

This sub-section provides a qualitative assessment of the scientific significance values of the survey areas.

Edderton Road Survey Area

The Edderton Road Survey Area contains a single stone artefact that is rare within both the local and regional context. There was no PAD considered to be evident anywhere within the survey area. The individual site is considered to have high local and regional significance, but the survey area itself is not considered to hold any specific heritage values.

Mount Arthur Survey Area

The Mount Arthur survey area comprises approximately 86 ha of generally moderate-steeply undulating landscape with deeply incised drainage lines contiguous with the existing Mount Arthur North West Slopes HMZ to the north and the proposed Mount Arthur CA to the south.

The Mount Arthur survey area contains sites that are generally comprised of isolated stone artefacts or very low density artefact scatters comprising stone tool types, raw materials and manufacturing methods that are commonly found throughout the Upper Hunter Valley. Of interest though, is that artefact sites were located on steeply sloping terrain, a landform that is not considered common for Aboriginal open camp sites. However, the majority of sites are isolated finds and are interpreted as discards rather than intense activity areas.

The landscape elements and site types of this survey area are considered to be adequately conserved in the adjacent proposed Mount Arthur CA.

Offset Survey Area

The Offset survey area is a 495 ha area that is located outside Mt Arthur Coal's mining lease area and is not subject to future mining activity. It encompasses a large area of contiguous landscape that encompasses approximately twelve of the 74 representative environmental/cultural contexts defined by Kuskie for the MAN ML (although some of his environmental/cultural contexts could not be directly

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Aboriginal Archaeology and Cultural Heritage
Impact Assessment

93 S

6067101_RPTFinalRev01_28Aug09

translated to the Offset survey area due to geographic and geomorphological separation from the MAN survey area. For example, several of Kuskie's contexts relate directly to ridges between Mount Arthur and the Hunter River or related to the Whites Creek Valley flat).

The Offset survey area is considered to have significant Aboriginal cultural heritage values based on the following attributes:

- the area contains sites that are rare (e.g. scarred trees) or sites that have rare features (e.g. hatchet heads) in both the local and regional context;
- the area contains a contiguous extent of archaeological deposit associated with Ramrod Creek and evidenced by extensive and continuous expressions of surface archaeological evidence, particularly on the high terrace side of the creek;
- the area contains a sample of extensive silcrete raw material scatter. Whilst similar scatters of indurated mudstone were observed across the MAN landscape (Kuskie 1999a), little will be retained under the development consent;
- the area represents a contiguous landscape containing most representative types of ATU and landform element contained within the EA Boundary;
- the area is not contained within a mining lease. Therefore the area can be conserved for Aboriginal cultural heritage values with little likelihood of future mining; and
- the area offers a more flexible opportunity for members of the Aboriginal community to access Aboriginal sites without the inherent risks and stringent security/safety considerations within the mining lease areas.

The Offset survey area is considered to offer a suitable alternative conservation offset in place of the three existing HMZ's and further disturbance (see below).

6.5 Management Areas - Heritage

This section provides a description of heritage management areas within the EA Boundary. These areas consist of:

- 1 Conservation Areas that are currently being negotiated;
- 2 areas that were originally proposed for conservation by Kuskie (1999a); and
- 3 Heritage Management Zones that were subsequently created.

This will then be used as a basis for assessing the relative significance of the existing HMZs with the proposed Offset survey area.

6.5.1 Conservation Areas

There are two Conservation Areas proposed within the EA Boundary.

- 1 ***Proposed Mount Arthur Conservation Area:*** The Mount Arthur Conservation Area was proposed as part of the MAN Archaeological and Cultural Heritage offset to preserve the Aboriginal cultural heritage values of this area. As part of the South Pit Extension Project EA, a commitment was made to extend the Conservation Agreement to include the protection of Mount Arthur's ecological values.

The Mount Arthur Conservation Area is significant in terms of both Aboriginal cultural heritage and biodiversity.

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Aboriginal Archaeology and Cultural Heritage
Impact Assessment

The Wanaruah Local Aboriginal Land Council, on behalf of local Aboriginal groups, observes that “the area surrounding and including Mount Arthur has great cultural and social significance to the Aboriginal people of the area and was an important cultural and economic transit way for thousands of years. Local Aboriginal groups also observe that Mount Arthur itself was a site used for teaching, was within easy walking distance of several significant sites and ceremonial grounds, and is in close proximity of the song line between the Hunter Valley and the coast”.

The Mount Arthur Conservation Area is also significant in terms of biodiversity. The area contains Critically Endangered Ecological Communities, habitat for threatened species and its relatively undisturbed forest provides unique habitat features such as rock crevices. The proximity of the Saddlers Creek Conservation Area enhances the value of the Mount Arthur Conservation Area for mobile species that roost in forest and woodland, but forage over creeks and water sources.

The development of a Conservation Agreement is currently underway to preserve the Aboriginal cultural heritage and ecological values of the Mount Arthur Conservation Area in perpetuity.

- 2 **Saddlers Creek Conservation Area:** The Saddlers Creek Conservation Area was initially proposed as part of the South Pit Extension as a Heritage Management and Conservation Area, although this is not a condition of approval or described in the Statement of Commitments. In the MAU EA, the existing Saddlers Creek Conservation Area was extended for ecological purposes. A Conservation Agreement, as required by the MAU Project Approval will be entered to protect this area.

The Saddlers Creek Conservation Area includes the main riparian channel of Saddlers Creek, which houses threatened vegetation communities and species.

The riparian vegetation along the creek also provides habitat for several threatened fauna species and a known population of the threatened listed Tiger Orchid.

The Saddlers Creek Conservation Area is significant in terms of Aboriginal heritage, as water sources such as Saddlers Creek, were common places of activity and recreation, to which local Aboriginal groups hold in great significance.

6.5.2 Conservation Zones Proposed By Kuskie (1999)

Kuskie (1999a) proposed the creation of three new management areas to conserve representative samples of Aboriginal cultural heritage to offset the impacts of the (then) proposed MAN mine. The three management areas consisted of the following:

- 1 **MAN Edderton Road Conservation Zone (MER):** an area of approximately 122 ha (3.4% of MAN mining lease application area) recommended by Kuskie (1999a). It was nominated because it was considered to offer the only feasible area within the MAN area that could conserve a representative sample of Aboriginal heritage whilst allowing the mine to proceed in an economically viable manner. This zone was not nominated specifically for its ability to conserve objects/sites or even landscape elements of high heritage value. It conserved eight of the 74 representative environmental/cultural contexts defined by Kuskie. This conservation zone was created under the MAN development consent as the Edderton Road HMZ (see below);
- 2 **Bayswater Edderton Road Conservation Zone (BER):** an area of approximately 21 ha located at Bayswater No. 3 west of Edderton Road and approximately 1 km south of MER. This conservation zone was not subsequently created;

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Aboriginal Archaeology and Cultural Heritage
Impact Assessment

95 S

6067101_RPTFinalRev01_28Aug09

- 3 **Bayswater Saddlers Creek Conservation Zone (BSC):** an area of approximately 323 ha also located at Bayswater No. 3 around Saddlers Creek. Although this conservation zone was not created in its intended form, parts of the proposed zone were subsequently incorporated into the Saddlers Creek CA.

Specific heritage values for the two proposed Bayswater conservation zones were not given. The two zones did not occur on MAN lands and exhibited several notable differences in cultural evidence with MAN (Kuskie 1999a: 201). These differences related chiefly to the lower level of previous survey undertaken on the Bayswater lease and consequently the lower extent of survey coverage, number of identified sites and number of surface artefacts. Furthermore, MAN demonstrated a higher proportion of evidence along ridge and spur crests, but again this may be due to limitations of early survey coverage. BER and BSC combined were intended to conserve a sample of 24 of the 74 representative environmental/cultural contexts within MAN.

From this it can be inferred that Kuskie (1999) considered that the general heritage significance values of the majority of the MAN area were not sufficient to warrant conservation of sites within MAN if alternative offsets could be established. Kuskie (1999: 203) stated that:

...the evidence (taken as a whole) is not considered to be of sufficient scientific significance or uniqueness to warrant its total conservation, notwithstanding that specific elements of the evidence are significant within local and/or regional contexts and the future study of this evidence may yield valuable information that cannot be obtained from other sources. Therefore, the conservation and/or salvage of a representative sample of this evidence is warranted.

He considered that the conservation of representative samples within the main study area was a feasible option if the Project was to proceed as planned.

6.5.3 Existing Heritage Management Zones

As stated, the two proposed Bayswater conservation zones were not subsequently created. Instead, as part of the MAN development application process, three HMZs were established for the MAN project.

Since the three HMZs occur in the MAN survey area the heritage values of the three HMZs need to be extrapolated from data provided in Kuskie's (1999a) report. However, a comparative analysis of Kuskie's data and the current study becomes problematical. The significance assessment for the Offset survey area (**Section 6.3.2**) used a similar approach to that used by Kuskie (1999a) and Umwelt (2007, 2008). It should also be noted that direct comparison between any of those survey areas is problematical due to the different definitions of what constitutes an Aboriginal site (see **Section 2.2.3**). Further problems arise due to Kuskie (1999) using his significance assessment of entire ATUs as a basis for assessing the significance of individual sites. The significance of each ATU used in Kuskie's assessment is provided in **Appendix E**.

Therefore, for the purposes of comparison Kuskie's data have been reassessed below on a loci basis. The assessment of significance values below is based on a combination of AHIMS data analysis, landscape assessment and review of artefactual material as described in the MAN EIS (Kuskie 1999a). The identification of sites using AHIMS data alone is problematic due to the method of using point-form coordinates to identify a site. Since Kuskie used a landscape approach to site identification where whole survey areas were defined as sites, the AHIMS coordinates are not necessarily representative of the location of material evidence at a site. Furthermore, many sites have components that occur outside the boundary of the HMZs and therefore the site loci are assessed in lieu of sites.

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Aboriginal Archaeology and Cultural Heritage
Impact Assessment

96 S

6067101_RPTFinalRev01_28Aug09

- **Macleans Hill HMZ:** consists of an area of approximately 139 ha situated adjacent to Denman Road on the northern boundary of MAN. This area was not originally nominated as a conservation area by Kuskie (1999a) but was created under the terms of the MAN development consent. The HMZ was not chosen because of its heritage values, but because it was an area that, at the time of the development consent, was not intended for mining as part of the MAN project. Therefore its inclusion as a HMZ is somewhat arbitrary.

A search of the AHIMS database shows that the HMZ contains a total of 12 registered Aboriginal sites, all of which were identified during Kuskie's (1999a) survey (**Figure 15**). However, assessment of the MAN EIS indicates that a total of 14 Aboriginal sites (48 site loci) are within the HMZ (**Table 32**)⁸. Macleans Hill HMZ contains a total of six of the 74 representative environmental/cultural contexts within MAN⁹. The HMZ consists of a generally gently undulating landscape with gentle slopes and drainage depressions on the southern faces and moderately steep slopes and drainage depressions facing the Hunter River floodplain to the north. Artefactual evidence consists of isolated stone artefacts¹⁰ or generally low density artefact scatters consisting of stone tools of types, and raw materials that are typically found in the Upper Hunter Valley. Three sites – CC117, PK117 and PK125 – have slightly higher numbers of stone artefacts and higher proportions of tool types and raw materials.

However, none of the sites are considered to be especially complex or retain a high degree of integrity. Two of the sites, CC117 and PK117, are located on gentle slopes and drainage lines, but PK125 is located on a ridge crest with a good outlook over the Hunter Valley floodplain.

After reassessment, AECOM considers that these three sites have locally moderate-high scientific significance based on their potential for subsurface deposits. All other sites are considered to have low local scientific significance because they are commonly found within the local and regional context.

- **West of Edderton Road HMZ:** consists of an area of approximately 131 ha, and is essentially the same area as nominated by Kuskie (1999a) in the MAN EIS. The area is also known as Edderton Road 1 (Umwelt 2007, 2008). Like the other two HMZs, this area was not chosen specifically for its heritage values, but because it was in an area that was not intended for mining at the time of the MAN development consent. However, its location was intended to conserve "environmental/contextual contexts, presumably representing different patterns of occupational utilisation" (Kuskie 1999a: 179).

The HMZ contains a total of 13 registered Aboriginal sites, 11 of which were identified during Kuskie's (1999) survey (**Figure 16, Table 33**). The west of Edderton Road HMZ contains a total of eight of the 74 representative

⁸ The discrepancy between the AHIMS database results (**Figure 15**) and the MAN EIS results is accounted for by the unconventional method of site definition using disparate loci in one site. For example, 37-2-1656 (MB41) is shown to be well outside the HMZ in Figure . However, the majority of loci are within the HMZ. The AHIMS grid coordinate is taken in the centre of the 'site', which is outside the HMZ.

⁹ The environmental/cultural contexts are interpreted as meaning a combination of ATUs with cultural sub-contexts as defined by Kuskie (1999).

¹⁰ The MAN EIS (Kuskie 1999a) did not differentiate isolated finds from artefact scatters. All sites were identified as artefact scatters.

environmental/cultural contexts within MAN. The HMZ consists of a generally gently undulating landscape with valley flat occurring along the margins of Edderton Road and associated with the Hunter Valley floodplain in the north of the HMZ, fading to gentle slopes and drainage depressions to the south and west of the HMZ.

Artefactual evidence consists of isolated stone artefacts or generally low density artefact scatters consisting of stone tools of types, and raw materials that are typically found in the Upper Hunter Valley.

Five sites – CC1, LS1, LS5, PK1 and PK7 – have slightly higher numbers of stone artefacts and higher proportions of tool types and raw materials (**Table 33**). However, none of the sites are considered to be especially complex or retain a high degree of integrity. Three of the sites are located on gentle slopes and valley flats, but PK7 is located in a moderately steep drainage line, which is considered to be unusual for such a large site.

After reassessment, AECOM considers CC1, LS1, LS5 and PK1 to have locally moderate-high scientific significance based on their potential for subsurface deposits and PK7 is considered to have locally high significance based on its potential for subsurface deposit and unusual location within a moderately steep drainage line. All other sites are considered to have low local scientific significance because they are commonly found within the local and regional context.

- **Mount Arthur North West Slopes Heritage Management Zone:** consists of an area of approximately 138 ha, and is not an area that was originally nominated by Kuskie (1999a) in the MAN EIS. The area is also known as Edderton Road 2 (Umwelt 2007, 2008). Like the other two HMZs, this area was not chosen specifically for its heritage values, but because it was an area that, at the time of the development consent, was not intended for future mining. Therefore its designation as a HMZ is somewhat arbitrary.

A search of the AHIMS database shows that the HMZ contains a total of 16 registered Aboriginal sites, 11 of which were identified during Kuskie's (1999a) survey (**Figure 16**). However, assessment of the MAN EIS indicates that a total of 13 Aboriginal sites (48 site loci) are within the HMZ (**Table 34**)¹¹.

The HMZ consists of a generally gentle to moderately undulating landscape with gentle to moderately steep drainage lines and spurs tending northwards off the slopes of Mount Arthur to the south. The southern boundary of this HMZ is contiguous with the northern boundary of the Mount Arthur survey area inspected during this assessment. The Mount Arthur North West Slopes HMZ contains a total of five of the 74 representative environmental/cultural contexts within MAN.

Artefactual evidence consists of isolated stone artefacts or generally low and moderate density artefact scatters consisting of stone tools of types, and raw materials that are typically found in the Upper Hunter Valley.

Four sites – MB57, MB58, MB59 and PK36 – have slightly higher numbers of stone artefacts and higher proportions of tool types and raw materials (**Table 34**). MB57 and MB59 have relatively complex assemblages in terms of the types of stone

¹¹ The discrepancy between the AHIMS database results (**Figure 15**) and the MAN EIS results is accounted for by the unconventional method of site definition using disparate loci in one site. For example, 37-2-1656 (MB41) is shown to be well outside the HMZ in Figure . However, the majority of loci are within the HMZ. The AHIMS grid coordinate is taken in the centre of the 'site', which is outside the HMZ.

tools and the raw materials used. All four sites occur in gentle terrain, either in drainage depressions or on simple slopes.

After reassessment, AECOM considers MB58 and PK36 to have locally moderate-high scientific significance based on their potential for subsurface deposits. MB57 and MB59 are considered to have locally high significance based on their potential for subsurface deposit retaining relatively intact and complex assemblages. All other sites are considered to have low local scientific significance because they are commonly found within the local and regional context.

To summarise, the existing HMZs contain a combined area of 408 ha conserved as offsets to the MAN development for the duration of the MAN project. The three HMZ were not originally selected for their heritage values but rather because they were in areas that were not due to be impacted by mining under the terms of the original development consent. The significance of the HMZ was originally based on a landscape approach to significance assessment, which is considered to be problematic.

The three HMZ contain a combined total of 40 Aboriginal sites comprised of 111¹² site loci (equivalent to 'sites' in this assessment), calculated from the number of sites in the MAN EIS listed in **Tables 31-33**. A revised significance assessment based on the more common sites-based approach shows that of the 40 sites, nine are considered to have moderate-high local significance and three are considered to have high local significance. However, it should be noted that in most cases the sites comprised of several loci, which, by themselves retain correspondingly less complex assemblages than when taken as a whole site. Therefore on a site (loci) by site (loci) basis, sites are considered to have less significance.

Table 31 provides a tabulated comparison of the existing HMZs with the proposed Offset area.

Table 31: Comparison of Existing Heritage Management Zones with Proposed Offset Area

Item	Macleans Hill HMZ	Eddertonn Road HMZ	North West Slopes HMZ	Total HMZs	Offset Area
Area (ha)	139	131	138	408	495
No. of sites	14 (55 loci)	13 (30 loci)	13 (26 loci)	40 (111 loci)	74*
No. sites (H)**	0	1	2	3	4
No. sites (M-H)**	3	4	2	9	14
No. sites (M)**	0	0	0	0	0
No. sites (L-M)**	0	0	0	0	6
No. sites (L)**	11	8	9	28	70
No. scarred tree sites	0 0 0			0	2
No. grinding groove sites	0 0 0			0	0

¹² The number of site loci consists of the total number of site loci listed in **Tables 31-33**, which includes the actual site loci identified by Kuskie (1999) (108 loci) and previously identified sites that do not have loci (n=3). For the purposes of this assessment, the latter are treated as loci, bringing the total loci to 111.

Item	Macleans Hill HMZ	Eddertonn Road HMZ	North West Slopes HMZ	Total HMZs	Offset Area
No. representative contexts	6 8 5			Avg 6.3	12

* includes seven previously recorded sites and 67 new sites.

** H = High significance; M-H = moderate-high significance; M = moderate significance; L-M = low-moderate significance and L = low significance. The significance ratings are taken from the revised significance assessment in this report rather than Kuskie's (1999a) original significance ratings which were based on significance of ATUs rather than individual sites.

6.6 Social (Cultural) Value

Aspects of social significance are applicable to sites, items and landscapes that are important or have become important to the local Aboriginal community. The importance involves both traditional links with specific areas as well as an overall concern by Aboriginal people for sites generally and their continued protection.

Aboriginal sites with archaeological evidence are all of value to the Aboriginal community because they represent a tangible connection with pre-European Aboriginal life. For this reason, we often report what we perceive to be the social value of a site to the Aboriginal community based on their comments and advice.

Representatives from 26 registered Aboriginal stakeholder groups were consulted regarding the cultural heritage values of the EA Boundary as a whole and the survey areas in particular (refer **Section 4.0**). Preliminary requests for information on cultural heritage values did not elicit any formal response. However, the Aboriginal community themselves are in the best position to identify levels of cultural significance. A copy of this draft report was distributed to the Aboriginal communities involved in the Project. Their values, both social and cultural, have been incorporated into this report where possible.

It should also be noted that the statement of scientific significance below does not take priority over cultural values or lessen the importance of the views of the Aboriginal community.

6.6.1 Assessment

Few comments were received from members of the Aboriginal community regarding the cultural heritage values of the EA Boundary. Several groups acknowledged verbally, either on fieldwork or in subsequent meetings, that the Mount Arthur area held cultural heritage significance for Aboriginal people. Few groups responded in writing with any assessment of cultural heritage values either generally, or for specific sites within the EA Boundary. Written correspondence is provided in **Appendix B**. Specific written comments include:

Wanaruah Local Aboriginal Land Council

In its response to the draft of this report, dated 23 July 2009, WLALC made the following comments regarding the cultural heritage values of the area:

"The area surrounding and including Mount Arthur has great cultural and social significance to Aboriginal peoples of this area. 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. It should also be noted that this area is within easy walking distance of several significant sites and ceremonial grounds. It is also situated in very

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Aboriginal Archaeology and Cultural Heritage
Impact Assessment

100 S

6067101_RPTFinalRev01_28Aug09

close the [sic] proximity of the song line between the Hunter valley and the Coast. This very important cultural and economic transit way was in use for thousands of years.

Aboriginal Cultural heritage is not limited to the relics and art that have survived the impact of European settlement. It is a living culture and includes landforms, water holes, vegetation zones, habitats and peoples.

WLALC did not provide specific comment on the significance values of individual sites within the EA Boundary, or the scientific significance assessment presented in the draft report.

Yinaar Cultural Services

In its response to the potential for relocation of the Saddlers Pit grinding grooves to another Keeping Place dated 10 July 2009, YCS stated that:

“Yinaar Cultural Services recommend that the Saddlers Pit grinding grooves are of high cultural significance.”

YCS did not provide specific comment on the significance values of any other individual site within the EA Boundary, or the scientific significance assessment presented in the draft report.

Cacatua Culture Consultants

In its review of the draft of this report dated 2 July 2009, CCC found that the “*proposed impact on significant items is high due to the expansion of Mt Arthur...*” No further clarification was made.

In its response to the potential for relocation of the Saddlers Pit grinding grooves to another Keeping Place dated 2 July 2009, CCC stated that the grinding grooves should be left in situ because:

“...the location is just as significant as the grooves. This location we feel should be gazette[d], as the large number of grooves in such a small area gives the impression that the place was of high significance to the aboriginal's inhabitation [sic].”

CCC did not provide specific comment on the significance values of any other individual site within the EA Boundary, or the scientific significance assessment presented in the draft report.

6.7 Aboriginal Heritage Significance

This section presents the *Aboriginal Heritage Significance* of the EA Boundary. This significance assessment can be considered a combination of the scientific and cultural values, or an overview of the importance of a particular area through Aboriginal heritage sites and places. The subsequent retention or manipulation of these values will be the rationale behind the management strategy presented in **Section 9.0**.

Due to the limited input from registered Aboriginal stakeholders regarding the cultural (social) significance of the EA Boundary, the significance assessment is based on the archaeological (scientific) assessment presented in **Section 6.4** and **Table 30** for new sites identified in this study, in **Section 6.5.3, Table 32 to Table 34** for heritage management zones, and in **Section 7.0, Table 35 to Table 40** for sites within the EA Boundary impacted by the Project.

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Aboriginal Archaeology and Cultural Heritage
Impact Assessment

102 S

6067101_RPTFinalRev01_28Aug09

Environment

Table 32: Aboriginal Sites Recorded within the Macleans Hill Heritage Management Zone

Site Name	Site Loci	AHIMS Site No. (DECC)	Site Type	ATU	No. of Artefacts	No. of Artefact Types	No. of Raw Material Types	Scientific Significance Rating (Kuskie 1999a)	Revised Scientific Significance Rating
CC112	A, B, C, D	37-2-1601	Open Camp Site	Mod. Drainage depression	9 3		3	mod/low-mod	low
CC113	A, B, C	37-2-338	Open Camp Site	Mod. Simple slope	3	2	1	mod-high/mod	low
CC114 (*MAN85)	A, B, C, D	37-2-1603	Open Camp Site	Mod. Simple slope	6	2	2	mod-high/mod	low
CC116	A	37-2-1605	Open Camp Site	Gentle drainage depression	1 1		1	high/mod	low
CC117	A, B, C, D, E, F, G, H, I, J, K	37-2-1606	Open Camp Site	Gentle drainage depression	74 6		3	high/mod	mod-high
CC118	A, G, B, C	37-2-1607	Open Camp Site	Gentle drainage depression	<25 3		3	high/mod	low
CC119	A, D	37-2-1608	Open Camp Site	Gentle drainage depression 2	1	4	2	high/mod	low
CC120	A	37-2-1609	Open Camp Site	Gentle drainage depression 3		1	2	high/mod	low
MB41	A, B, D, E, F, G, H, J, L	37-2-1656	Open Camp Site	Mod. Simple slope	6	2	2	mod-high/mod	low
PK117	A, B, C, D	37-2-1738	Open Camp Site	Gentle simple slope	<45 1	0	2	mod-high	mod-high
PK119	A, B	37-2-1740	Open Camp Site	Gentle drainage depression	4 4		2	high/mod	low

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103 S

Aboriginal Archaeology and Cultural Heritage Impact Assessment
6067101_RPTFinalRev01_28Aug09

Site Name	Site Loci	AHIMS Site No. (DECC)	Site Type	ATU	No. of Artefacts	No. of Artefact Types	No. of Raw Material Types	Scientific Significance Rating (Kuskie 1999a)	Revised Scientific Significance Rating
PK121	B, C, D, E	37-5-1742	Open Camp Site	Gentle ridge crest	<13	4	4	mod-high/low-mod	low
PK122	A, B	37-2-1743	Open Camp Site	Level ridge crest	<9	4	3	mod/low-mod	low
PK125	A, B, C, D	37-2-1744	Open Camp Site	Gentle ridge crest	<40	5	3	mod-high/low-mod	mod-high

Table 33: Aboriginal Sites Recorded within the West of Edderton Road Heritage Management Zone

Site Name	Site Loci	AHIMS Site No. (DECC)	Site Type	ATU	No. of Artefacts	No. of Artefact Types	No. of Raw Material Types	Scientific Significance Rating (Kuskie 1999a)	Revised Scientific Significance Rating
CC1	A, B, C, E, F, G	37-2-1839	Open Camp Site	Gentle simple slope	<125 5		2	mod-high/low-mod	mod-high
LS1	A, B, C, D	37-2-1622	Open Camp Site	Level valley flat	<13	5	4	high/mod	mod-high
LS5	A, B, C, D, E	37-2-1623	Open Camp Site	Gentle simple slope	<100 6		3	mod-high/low-mod	mod-high
MB1	A	37-2-1629	Open Camp Site	Level flat	1	1	1	mod/low-mod	low
MB2	A	37-2-1630	Open Camp Site	Gentle drainage depression	1 1		1	high/mod	low
PK1	A	37-2-1672	Open Camp Site	Gentle simple slope	15 7		4	high/mod	mod-high
PK2	A, B	37-2-1673	Open Camp Site	Gentle drainage depression	15 2		2	high/mod	low

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Aboriginal Archaeology and Cultural Heritage Impact Assessment

104 S

6067101_RPTFinalRev01_28Aug09

Site Name	Site Loci	AHIMS Site No. (DECC)	Site Type	ATU	No. of Artefacts	No. of Artefact Types	No. of Raw Material Types	Scientific Significance Rating (Kuskie 1999a)	Revised Scientific Significance Rating
PK3	A, B	37-2-1674	Open Camp Site	Gentle drainage depression 1		1	1	high/mod	low
PK4	A	37-2-1675	Open Camp Site	Gentle drainage depression 4		3	1	high/mod	low
PK6	A	37-2-1676	Open Camp Site	Gentle drainage depression 3		3	3	high/mod	low
PK7	A, B, C, D	37-2-1677	Open Camp Site	Mod. Drainage depression	100 9		5	mod/low-mod	high
Fairford 6	(not given)	37-2-0132	Open Camp Site	(not given)	N/A	N/A	N/A	(not given)	low
Fairford 2	(not given)	37-2-0118	Open Camp Site	(not given)	N/A	N/A	N/A	(not given)	low

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Table 34: Aboriginal Sites Recorded within the Mount Arthur North West Slopes Heritage Management Zone

Site Name	Site Loci	AHIMS Site No. (DECC)	Site Type	ATU	No. of Artefacts	No. of Artefact Types	No. of Raw Material Types	Scientific Significance Rating (Kuskie 1999a)	Revised Scientific Significance Rating
CC9	A, B	37-2-1552	Open Camp Site	Mod. Drainage depression	6 3		2	mod/low-mod	low
CC10	A	37-2-1553	Open Camp Site	Mod. Simple slope	1 1		1	mod/high mod	low
CC11	A	37-2-1554	Open Camp Site	Mod. Drainage depression	3 2		1	mod/low-mod	low
CC12	A	37-2-1555	Open Camp Site	Gentle simple slope	1 1		1	mod-high	low
MB53	A, B	37-2-1663	Open Camp Site	Mod. Drainage depression	2 2		2	mod/low-mod	low
MB56	A	37-2-1664	Open Camp Site	Mod. Drainage depression	1 1		1	mod/low-mod	low
MB57	A, B, C, D, E, F, G	37-2-1665	Open Camp Site	Gentle drainage depression	172 1	0	9	high/mod	high
MB58	A, B, C, D	37-2-1666	Open Camp Site	Mod. Drainage depression	28 5		2	mod/low-mod	mod-high
MB59	A, B	37-2-1667	Open Camp Site	Gentle drainage depression	142 1	2	4	high/mod	high

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106 S

Aboriginal Archaeology and Cultural Heritage Impact Assessment

6067101_RPTFinalRev01_28Aug09

Site Name	Site Loci	AHIMS Site No. (DECC)	Site Type	ATU	No. of Artefacts	No. of Artefact Types	No. of Raw Material Types	Scientific Significance Rating (Kuskie 1999a)	Revised Scientific Significance Rating
PK35 (Mount Arthur)	A	37-2-0128	Open Camp Site		N/A	N/A	N/A	mod/low-mod	
PK36	A	37-2-1696	Open Camp Site	Gentle spur crest	23 7		3	Mod-high/moderate	mod-high
PK40	A, D	37-2-1697	Open Camp Site	Level ridge crest	9	4	4	mod/low-mod	low
PK43	A	37-2-1699	Open Camp Site	Mod. Simple slope	2	1	1	mod/high mod	low

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7.0 Impact Assessment

This section provides an assessment of the impacts of the Project on the cultural heritage values of the EA Boundary.

7.1 Extensions to Mine Footprint

The Project consists of five major impact areas including four extensions to the open cut mining areas and the development of an overburden emplacement area (**Figure 15** to **Figure 17**). The five Mine Extension Areas consist of the following:

- Mine Extension Area 1 (Macleans Hill);
- Mine Extension Area 2 (along the western side of MAN);
- Mine Extension Areas 3 and 4 (located near Saddlers Pit); and
- Mine Extension Area 5 (Overburden Emplacement Area).

7.1.1 Mine Extension Area 1

The Mine Extension Area 1 covers an area of approximately 139 ha between Denman Road and the northern edge of the MAN pit. This extension area will directly impact the majority of the Macleans Hill HMZ (**Figure 15**), refer **Section 7.5.1**.

A total of 26 Aboriginal sites (with 100 loci) previously recorded as part of the MAN archaeological survey (Kuskie 1999) will be impacted by the proposed extension to the Macleans Hill area. **Table 35** below provides a list of those Aboriginal sites and includes a significance rating for each as assigned by Kuskie (1999). However, a review of AHIMS shows only 18 sites will be impacted (**Figure 15**). The discrepancy is caused by the unorthodox method of site definition used by Kuskie (1999) and the single-point grid coordinate required by AHIMS. For example, site 37-2-1612 appears to be outside the disturbance area (**Figure 15**); however it is an extensive 'site' as defined by Kuskie with several disparate loci spread across the landscape, five of which occur within the disturbance area. The number of sites shown in **Table 35** is a more accurate representation than the number of sites shown in **Figure 15**.

Table 35: Aboriginal Sites Impacted by the Proposed Mine Extension Area 1

Site Name	Site Loci	AHIMS Site No. (DECC)	Site Type	Significance Rating (Kuskie 1999a)	Within HMZ?
CC112	A, B, C, D	37-2-1601	Open camp site	Mod-high/low-mod	Yes
CC113 A,	B, C	37-2-1602	Open camp site	Mod-high/mod	Yes
CC114 (*MAN85)	A, B, C, D	37-2-1603 37-2-0329	Open camp site	Mod-high/mod	Yes

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Aboriginal Archaeology and Cultural Heritage
Impact Assessment

109 S

6067101_RPTFinalRev01_28Aug09

Site Name	Site Loci	AHIMS Site No. (DECC)	Site Type	Significance Rating (Kuskie 1999a)	Within HMZ?
CC115 A,	B, C	37-2-1604	Open camp site	Mod-high/low-mod	Yes (according to Kuskie's mapping but AHIMS co-ordinates place it outside)
CC116 A		37-2-1605	Open camp site	High/mod Yes	
CC117	A, B, C, D, E, F, G, H, I, J, K	37-2-1606	Open camp site	High/mod Yes	
CC118	A, B, C, D, E, F, G	37-2-1607	Open camp site	High/mod Yes	
CC119	A, B, C, D	37-2-1608	Open camp site	High/mod Yes	
CC120 A		37-2-1609	Open camp site	High/mod Yes	
CC121	A, B, C, D, E, F	37-2-1610	Open camp site	Mod-high/low-mod	No
CC124 (*MAN83)	A, B, C, D, E, F	37-2-1612 37-2-0327	Open camp site	Mod-high/low-mod	Partially within HMZ
CC125 (*MAN82, MAN84, MAN86)	A, B, C, D	37-2-1566 37-2-0328 37-2-0326 37-2-0330	Open camp site	High-mod	Partially within HMZ
MB41	A, B, D, E, F, G, H, J, L	37-2-1656	Open camp site	Mod-high/mod	Partially within HMZ
MB43	A, B, C, D	37-2-1657	Open camp site	Mod/high mod	No
MB45 A		37-2-1658	Open camp site	Mod/high mod	Partially within HMZ
MB46	A, B, C, D, F	37-2-1659	Open camp site	Mod/high mod	Partially within HMZ
PK116	D, E, G	37-2-1737	Open camp site	Mod-high	Partially within HMZ
PK121	B, C, D, E	37-2-1742	Open camp site	Mod-high/low-mod	Yes
PK122 A	, B	37-2-1743	Open camp site	Mod/low-mod Yes	
PK125	A, B, C, D	37-2-1744	Open camp site	Mod-high/low-mod	Yes

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Aboriginal Archaeology and Cultural Heritage
Impact Assessment

Site Name	Site Loci	AHIMS Site No. (DECC)	Site Type	Significance Rating (Kuskie 1999a)	Within HMZ?
PK126 A,	C, E	37-2-1745	Open camp site	Mod-high/low-mod	Partially within HMZ
PK127 A		37-2-1746	Open camp site	Mod-high/low-mod	Partially within HMZ
PK128 A		37-2-1747	Open camp site	Mod-high/mod No	
PK129 A		37-2-1748	Open camp site	Mod/low-mod	Partially within HMZ
PK117	A, B, C, D, E, F	37-2-1738	Open camp site	High/mod	Partially within HMZ but not in impact area
PK119 A	, B	37-2-1740	Open camp site	High/mod	Within HMZ but not in impact area

*AHIMS sites located within Kuskie's (1999) defined loci.

** Kuskie's significance ratings are presented as local significance/regional significance.

7.1.2 Mine Extension Area 2

Mine Extension Area 2 covers an area of approximately 1,200 ha extending from the western edge of the current MAN pit towards Edderton Road in the north west and Bayswater No. 3 mine in the south west. This extension will directly impact a small section of the Edderton Road HMZ (**Section 7.5.2**), the majority of the Mount Arthur North West Slopes HMZ (**Section 7.5.3**) and small sections of the Mount Arthur survey area (**Figure 16**). The southern extent of the extension area borders, but does not encroach, the Mount Arthur CA.

A total of 66 Aboriginal sites will be impacted by the proposed Mine Extension Area 2. This is comprised of 55 sites (with 202 loci) previously recorded as part of the MAN archaeological survey (Kuskie 1999a) and a further 11 sites that were recorded in the Mount Arthur survey area as part of this assessment. **Table 36** below provides a list of those Aboriginal sites and includes a significance rating for each as assigned by Kuskie (1999) and AECOM (2009). In addition a further five sites within the Edderton HMZ, whilst not directly within the footprint of the impact area, are considered to be at risk.

Table 36: Aboriginal Sites Impacted by the Proposed Mine Extension Area 2

Site Name	Site Loci	AHIMS Site No. (DECC)	Site Type	Significance Rating (Kuskie 1999a)	Within HMZ?
CC1	A, B, C, E, F, G	37-2-1839	Open camp site	Mod-high/low-mod	Edderton
CC2 A,	B, C	37-2-1549	Open camp site	Mod-high/low-mod	No
CC4 A,	B, C	37-2-1546	Open camp site	Mod/low No	

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Aboriginal Archaeology and Cultural Heritage
Impact Assessment

Site Name	Site Loci	AHIMS Site No. (DECC)	Site Type	Significance Rating (Kuskie 1999a)	Within HMZ?
CC7(*MAN54)	A, B, C, D, E, F	37-2-1550	Open camp site	Mod/low-mod No	
CC8	A, B, C, D, E, F, G, H, J, K, L	37-2-1551	Open camp site	Mod-high/low-mod	No
CC9 A,	B	37-2-1552	Open camp site	Mod/low-mod NW	Slopes
CC10 A		37-2-1553	Open camp site	Mod-high/mod NW	Slopes
CC11 A		37-2-1554	Open camp site	Mod/low-mod NW	Slopes
CC12 A		37-2-1555	Open camp site	Mod-high/low-mod	NW Slopes
CC15	A, B, C, D, E	37-2-1556	Open camp site	Mod/low-mod No	
LS1 A,	B, C, D	37-2-1622	Open Camp Site	High/mod E	dderton
LS5	A, B, C, D, E	37-2-1623	Open Camp Site	Mod-high/low-mod	Edderton
MB1 A		37-2-1630	Open Camp Site	Mod/low-mod	Edderton
MB2 A		37-2-1631	Open Camp Site	High/mod	Edderton
MB5 A		37-2-1631	Open camp site	High/mod No	
MB7 (*MAN60)	J, K, L, M, N, O, P, R, S	37-2-1632	Open camp site	Mod-high/low-mod	No
MB53 A,	B	37-2-1663	Open camp site	Mod/low-mod NW	Slopes
MB56 A		37-2-1664	Open camp site	Mod/low-mod NW	Slopes
MB57(*MAN51, MAN50, MAN49, MAN52, MAN53, Fairford3, MountArthur)	A, B, C, D, E, F, G, H, I, J, K, L, M	37-2-1665	Open camp site	High/mod NW	Slopes
MB58	A, B, C, D	37-2-1666	Open camp site	Mod/low-mod NW	Slopes
MB59 A,	B	37-2-1667	Open camp site	High/mod NW	Slopes

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Impact Assessment

Site Name	Site Loci	AHIMS Site No. (DECC)	Site Type	Significance Rating (Kuskie 1999a)	Within HMZ?
MB62 (*MAN58, MAN61)	A, B, C, D, E, F, G, H, I	37-2-1668	Open camp site	Mod-high/low-mod	No
MB66 (*MtArthur, MAN56)	A, B, C, D, E	37-2-1671	Open camp site	Mod-high/low-mod	No
PK1 A		37-2-1672	Open camp site	High/mod E	dderton
PK2 A,	B	37-2-1673	Open Camp Site	High/mod E	dderton
PK3 A,	B	37-2-1674	Open Camp Site	High/mod E	dderton
PK4 A		37-2-1675	Open Camp Site	High/mod E	dderton
PK6 A		37-2-1676	Open Camp Site	High/mod E	dderton
PK7 A,	B, C, D	37-2-1677	Open Camp Site	Mod/low-mod E	dderton
PK8 (*MAN70)	A, B, C, D, E, F, G, H, I, J, K, L, M, N, O, P	37-2-1678	Open camp site	Mod-high/low-mod	No
PK10 A,	B, C, D	37-2-1679	Open camp site	Mod/low-mod No	
PK35 A		37-2-0128	Open camp site	Mod-high/low-mod	No
PK36 A		37-2-1696	Open camp site	Mod-high/mod NW	Slopes
PK40 A,	B, C, D	37-2-1697	Open camp site	Mod/low-mod NW	Slopes
PK42 A,	B, C, D	37-2-1698	Open camp site	Mod-high/low-mod	No
PK43	A, B, C, D, E, F, G	37-2-1699	Open camp site	Mod-high/mod NW	Slopes
PK44 A		37-2-1700	Open camp site	Mod/low-mod No	
PK143 (*Eden Valley)	A 3	7-2-1754	Open camp site	Mod/low-mod No	
PK144 A		37-2-1755	Open camp site	Mod/low No	

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Aboriginal Archaeology and Cultural Heritage
Impact Assessment

113 S

6067101_RPTFinalRev01_28Aug09

Site Name	Site Loci	AHIMS Site No. (DECC)	Site Type	Significance Rating (Kuskie 1999a)	Within HMZ?
PK151 (*MAN65, MAN64, MAN63, MAN62, Fairford 4)	A, B, C, E, F, G, H, I, J, K	37-2-1761	Open camp site	Mod-high/mod No	
PK152	A, B, C, E, F, G, J	37-2-1762	Open camp site	High/mod No	
PK163 (*MAN59)	A, B, C, D, E, F, G, H, I, J	37-2-1771	Open camp site	High/mod No	
PK164 A,	B, C, D	37-2-1772	Open camp site	High/mod No	
RP114	A, B, C, D, E	37-2-1836	Open camp site	High/mod No	
RP115	A, B, C, D, E	37-2-1837	Open camp site	High/mod No	
RP116	A, B, C, D, E	37-2-1838	Open camp site	Mod/low No	
BC7 (*Fairford 1)	A 3	7-2-0111	Axe grinding grooves	Mod/low-mod No	
BC8 A		37-2-1855	Open camp site	Mod/low-mod No	
BC9 A		37-2-1854	Open camp site	Mod/low-mod No	
BC12 A		37-2-1858	Open camp site	Mod/low-mod No	
BC15 A		37-2-1857	Open camp site	Mod/low-mod No	
BC17 A		37-2-1856	Open camp site	Mod-high/low- mod	No
BC18 A		37-2-1859	Open camp site	Mod/low-mod No	
Fairford 6	(not given)	37-2-0132	Open camp site	(not given)	Edderton
Fairford 2	(not given)	37-2-0118	Open camp site	(not given)	Edderton
MAC1	Not Applicable***	-	Open camp site	low No	
MAC2	Not Applicable***	-	Open camp site	low No	

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Impact Assessment

Site Name	Site Loci	AHIMS Site No. (DECC)	Site Type	Significance Rating (Kuskie 1999a)	Within HMZ?
MAC3	Not Applicable***	-	Open camp site	low No	
MAC4	Not Applicable***	-	Open camp site	low No	
MAC5	Not Applicable***	-	Open camp site	low No	
MAC6	Not Applicable***	-	Open camp site	low No	
MAC7	Not Applicable***	-	Open camp site	low No	
MAC8	Not Applicable***	-	Open camp site	low No	
MAC9	Not Applicable***	-	Open camp site	low No	
MAC10	Not Applicable***	-	Open camp site	low NW	Slopes
MAC11	Not Applicable***	-	Open camp site	low NW	Slopes

*AHIMS sites located within Kuskie's (1999a) defined loci.

** Kuskie's significance ratings are presented as local significance/regional significance.

*** Sites identified during this survey. Site loci were not used during this survey. Note also, that significance assessments for these sites should be differentiated from significance ratings of sites assessed by Kuskie (1999a).

All sites in this impact zone are open camp sites (consisting of isolated finds or artefact scatters) that are commonly found in the Upper Hunter Valley, with the exception of a set of axe grinding grooves located at the head of a creek on the northern slopes of Mount Arthur and just east of the Mount Arthur survey area. This site (BC7/Fairford 1; #37-2-0111) was originally recorded by Dyll (1980) and was re-inspected during the field survey as part of this Project. The site consists of two axe grinding grooves approximately 1 m apart on sandstone bedrock. Several small artefact scatters are located in the surrounding area. Specific management strategies are proposed for this site and are detailed in **Section 9.5.2**.

7.1.3 Mine Extension Areas 3 and 4

The Mine Extension Areas 3 and 4 comprises two small areas (approximately 12.5 ha and 25 ha in area respectively) adjacent to the southern boundaries of the Bayswater No. 3 and South Pit extension areas (**Figure 16**). These extension areas lie within the MAU archaeological survey boundary (Umwelt 2008), and are adjacent to the proposed Saddlers Creek CA.

A total of two previously recorded Aboriginal sites will be impacted by the proposed extension to the Saddlers Pit area. **Table 37** below provides a list of those Aboriginal sites.

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Aboriginal Archaeology and Cultural Heritage
Impact Assessment

115 S

6067101_RPTFinalRev01_28Aug09

Table 37: Aboriginal Sites Impacted by the Proposed Mine Extension Areas 3 and 4

Site Name	Site Loci	AHIMS Site No. (DECC)	Site Type	Significance Rating
JF/MJS3	Unspecified (Umwelt 2007)	37-2-2236	Open camp site	(not given)
HR10	Not Applicable	37-2-0759	Open camp site	(not given)

Source: Umwelt (2006); AHIMS database.

7.1.4 Mine Extension Area 5

In addition, an area of approximately 375 ha on the south western side of Bayswater No. 3 is proposed for an overburden emplacement area (**Figure 17**). **Table 38** below provides a list of Aboriginal sites located as part of the MAU archaeological survey (Umwelt 2007) and AHIMS registered sites (not listed in Umwelt 2007) that will be directly impacted by the Project. The list contains a total of eight previously recorded Aboriginal sites (with 46 loci). There are no conservation areas impacted or adjacent to the proposed overburden emplacement area, however the proposed Saddlers Creek CA lies approximately 500 m to the south.

Table 38: Aboriginal Sites Impacted by the Proposed Mine Extension Area 5

Site Name	Site Loci	AHIMS Site No. (DECC)	Site Type	Significance Rating
SC02	1/1 3	7-2-2619	Artefact scatter	Low
	1/2 3	7-2-2619	Artefact scatter	Low
	3/1 3	7-2-2619	Isolated find	Low
	4/1 3	7-2-2619	Artefact scatter	Low
	4/2 3	7-2-2619	Isolated find	Low
	9/1 3	7-2-2619	Artefact scatter	Low
	9/2 3	7-2-2619	Artefact scatter	Low
	10/1 3	7-2-2619	Artefact scatter	Low
	10/2 3	7-2-2619	Artefact scatter	Low
	11/1 3	7-2-2619	Artefact scatter	Low
	12/1 3	7-2-2619	Artefact scatter	Low
SC03	1/1	(not listed)	Isolated find	Low
	1/2	(not listed)	Isolated find	Low
	1/3 (not	listed)	Artefact scatter	Low
	2/1	(not listed)	Isolated find	Low
	3/1	(not listed)	Isolated find	Low
	3/3	(not listed)	Isolated find	Low
	4/1 (not	listed)	Artefact scatter	Low
SC05 (*McDonald's Pit Dump Site)	1/1 3	7-2-1427	Isolated find	Low

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Impact Assessment

Site Name	Site Loci	AHIMS Site No. (DECC)	Site Type	Significance Rating
	½ 3	7-2-1427	Artefact scatter	Low
	1/3 3	7-2-1427	Artefact scatter	Low
	1/4 3	7-2-1427	Artefact scatter	Low
	1/5 3	7-2-1427	Artefact scatter	Low
	1/6 3	7-2-1427	Isolated find	Low
	1/7 3	7-2-1427	Isolated find	Low
	2/1 3	7-2-1427	Artefact scatter	Low
	2/2 3	7-2-1427	Isolated find	Low
	3/1 3	7-2-1427	Artefact scatter	Low
	3/2 3	7-2-1427	Artefact scatter	Low
	5/1 3	7-2-1427	Isolated find	Low
	6/1 3	7-2-1427	Artefact scatter	Low
	6/2 3	7-2-1427	Artefact scatter	Low
	7/1 3	7-2-1427	Isolated find	Low
	8/1 3	7-2-1427	Isolated find	Low
	9/1 3	7-2-1427	Isolated find	Low
	10/1 3	7-2-1427	Artefact scatter	Low
	10/2 3	7-2-1427	Isolated find	Low
	11/1 3	7-2-1427	Artefact scatter	Low
	12/1 3	7-2-1427	Isolated find	Low
	13/1 3	7-2-1427	Artefact scatter	Low
	13/2 3	7-2-1427	Isolated find	Low
SC06 (*McDonald's Pit 2)	2/1 3	7-2-1426	Artefact scatter	Low
	2/2 3	7-2-1426	Artefact scatter	Low
	2/3 3	7-2-1426	Artefact scatter	Low
SC25 (*BMP 4; Jerrys Plain)	1/1 3	7-2-0503	Isolated find	Low
SC26 (*LFE1_(McDonalds Pit Dump Site)	1/1 3	7-2-2657	Artefact scatter	Low
HR2	(not in Umwelt 2008)	37-2-0751 Op	en camp site	(not in Umwelt 2008)
LFE1_(McDonalds Pit Dump Site)	(not in Umwelt 2008)	37-2-0709 Op	en camp site	(not in Umwelt 2008)

*AHIMS sites located within Umwelt's (2008) defined loci.

**Site no's recorded as 'not listed' have not been allocated AHIMS site numbers.

Source: Umwelt (2008: Figures 6.2 and 7.3c; Appendix 6, Table 1); AHIMS database.

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Aboriginal Archaeology and Cultural Heritage
Impact Assessment

117 S

6067101_RPTFinalRev01_28Aug09

7.2 Relocation of Edderton Road

Due to the proposed Mine Extension Area 2 encroaching upon the existing Edderton Road easement and adjacent West of Edderton Road HMZ, it is proposed that the northern section of Edderton Road be realigned further to the west to allow unimpeded open cut mining. The new alignment will occur from (approximately) the east-west ridgeline between Mt Ogilvie and Bayswater No. 3, northwards to meet Denman Road on the Mt Arthur Coal owned property "Windmill".

Currently there are two options being considered for the realignment. Both options use the Edderton Road survey area inspected during this assessment. The realigned easement covers an area of approximately 82.5 ha in total for the option 1 alignment route. This consists of approximately 37 ha of the Edderton Road survey area and approximately 45.5 ha of land previously surveyed as part of the MAU archaeological survey (Umwelt 2008). A similar land area would be impacted for the option 2 alignment.

A total of three Aboriginal sites (comprising seven loci) will be impacted by the relocation of Edderton Road (Option 1), comprising two previously recorded sites (six loci) within the MAU survey area and one site recorded during the survey of the Edderton Road in this assessment (**Table 39**). All previously recorded sites are typical isolated artefacts or open camp sites with typical assemblages found in the Upper Hunter Valley. Both sites are considered to be of low scientific significance (Umwelt 2008). The site (MAC15) within the Edderton Road survey area is considered to have high scientific significance for its rarity in the region, however no other artefacts were found in the location and no PAD was identified for the site (**Figure 9**).

Table 39: Aboriginal Sites Impacted by the Proposed Edderton Road Realignment (Option 1)

Site Name	Site Loci	AHIMS Site No. (DECC)	Site Type	Significance Rating
QC07	1/1 3	7-2-2603	Artefact scatter	Low
	2/1 3	7-2-2603	Artefact scatter	
	2/2 3	7-2-2603	Isolated find	
	3/1 3	7-2-2603	Isolated find	
	4/1 3	7-2-2603	Artefact scatter	
	4/2 3	7-2-2603	Artefact scatter	
QC16 1/1		37-2-2612	Isolated find	Low
MAC15 N/	A	N/A	Isolated find	High

Source: Umwelt (2008: Figures 6.2 and 7.3c; Appendix 6, Table 1); AHIMS database; current survey.

A total of three recorded Aboriginal sites will be impacted by the relocation of Edderton Road (Option 2) (**Table 40**). These sites were recorded prior to the Umwelt (2008) survey of the MAU.

Table 40: Aboriginal Sites Impacted by the Proposed Edderton Road Realignment (Option 2)

Site Name	Site Loci	AHIMS Site No. (DECC)	Site Type	Significance Rating
*MAN87	Not Applicable	37-2-0331	Open camp site	(not given)
*Quarry Creek	Not Applicable	37-2-0117	Open camp site	(not given)
*LDD1	Not Applicable	37-2-0685	Open camp site	(not given)

*not listed in Umwelt (2008)

Source: AHIMS database.

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Aboriginal Archaeology and Cultural Heritage
Impact Assessment

7.3 Second Rail Loading Facility and Conveyors

These facilities will be constructed within areas previously assessed under the MAN EIS by Kuskie (1999). The lands have been subject to intense disturbance for mine infrastructure development. There is unlikely to be any impacts to Aboriginal cultural heritage values as a result of these works.

7.4 Modifications to Existing Mine Infrastructure

These modifications will be made to existing mine infrastructure within areas previously assessed under the MAN EIS by Kuskie (1999). The lands have been subject to intense disturbance for mine infrastructure development. There is unlikely to be any impacts to Aboriginal cultural heritage values as a result of these works.

7.5 Heritage Management Zones

As described in **Sections 3.5** and **6.5.3**, three HMZ's were established under the MAN development consent in 2001. Analysis of Kuskie's (1999) site distribution maps indicate that a total of 13 Aboriginal sites occur wholly within the three HMZs and another 32 sites occur partially within these areas¹³. Under the MAN development consent and existing MAN Aboriginal Cultural Heritage Management Plan, there is no requirement or intention to conserve these sites in the long term (Umwelt 2002: 10). The Project will impact all three HMZ's.

7.5.1 Macleans Hill Heritage Management Zone

The majority of the Macleans Hill HMZ will be impacted by the proposed Mine Extension Area 1 as part of the Project (**Figure 15**). All Aboriginal sites within the HMZ (listed in **Table 32**) with the exception of site 37-2-1738 (PK117) will be impacted. **Table 35** lists all those Aboriginal sites that will be impacted by the proposed Mine Extension Area 1, including those within the Macleans Hill HMZ. The list contains 25 previously recorded Aboriginal sites (with 97 loci) that will be impacted by the proposed Mine Extension Area 1.

7.5.2 West of Edderton Road Heritage Management Zone

The Project will encroach into the West of Edderton Road HMZ (**Figure 16**). **Table 33** provides a list of all the sites within the HMZ and **Table 36** above shows those Aboriginal sites within the West of Edderton Road HMZ that will be impacted by the proposed Mine Extension Area 2. There are no sites (or site loci) within the west of Edderton Road HMZ that appear to be directly within the Mine Extension Area 2. However five sites and their site loci are in very close proximity to the extent of the impact area. It is considered that these five sites are at risk of disturbance by mining activities.

7.5.3 Mount Arthur North West Slopes Heritage Management Zone

The entire Mount Arthur North West Slopes HMZ will be impacted by the proposed Mine Extension Area 2 (**Figure 16**). All sites within the HMZ will be directly impacted by the Project. **Table 36** above lists those sites impacted in the North West Slopes HMZ. The list contains 13 previously recorded sites (with 26 loci) and two new sites identified during this survey. The HMZ contains sites identified in both Kuskie's (1999a) survey and those listed on the AHIMS register from previous surveys.

7.6 Comparative Analysis of Current HMZs with Offset Survey Area

As part of the Project, a large area east of Thomas Mitchell Drive was surveyed as a possible alternative Offset survey area to conserve a representative sample of Aboriginal sites at Mt Arthur Coal, in lieu of the three existing HMZs and to offset for the additional impact of the project on sites of

¹³ Since Kuskie's sites contain various disparate loci, some of a site's loci are within the HMZ boundary and some are external.

significance. All three HMZs fall within Kuskie's (1999) MAN EIS survey area and an assessment of those areas was made on a "cultural landscape" basis. In order to form a comparative assessment of sites within the three HMZs with the sites in the Offset survey area, the cultural significance of the three HMZs was reassessed on a sites-basis (**Section 6.5.3**). The comparative significance assessment of the three HMZs with the Offset survey area (**Section 6.5**) and **Table 31** shows that the Offset survey area offers a suitable alternative to the three HMZs because:

- the Offset survey area retains a representative range of Aboriginal sites types including sites or site features that are rare in both the local and regional context;
- the area retains a contiguous archaeological deposit in the level to gentle drainage depression terrain unit comparable to those found along White's creek in the original Kuskie (1999a) survey);
- the area represents a sample of Kuskie and Clarke's (2004) results indicating the spatial patterning of sites along major tributaries of the Hunter River and along ridgelines in closer proximity to the Hunter River;
- the area retains a representative sample of the terrain units and landform elements that were present in the MAN survey area and are still present in the three HMZs;
- the area is not part of a current mining lease and offers a more realistic option for future conservation; and
- the area will be more accessible to members of the Aboriginal community since it is not part of a mining lease and therefore more relaxed security and safety policies currently apply.

7.7 Grinding Groove Sites

There are three grinding groove sites within the EA Boundary.

7.7.1 Site 37-2-0110

This site lies within the proposed Mt Arthur CA and will be conserved in situ. It will not be affected by the Project.

7.7.2 Site 37-2-0111

This site lies at the headwaters of a creek that flows northwards off the northern slopes of Mount Arthur. It consists of two grooves that are spaced <1 m apart (**Plates 11 and 12**). The site is considered to hold high significance values due to the relative rarity in the local context.

The site lies at the southern extremity of the Mine Extension Area 2 (**Figure 16**). However, Mt Arthur Coal intends to manage the site in situ for the foreseeable future (refer **Section 9.5.2**).

7.7.3 Site 37-2-0731

This site lies within the Bayswater No. 3 ML and the current management protocol for the site provides for an exclusion zone around the site. The site consists of more than 90 grinding grooves (**Plates 13 and 14**). The mine plan presented as part of the Project has been specifically redesigned to avoid the site, such that it may remain and be managed in situ. Within such a management framework there is a strong risk of secondary impact from aggrading fines washed onto the grinding grooves from the overburden emplacement area.

8.0 Applicable Policy and Legislation

8.1 Commonwealth Legislation

8.1.1 Aboriginal and Torres Strait Islander Heritage Protection Act 1984

The purpose of the *Aboriginal and Torres Strait Islander Heritage Protection Act 1984* (Heritage Protection Act) is the preservation and protection from injury or desecration of areas and objects in Australia and in Australian waters that are of particular significance to Aboriginal people in accordance with Aboriginal tradition.

Under the Heritage Protection Act the responsible Minister can make temporary or long-term declarations to protect areas and objects of significance under threat of injury or desecration. The Act can, in certain circumstances, override state and territory provisions, or it can be implemented in circumstances where state or territory provisions are lacking or are not enforced. The Act must be invoked by or on behalf of an Aboriginal or Torres Strait Islander or organisation.

The Act is administered by the Department of the Environment, Water, Heritage and the Arts.

8.2 New South Wales Legislation

The following New South Wales legislation protects aspects of cultural heritage and is relevant to development activities in the EA Boundary.

8.2.1 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 cultural heritage impact. Three parts of the EP&A Act are most relevant to Heritage. Part 3 relates to planning instruments, including those at local and regional levels; Part 4 controls development assessment processes; and Part 5 refers to approvals by determining authorities.

Part 3A provides an approvals regime applying to all major projects. Major projects are defined under *State Environmental Planning Policy (Major Projects) 2005* (SEPP 2005). It also applies to those projects which the Minister believes are required to deliver particular government plans or programs, known as critical infrastructure projects. Part 3A applies to all projects where the Minister has the approval role. Under Part 3A, the Minister can issue a project approval or a concept approval. Both maintain the requirement for consultation with the community and relevant State Government agencies, however the requirement for certain other permits and licences is removed under Part 3A.

Section 75B(2) of the EP&A Act makes provision for 'major projects' to be identified through various means, including by way of declaration as a listed project in SEPP 2005, or by notice in the Gazette.

This Project is classified as a 'major project' under Part 3A.

8.2.2 National Parks and Wildlife Act 1974

The *National Parks and Wildlife Act 1974* (NPW Act), administered by DECC, is the primary legislation for the protection of Aboriginal cultural heritage in NSW. One of the objectives of the NPW Act is:

The conservation of objects, places or features (including biological diversity) of cultural value within the landscape, including but not limited to: (i) places, objects and significance to Aboriginal people... (s.2A(1)(b))

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Aboriginal Archaeology and Cultural Heritage
Impact Assessment

121 S

6067101_RPTFinalRev01_28Aug09

Part 6 of the NPW Act provides specific protection for Aboriginal objects and places by making it an offence if impacts are not authorised. An Aboriginal Heritage Impact Permit (AHIP) should be obtained if impacts on Aboriginal objects and places are anticipated. AHIPs can be issued under ss.87 and 90 of the NPW Act.

Sections 86 and 87

Under section 86 of the NSW *National Parks and Wildlife Act 1974* (NPW Act) it is an offence to:

- a) disturb or excavate any land, or causes any land to be disturbed or excavated, for the purpose of discovering an Aboriginal object; or
- b) disturb or move on any land an Aboriginal object that is the property of the Crown, other than an Aboriginal object that is in the custody or under the control of the Australian Museum Trust.

...except in accordance with the terms and conditions of an AHIP issued under s.87 of the NPW Act.

Section 90

Under section 90 of the NPW Act it is an offence to:

knowingly destroy, deface or damage, or knowingly cause or permit the destruction or defacement of or damage to, an Aboriginal object or Aboriginal place...

...unless under an AHIP issued by the Director-General under s.90, subject to such conditions and restrictions as are specified in the AHIP. Therefore an AHIP issued under s.90 should be obtained if impacts on Aboriginal objects and places are anticipated.

For the purposes of the Act:

- An Aboriginal object is any deposit, object or material evidence (that is not a handcraft 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.

Under s.75U of the EP&A Act, projects approved under Part 3A do not require a permit under s.87 or a consent under s.90 of the NPW Act. However, for the preparation of an EA, the Director-General will issue environmental assessment requirements under s.75F, in consultation with other relevant public authorities and have regard to the need for the requirement to assess any key issues raised by those public authorities. In practice this usually means that Part 3A still requires assessment of potential impacts to European and Indigenous heritage and such assessment is generally equivalent to the normal assessment process under the NPW Act and Heritage Act.

Consultation with the Aboriginal communities is required under DECC policy when an application for an approval under Part 6 of the NPW Act, or Part 3A of the EP&A Act, is considered. The consultation process used in this study is outlined in more detail in **Section 4.0**.

8.3 Local Government

Under the provisions of the EP&A Act, Local Environmental Plans (LEP) and Regional Environmental Plans (REP) are prepared by a Local Government Council. An LEP defines some of the rules relating

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Commercial in Confidence

Aboriginal Archaeology and Cultural Heritage
Impact Assessment

122 S

6067101_RPTFinalRev01_28Aug09

to the development of an area or a particular site. It contains information on the zoning of land and any special provisions relating to the development of the land. An LEP is enforceable after it is published in the Government Gazette (i.e. "gazetted") by the NSW Minister for Planning.

Typically, LEPs and REPs have provisions that protect items of environmental heritage.

8.3.1 Muswellbrook Local Environmental Plan 2009

The *Muswellbrook Local Environmental Plan 2009* (MLEP) is the comprehensive statutory (legal) planning document that applies to the whole of the Muswellbrook Local Government Area (LGA), including the EA Boundary.

Clause 5.10 of the MLEP provides protection for items of heritage significance within Muswellbrook LGA, and provides specific provisions for the protection of Aboriginal heritage values. Under clause 5.10 (2) a development consent is required for:

- a) 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; and
- b) disturbing or excavating a heritage conservation area that is a place of Aboriginal heritage significance,

Under clause 5.10(8) the consent authority must, before granting consent under this clause to the carrying out of development in a place of Aboriginal heritage significance:

- a) consider the effect of the proposed development on the heritage significance of the place and any Aboriginal object known or reasonably likely to be located at the place, and
- b) notify the local Aboriginal communities (in such way as it thinks appropriate) about the application and take into consideration any response received within 28 days after the notice is sent.

Schedule 5 of the MLEP provides a list of heritage sites and heritage conservation areas protected under the MLEP. There are no Aboriginal sites listed in Schedule 5.

8.3.2 Hunter Regional Environmental Plan 1989 (Heritage)

The *Hunter Regional Environmental Plan 1989 (Heritage)* (REP(H)) is the statutory (legal) planning document that applies to all the LGAs within the Hunter Valley region, including the EA Boundary.

The REP(H) aims to conserve the environmental heritage (including the historic, scientific, cultural, social, archaeological, architectural, natural and aesthetic heritage) of the Hunter Region. Schedules 1 to 5 in the REP(H) list items of State, regional and local heritage value, as well as conservation areas.

There are no Aboriginal sites or objects within the EA Boundary listed in the REP(H).

8.3.3 Hunter Regional Environmental Plan 1989

The *Hunter Regional Environmental Plan 1989* (REP) is the statutory (legal) planning document that applies to all the LGAs within the Hunter Valley region, including the EA Boundary. It does not have provision for protection of heritage items, which is addressed by the REP(H).

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Aboriginal Archaeology and Cultural Heritage
Impact Assessment

124 S

6067101_RPTFinalRev01_28Aug09

Environment

9.0 Mitigation and Management of Aboriginal Cultural Heritage Values

This section reviews the mitigation and management strategies already proposed and/or instigated within the EA Boundary, and provides an updated strategy incorporating the additional impacts proposed by the current Project.

9.1 Existing Mitigation and Management Strategies

9.1.1 MAN Archaeology and Cultural Heritage Management Plan

An Archaeology and Cultural Heritage Management Plan (ACHMP) was developed by Umwelt (2002) to mitigate and manage the impacts to Aboriginal cultural heritage values at MAN. The ACHMP was devised to manage Aboriginal and historic heritage values at MAN for the 21 year term of the MAN development consent.

The MAN ACHMP identified that 72% of MAN would be disturbed (21 Year Mine Disturbance Envelope) and that 95% of the ML would be disturbed in the period beyond the current 21 year development consent. Consequently, all Aboriginal sites within the 21 Year Mine Disturbance Envelope would be destroyed by open cut mining and associated activities (Umwelt 2002: 9-10).

Within the MAN ML a total of 307 Aboriginal sites were identified by Kuskie (1999). Of these:

- 283 sites would probably be impacted within the 21 Year Mine Disturbance Envelope and would be subject to Section 90 Consent to Destroy applications for each two year phase of mining;
- 13 sites occur wholly in the HMZs with another 32 sites occurring partially within the HMZs. The ACHMP identifies the possibility that these HMZs might be impacted by future mining activities and that there was no long-term conservation intended; and
- 11 sites are located outside the ML application area and/or development area and will not be impacted by mining activities.

Mitigation of impacts to the 283 sites impacted by the MAN mining activities included:

- **Heritage Management Zones:** conservation of 13 complete sites within three HMZs and components of an additional 32 sites;
- **Mount Arthur CA:** the proposed CA over Mount Arthur (approx. 102 ha) is currently being negotiated and a separate ACHMP will be prepared for the CA (Umwelt 2008: Appendix 10),
- **Archaeological Salvage Program:** a detailed salvage and excavation program under a Section 87 excavation permit was conducted in 2001 (Kuskie and Clarke 2004);
- **Aboriginal Burial:** protection measures for a burial site uncovered as part of the salvage and excavation program were established in conjunction with the Aboriginal community;

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125 S

Aboriginal Archaeology and Cultural Heritage
Impact Assessment

6067101_RPTFinalRev01_28Aug09

- **Cultural Salvage Program:** in addition to the archaeological salvage program, a cultural salvage program for the MAN ML was developed by the Upper Hunter Wonnarua Council including salvage and storage of surface artefacts and recovery of some samples of topsoil (containing artefacts) for future research;
- **Trust Fund for Regional Research:** BHP Billiton contributed \$50,000 towards the establishment of a trust fund set up by Department of Urban Affairs and Planning (now Department of Planning) to be used for the regional study of Aboriginal sites and other cultural heritage projects as defined by the Trust Deed; and
- **Access for Aboriginal Community:** protocols were established and agreed upon by the Upper Hunter Wonnarua Council and BHP Billiton to allow access to certain sites within the ML; namely those within the proposed Mount Arthur CA and the three HMZs.

The proposed Mine Extension Areas 1 and 2 fall within the area covered by this ACHMP.

9.1.2 MAU Aboriginal Cultural Heritage Management Plan

Umwelt (2008) proposed a management strategy and requirements for the development of an ACHMP for Aboriginal sites located within the MAU survey area, although the latter has not yet been completed.

The MAU study found that a total of 31 Aboriginal sites and their associated PAD will be directly impacted by the MAU project during the term of the development consent. Further sites may be impacted once the location of surface infrastructure and facilities for the underground mining activities are identified. Since these locations were not known at the time of the MAU EA, the report stipulated that site-specific management strategies would be formulated within the ACHMP.

A total of 77 Aboriginal sites (509 loci) were identified by Umwelt (2008) within the MAU. Of these:

- 31 sites would probably be impacted within the Mine Disturbance Envelope as a result of underground mining activity; and
- 46 sites occur outside the surface impact (subsidence) zone and will be managed for in situ conservation as the preferred strategy.

Recommended mitigation of impacts to the 31 sites impacted by the MAU mining activities included:

- **Saddlers Creek CA:** the proposed CA will be approximately 295 ha and encompasses the majority of site SC01 (42 loci) and Saddlers Creek. It is currently being negotiated and a separate ACHMP will be prepared (Umwelt 2008: Appendix 10);
- **In Situ Management:** a total of 46 archaeological sites and two Aboriginal cultural sites were recommended for in situ management for the term of the development consent (i.e. they occur in areas outside the surface impact (subsidence) zone);
- **Archaeological Salvage Program:** a salvage program including targeted subsurface investigation was recommended for sites within the surface impact zone that were identified as having potential to retain a degree of integrity and/or complex subsurface assemblages including QC01, SC09 and WC04, and for parts of SC01 within the proposed conveyor corridor. Further, salvage was proposed on a longwall panel basis so that the subsidence impact zone may be reduced allowing more sites to be managed in situ;

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- **Keeping Place:** a Keeping Place will be funded and constructed within the proposed Saddlers Creek CA as part of the offset strategy;
- **Training:** Mt Arthur Coal will fund and construct a facility near Quarry Creek for the Aboriginal community to use for teaching purposes. Training will be provided to one representative from each registered Aboriginal stakeholder group in site and artefact recording and basic artefact analysis. Mt Arthur Coal will fund training for five representatives from stakeholder groups to undertake 'Collections Training' at the Australian Museum (or similar training);
- **Employment:** Mt Arthur Coal will fund training for staffing of the proposed Keeping Place for two people for fifty days per year for the duration of the project. Mt Arthur Coal also encourages Aboriginal stakeholder groups to apply for employment within their existing mining operations; and
- **Access for Aboriginal Community:** access to sites within the ML, namely those within the proposed Saddlers Creek CA, will be available. Furthermore, restricted access may be available for sites outside the surface impact zone.

Mine Extension Areas 3, 4 and 5 fall within the MAU survey area.

9.1.3 MAN South Pit Extension Project

The MAN South Pit Extension Project was subject to heritage assessment in 2005 (Umwelt 2007). The northern section of the survey area incorporated part of Kuskie's (1999) survey and the sites identified were incorporated into the management strategies outlined in the MAN ACHMP (Umwelt 2002).

Within the southern portion surveyed by Umwelt in 2005, a total of eight Aboriginal sites (42 loci) were identified. Of these:

- six sites (30 loci) would be impacted by the South Pit extension project and would be salvaged under a Section 90 Consent to Destroy permit; and
- two sites (12 loci) sites occur outside the impact zone and will be managed for in situ conservation as the preferred strategy.

Recommended mitigation of impacts by the South Pit Extension Project included:

- **Archaeological Salvage Program:** a salvage program was recommended for all sites within the impact zone; and
- **In Situ Management:** a total of two archaeological sites (12 loci) were recommended for in situ management for the term of the development consent (i.e. they occur in areas outside the impact zone).

9.2 Assessment of Mitigation and Management Strategies to Date

As part of the Director General's Requirements (DGRs) for this Project (**Appendix F**) the Director General of DECC requested an:

...audit to confirm the extent and compliance with the current consent conditions. In particular the cultural heritage component of the EA should review the implementation and adequacy of mitigation measures imposed under existing consents. Any outstanding deficiencies need to be addressed in Statements of Commitment and consent conditions associated with the Part 3A application prior to cancellation of the existing consents.

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Commercial in
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127 S

Aboriginal Archaeology and Cultural Heritage
Impact Assessment

6067101_RPTFinalRev01_28Aug09

The remainder of this subsection provides an overview of the consent conditions and mitigation measures within existing consents. Existing consents consist of the following:

- **Bayswater No. 3 Development Consent:** Development Consent (No. 210/93) for Bayswater No. 3 mine was approved on 12 September 1994. Two specific conditions in relation to Aboriginal sites were imposed as part of the consent and are shown in **Table 41** below.
- **Bayswater Rail Loading Facility and Rail Loop Development Consent:** Development Consent (DA 105-04-00) for the Bayswater Rail Loading Facility and Rail Loop was approved on 2 November 2000. Five specific conditions in relation to Aboriginal heritage assessment, management and monitoring were imposed as part of the consent and are shown in **Table 42** below.
- **Mt Arthur North Development Consent:** Development Consent (DA 144-05-2000) for the Mt Arthur North mine development was approved on 1 May 2001. Eight specific conditions in relation to Aboriginal heritage assessment, management and monitoring were imposed as part of the consent and are shown in **Table 43** below.
- **Mt Arthur Coal Exploration Adit:** Project Approval 06_0040 for the Mount Arthur Coal exploration adit was approved on 20 September 2006. Two specific conditions in relation to Aboriginal heritage were imposed as part of the consent and are shown in **Table 44** below.
- **Mt Arthur Coal Mine – South Pit Extension Project:** Project 06_0108 for the South Pit Extension Project was approved on 9 January 2008. Four specific conditions in relation to Aboriginal heritage were imposed within the Statement of Commitments as part of the approval and are shown in **Table 45** below.
- **Mt Arthur Underground Project:** the Project Approval (for Application No. 06_0091) for the Mount Arthur Coal Mine – Underground Project was approved on 2 December 2008. Two specific conditions in relation to Aboriginal heritage were imposed as part of the consent and are shown in **Table 46** below.

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Aboriginal Archaeology and Cultural Heritage
Impact Assessment

128 S

6067101_RPTFinalRev01_28Aug09

Table 41: Status of Development Consent Conditions for Aboriginal Sites at Bayswater No. 3 mine

Conditions	Status	Comment
13 (i) Further archaeological investigation approved by NPWS designed to: a) provide such information as is necessary for the assessment of the significance of Aboriginal sites within the proposed mining lease area; b) assess the need for the "conservation zone" previously identified to reserve an example of undisturbed archaeology; c) test for the presence of a "ceremonial precinct" near Mount Arthur, as indicated by the NPWS submission to the Inquiry.	Compliant	The Bayswater Archaeological Research Project (BARP) was carried out over six years between 1993 and 1998 (MacDonald and Davidson n.d.), including extensive survey and excavation, together with significance assessment. The BARP reviewed the previous proposals for conservation zone, recommending that conservation zones be established in the Edderton Catena and along Saddlers Creek (n.d.: 11). The BARP also surveyed lands associated with the "ceremonial precinct" using indicators specified by Witter (1994). No evidence was identified to suggest that a "ceremonial precinct" was located at Mount Arthur.
13 (ii) Apply to the Director-General of National Parks and Wildlife for consents to destroy Aboriginal sites as required.	Compliant	Permits SZ156, 692, 695, 1384 are held under the Bayswater No. 3 Development consent to destroy relics in the course of coal mining. A report was prepared (Kuskie 2005). Fieldwork and salvage has been completed. This report was submitted to DEC (NPWS) as part of the UNE report from Iain Davidson in 2005. At that time the Australian Museum would not accept the artefacts given their lack of storage.

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Table 42: Status of Development Consent Conditions for Aboriginal Heritage Assessment, Management and Monitoring at Bayswater Rail Loading Facility and Rail Loop

Conditions	Status	Comment
2.3 (a) Prepare an ACHMP to address both Aboriginal and European cultural heritage issues including: (i) identification of all areas of conservation within the DA area; (ii) provision of management strategies for all part of DA not affected by project; (iii) identification of any future salvage, excavation and monitoring of any heritage/archaeological sites within the DA area; (iv) details of measures to assist Aboriginal community to maintain and manage cultural heritage in DA area; (v) details of management of Aboriginal heritage sites unaffected by activities in DA area including fencing; (vi) identification and discussion of Aboriginal archaeological sites that require section 90 consents to destroy [now or in the future]; (vii) details of consultation undertaken in the preparation of the ACHMP.	Compliant	ACHMP prepared in 2000 and includes ▪ the identification and management of conservation areas are discussed in Section 2.1 of the ACHMP; ▪ the management strategies for Aboriginal sites not affected by mining are set out in Section 2.3 of the ACHMP; ▪ identification of future salvage, excavation and monitoring programs are identified in Section 2.3 of the ACHMP; ▪ management protocols for all stages of development are outlined in Section 2.3 of the ACHMP; ▪ the details regarding salvage of Aboriginal sites are set out in Section 2.3 of the ACHMP; and ▪ details of Aboriginal consultation are addressed in Section 2.4.

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Conditions	Status	Comment
2.3 (b) Members of Aboriginal community given opportunity to recover relics from locations in the impact area as part of section 90 consent to destroy.	Compliant	Achieved. Consent to Destroy issued by NPWS on 15 January 2001. Salvage by the UHWC was completed over three days from 17 th -19 th January 2001. Salvage report has not yet been finalised. Refer Brett Jenkins, of Mt Arthur Coal letter to Victor Perry dated 20 April 2001 requesting salvage report (no response received). Follow-up letter from Mt Arthur Coal requesting confirming status of the report and consultation dated 11 November 2003. UHWC lodged successful application for care and control of the recovered cultural items rather than lodging them with the Aust Museum. Application was approved by NPWS on 15 January 2001.
2.3 (c) During the course of construction and operation of the [facilities], the applicant is to stop work immediately on becoming aware of any sites not covered by a Consent to Destroy and consult the NPWS and relevant local Aboriginal community.	Compliant	No sites not covered by a consent to destroy were identified during construction.

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Conditions	Status	Comment
2.3 (d) The Applicant is to consult regularly during construction with the relevant local Aboriginal community using consultation principles and strategies consistent with "Guidelines for best practice community consultation in the NSW mining and extractive industries. The results of consultation to be documented in the AEMR.	Compliant	Regular consultation occurred with representatives of the local Aboriginal community during construction of the facility. This consultation included members of UHWC regularly visiting the site during the construction phase. Outcomes of this consultation process included; Members of the UHWC conducted a salvage of Aboriginal heritage items from the construction area under a Section 90 Permit from NPWS. An Aboriginal heritage site located adjacent to the construction area was fenced to prevent inadvertent damage. The fence was removed after construction works were completed and is currently within larger fenced area preventing access to rail loop. Several contracts for fencing works were let to the UHWC to supply and install fences around the facility. Contracts were also let to the UHWC to plant over 3000 plants for visual screening and habitat replacement purposes. A contribution was made to the UHWC for assistance with establishing a Cultural Heritage Centre. Refer letter from Mike Heath, Mt Arthur Coal, dated 27 October 2003 to Rhoda Perry re. transfer of land as payment of contribution. Results from this consultation were documented in the 2001 AEMR
2.3 (e) The Applicant shall monitor the effectiveness of the measures outlined in the ACHMP. A summary of monitoring shall be included in the AEMR.	Compliant	There are relevant sections in the 2001 and 2002 AEMR's.

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Table 43: Status of Development Consent Conditions for Aboriginal Heritage Assessment, Management and Monitoring at Mt Arthur North

Conditions	Status	Comment
3.3 (a) Prepare an ACHMP to address both Aboriginal and European cultural heritage issues including: (i) identification of all areas of conservation within the DA area. Establishment of a VCA at Mount Arthur and HMZ 1 (west of Edderton Road), 2 (south east of Edderton Road), 3 (Macleans Hill); (ii) provision of management strategies for all part of DA not affected by mining; (iii) identification of any future salvage, excavation and monitoring of any heritage/archaeological sites within the DA area; (iv) management procedures and protocols for Aboriginal heritage issues for all stages of the development; (v) details of a program for salvaging Aboriginal sites; and (vi) details of consultation undertaken with the WTC and WLALC in preparation of ACHMP.	Compliant	ACHMP completed by Umwelt (2002). The Archaeology and Cultural Heritage Management Plan encompasses the whole of the MAN area and is intended to manage sites for the 21 year life of the development consent. ▪ the identification and management of conservation areas are discussed in Section 2.3 of the ACHMP; ▪ the management strategies for Aboriginal sites not affected by mining are set out in Section 2.4 of the ACHMP; ▪ identification of future salvage, excavation and monitoring programs are identified in Section 2.4 of the ACHMP; ▪ management protocols for all stages of development are outlined in Section 2.4 of the ACHMP; ▪ the details regarding salvage of Aboriginal sites are set out in Section 2.4.1 of the ACHMP; and ▪ details of Aboriginal consultation are addressed in Section 2.1
3.3 (b) Contribute \$50,000 towards establishment of a trust fund for the regional study of Aboriginal sites and other cultural heritage projects.	Compliant	BHP Billiton contributed the nominated fee to the trust fund.
3.3 (c) Mount Arthur Conservation Area to be afforded statutory protection as a VCA.	In progress	Mount Arthur CA currently being negotiated.
3.3 (d) No section 90 permits granted for Aboriginal sites contained within the three HMZ.	Compliant	No Section 90 Consents to Destroy have been issued for sites within the three HMZ. This is stipulated in Section 2.5 of the ACHMP.
3.3 (e) WTC to be provided opportunity to recover artefacts from the impact area as part of s90 permits.	Compliant	The WTC completed a significant cultural salvage program for the recovery of artefacts within the MAN development

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Conditions	Status	Comment
		area in 2001/02. An additional Consent to Destroy salvage near Macleans Hill since the last Consent audit invited WTC to participate through a competitive tender process.
3.3 (f) During the course of construction and operation of the [facilities], the applicant is to stop work immediately on becoming aware of any sites not covered by a Consent to Destroy and consult the NPWS and relevant local Aboriginal community	Compliant	No Aboriginal sites that are not covered by a Section 90 permit have been identified during construction and operation of the MAN mine.
3.3 (g) The Applicant is to consult regularly during construction with the relevant local Aboriginal community using consultation principles and strategies consistent with "Guidelines for best practice community consultation in the NSW mining and extractive industries. The results of consultation to be documented in the AEMR.	Compliant	Mt Arthur Coal has maintained consultation with the local Aboriginal community as part of the MAN mine construction process and for development of subsequent mine operations at Mt Arthur Coal. The Mt Arthur North Aboriginal Liaison Committee meets annually to discuss Aboriginal heritage issues on Mt Arthur Coal MLs. A summary of consultation is provided in the AEMR (e.g. AEMR 2007).
3.3 h) The Applicant shall monitor the effectiveness of the measures outlined in the ACHMP. A summary of monitoring shall be included in the AEMR.	Compliant and Ongoing	A summary of both indigenous and historic heritage at Mt Arthur Coal has been provided in the Annual Environmental Management Report (e.g. AEMR 2007).

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Table 44: Status of Project Approval Conditions for Aboriginal Heritage at Mt Arthur Coal Exploration Adit

Conditions	Status	Comment
11. If Aboriginal artefacts are uncovered during ground disturbance works for the downcast ventilation shaft facility, all work will cease and appropriate mitigation strategies will be developed in consultation with Aboriginal stakeholders.	Compliant to date	No work has commenced on the downcast ventilation shaft facility as at the time of writing this report.
12. In the unlikely event that human skeletal material is uncovered during the ground disturbance works, all work will cease and the Police, DEC and Aboriginal stakeholder groups notified. Mitigation strategies developed in consultation with Aboriginal stakeholders.	Compliant	No human skeletal material has been uncovered to date.

Table 45: Status of Project Approval Conditions (Statement of Commitments) for Aboriginal Heritage in the South Pit Extension Project Area

Conditions	Status	Comments
6.7.1 Aboriginal site loci within disturbance area shall be salvaged by surface collection prior to any earth works, in consultation with Aboriginal community and in accordance with the salvage methodology contained in Appendix 6 of the EA.	Complete	Salvage works conducted by AECOM in late 2008 (AECOM in prep.). Salvage methodology was compliant with Appendix 6 of the EA.
6.7.2 A report containing the findings of the salvage program and subsequent artefact analysis will be completed within two years of the salvage works and two copies provided to DECC. Copies will be made available to Aboriginal community groups that participated in the consultation program for this project.	In preparation	The salvage fieldwork was conducted in late 2008. A report detailing the results of salvage and the analysis of artefacts is currently being prepared (AECOM in prep.)
6.7.3 Aboriginal site loci (or parts thereof) identified in the projects specific archaeological survey and located outside the disturbance area shall be managed in situ and protected by fencing, appropriate signage and notification to site personnel. The MAN ACHMP will be revised to incorporate management of these site loci.	In preparation	No fencing works have been carried out as yet. Appropriate fencing will be erected as required and as advised in the salvage report and EA. Amendment of the MAN ACHMP to reflect the changed management recommendations in this report as a result of the South Pit extension is currently underway.

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Conditions	Status	Comments
6.7.4 If any human skeletal material is uncovered during ground disturbance works, all works will cease and Police, DECC and Aboriginal stakeholder groups notified. These groups will be consulted in relation to development of appropriate mitigation measures.	Compliant	No human skeletal material has been uncovered to date.

Table 46: Status of Development Consent Conditions for Aboriginal Sites at the Mt Arthur Underground Project Area

Conditions	Status	Comments
11. Notwithstanding condition 12 of schedule 2, the Aboriginal Cultural Heritage Management Plan must: a) be prepared in consultation with DECC and all relevant Aboriginal groups; b) be submitted prior to carrying out any operations that could affect Aboriginal sites; and; c) include a program/procedures for: - o salvage, subsurface investigation and management of affected highly significant Aboriginal sites (including sites SC01 and QC01); - o salvage and management of all other affected Aboriginal sites, based on additional assessment in the case of sites affected by the relocation of the 330/500kV transmission line; and - o protecting, monitoring and managing site QC02 (a scarred tree) <i>Note: The Aboriginal Cultural Heritage Management Plan may form part of the Archaeology and Cultural Heritage Management Plan, as referred to in the Mt Arthur North mine consent (DA 144-05-2000).</i>	In preparation	The MAN ACHMP will be amended to reflect additional management requirements for Aboriginal sites identified within the MAU survey area, with particular reference to conservation and management of site QC02.

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9.3 Mitigation and Management Options

The management options discussed in this section are presented to inform a management strategy that recognises the Aboriginal cultural heritage values of sites within the EA Boundary. The range of options potentially available is presented below. Each option is discussed and where appropriate, is nominated as the preferred management option for selected sites.

Section 7.0 indicates that the additional mining operations within the EA Boundary will impact a total of 77 additional sites (comprising 315 loci) recorded in previous surveys and 11 new sites identified in this survey.

9.3.1 Unmitigated Destruction

One option is to destroy any known Aboriginal sites or objects. This strategy is typically suitable when the heritage values are of low scientific significance, the relevant Aboriginal stakeholders have no objection, and/or other strategies are not feasible. Typically, Aboriginal groups in the Upper Hunter Valley do not agree with unmitigated destruction and therefore this option is not considered appropriate.

9.3.2 Mitigated Destruction (Salvage)

Another option is to destroy Aboriginal sites following collection of surface artefacts and/or systematic excavation of deposits. This strategy is the most common means of mitigating impacts from proposed developments to Aboriginal heritage material, where conservation is not considered feasible.

This option is usually considered where:

- sites are assessed as having moderate or high scientific significance;
- sites are of cultural significance to the local Aboriginal stakeholders;
- sites have potential to yield information that is not available from other sources; and
- the potential for conservation is limited (Kuskie 1999a: 175).

Aboriginal stakeholders tend to regard all Aboriginal sites as being culturally significant, making this option the minimum acceptable strategy.

9.3.3 Site Conservation

This option refers to the conservation of all or a selected number (representative sample) of Aboriginal sites within the EA Boundary. This may be achieved through either:

- in situ management of sites (i.e. retention of sites within their current context with appropriate management measures implemented, which may include fencing and/or suitable signage; and/or
- the creation of appropriate conservation areas as offsets for the loss of medium to highly significant archaeological and Aboriginal cultural heritage sites and values within the EA Boundary.

The in situ management strategy is effective for sites that occur in areas that are not intended for ground surface impact. This approach is currently being used within the EA Boundary for two sites within the MAN South Pit extension area and 46 sites within the MAU area that will not be impacted by surface subsidence resulting from underground mining.

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The conservation area strategy (referred to by Kuskie (1999) as 'area-based conservation approach') is suitable where sufficiently large enough areas of land are available to conserve a representative sample of both site and terrain unit types. According to Kuskie (1999: 176) the conservation area strategy:

...relies on the concept that Aboriginal behaviour was continuous across space. Therefore the physical evidence of that behaviour is widely distributed and is variable in nature, and typically correlated, at least in part, with environmental factors. With area-based management, the emphasis shifts to decision-making on what areas, rather than sites, are representative. By preserving a representative suite of environmental contexts (such as landform elements or archaeological terrain units), the range of Aboriginal evidence across the landscape is preserved, regardless of the precise nature of variations in the density or distribution of relics...Protection is therefore afforded to samples of the potential heritage resource, as well as to the identified resource.

This management strategy has been used extensively within the EA Boundary with currently 408 ha conserved within three HMZ and a further 352 ha conserved within the two proposed CAs. Collectively these conservation areas conserve a total of 805 ha and include a large proportion of the representative environmental/cultural contexts.

Section 7.6 indicates that the Offset survey area offers a comparable alternative to the three HMZ and, in terms of contiguous landscape character, a superior representative sample of the landscape and archaeological nature of the MAN area. Being outside the ML area, the area offers a more suitable conservation alternative.

9.3.4 Monitoring

This option is usually taken to mean the observation of initial ground surface disturbance during the early stages of a development to monitor for potential artefact deposits, including the presence of human skeletal remains.

Monitoring is often recommended as a management strategy by Aboriginal stakeholders. However, there is little data to suggest that this strategy is effective in conserving artefact deposits. The scale of earthmoving in an open cut mine operation does not lend itself to this form of management, particularly in regard to stone artefacts.

9.4 Management Strategy

This management strategy is designed to encompass all Aboriginal heritage sites within EA Boundary and present a consolidated Aboriginal heritage management approach for the Mt Arthur Coal Complex. It reviews the management strategies devised in the major Aboriginal assessment reports for the EA Boundary (Kuskie 1999a, Kuskie and Clarke 2004, Umwelt 2007, 2008). In most cases, the original management recommendations are still valid for the Project. This strategy also provides:

- amendments to existing management strategies where additional impacts have been identified under this Project; and
- additional management recommendations for new sites identified as part of the field survey in this Project.

Due to the varying management strategies devised under the previous assessments, the following strategy is based on those survey areas.

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9.4.1 Aboriginal Cultural Heritage Management Plan

It is a requirement of several of Mt Arthur Coal's Development Consents that Archaeological and Cultural Heritage Management Plans (ACHMPs), incorporating Aboriginal Heritage Management Plans (AHMPs), are developed for Aboriginal sites identified within each development consent area. There are currently the following ACHMP requirements at Mt Arthur Coal:

- *Mt Arthur North:* This ACHMP was completed by Umwelt (2002), incorporating management of the three HMZ within MAN and Mount Arthur CA. The plan is required to be amended to incorporate management of additional sites identified within the South Pit extension project;
- *Bayswater Railing Loading Facility and Rail Loop:* This ACHMP was completed in 2000 in accordance with development consent conditions;
- *Mt Arthur Underground:* the requirement for this ACHMP was part of the recent approval (December 2008) for this development. The conditions also stipulate that the AHMP may be incorporated into the MAN ACHMP;

Management Action: Should the existing development consents for Mt Arthur Coal's operations be consolidated into a single Project Approval as defined by this Project, a new ACHMP for the surface areas covered by this approval will be developed to encompass all Mt Arthur Coal's MLs, although consideration will be given to retaining the MAU ACHMP as a separate document. Should this option be implemented, all existing ACHMPs and requirements for additional ACHMPs, will be superseded. This will:

- streamline the management of archaeological and cultural heritage sites across Mt Arthur Coal's operations;
- provide a single source document specifying management actions for all Aboriginal sites within the EA Boundary; and
- provide a consistent approach to management of Aboriginal sites across the EA Boundary;

provide an increased level of certainty for the Aboriginal community regarding management of Aboriginal sites.

9.4.2 Sites within the Mt Arthur North Survey Area

Sites surveyed and assessed within the MAN survey area (Kuskie 1999a; Kuskie and Clarke 2004) were reassessed in terms of management of additional impacts resulting from the proposed Mine Extension Areas 1 and 2. Amended management strategies are provided in **Table 47** and **Table 48**.

Management Actions:

- A total of 100 site loci (within 26 sites or partial sites) originally identified in the MAN EIS (Kuskie 1999a) will be impacted by the Mine Extension Area 1. Sites in the Macleans Hill HMZ that are assessed in this report as having high local or regional scientific significance will be salvaged (see **Tables 34** and **35**).
- a total of approximately 172 site loci (within 42 sites or partial sites) originally identified in the MAN EIS (Kuskie 1999a) will be impacted by the proposed Mine Extension Area 2. Of these, three sites were originally recommended for salvage to mitigate impacts, six sites were selected as alternative sites for salvage in lieu of sites conserved in the (then) proposed conservation areas, eight were proposed as possible sites for salvage to represent a particular archaeological context, and the remainder (24) were not recommended for salvage or conservation (i.e. Consent to

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Destroy recommended) and one was not given any specific recommendations. The latter is the grinding groove site (37-2-0111). All surface artefacts in the Edderton Rd HMZ that will be impacted upon, and all surface artefacts within the Mount Arthur North West Slopes HMZs, considered in this report to be of high local or regional significance, will be collected;

- a total of 11 new sites identified in the current survey will be impacted by the proposed Mine Extension Area 2. The Aboriginal community will be consulted regarding salvage at these sites;
- Mt Arthur Coal will protect and manage the axe grinding grooves (37-2-0111) in situ for the foreseeable future in accordance with the MAN ACHMP. Beyond this, and only in the event that agreement is reached with DECC and the local Aboriginal community, they may be relocated to a keeping place to facilitate coal extraction at this extremity of the proposed mining area;
- a new HMZ should be created in the lands occupied by the Offset Survey Area to offset the impacts proposed in this Project. The three HMZ (Macleans Hill, West of Edderton Road and North West Slopes) will be revoked to allow expansion of the mine footprint in those areas;
- the proposed new ACHMP will incorporate the existing MAN ACHMP management strategies including amendments to reflect the management recommendations in this report; and
- the remaining sites in the MAN survey area will be managed as defined by the amended ACHMP using a combination of conservation (Offset conservation area and in situ management) and salvage.

Aboriginal Stakeholder Comments: Three Aboriginal stakeholder groups made comment regarding the proposed management of Aboriginal sites in the MAN survey area:

- GWCHC agreed with the overall management strategy for Aboriginal sites within the EA Boundary (**Section 9.4**), although no specific comment was made regarding the management actions in the MAN survey area (**Appendix B**);
- WLALC is opposed to any revocation of existing HMZs, and would not accept any management actions without guaranteed protection of all the existing MAN HMZs (**Appendix B**). As discussed in **Sections 6.5**, two of the existing HMZs were not recommended for conservation in the original assessment report (Kuskie 1999a) and none of the HMZs were established for any significance values (rather they were established in areas that were not then intended for mining). The proposed Offset area is considered to hold higher site significance values, and provide a more effective conservation offset by way of contiguous extent and access arrangements for the Aboriginal community (**Section 6.4.2**); and

CCC believes that items impacted by extensions of Mt Arthur Coal should “remain under separate Section 90 consent to destroy and collection to 30 cm below surface” (**Appendix B**).

No other groups made specific comment regarding sites within the MAN survey area.

9.4.3 Sites within Mount Arthur Underground Survey Area

Sites surveyed and assessed within the MAU survey area (Umwelt 2008) were reassessed in terms of management of additional impacts resulting from the proposed Mine Extension Areas 3, 4 and 5. Amended management strategies are provided in **Table 49** and **Table 50**.

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140 S

Aboriginal Archaeology and Cultural Heritage
Impact Assessment

6067101_RPTFinalRev01_28Aug09

Management Actions:

- one site (37-2-2236) will be impacted by the proposed Mine Extension Area 3. The site was originally identified by Curren (1994) and lies within the MAU survey area. However no management recommendations were originally given for this site. The Aboriginal community will be consulted regarding salvage at this site. Another site (37-2-2236) was identified during the South Pit Extension project (Umwelt 2007), and was subsequently salvaged under a Section 90 Aboriginal Heritage Impact Permit (AHIP) in 2009 (AECOM in prep.);
- a total of 45 site loci (within five sites or site components) will be impacted by the Overburden Emplacement Area. All will be subject to Section 90 Consents to Destroy and surface artefacts will be collected. Of these, 30 loci were already subject to impact by mine subsidence and will continue to be managed in accordance with existing consent conditions. Thirteen site loci that were not originally subject to impacts from mine subsidence, and were to be managed by in situ conservation, will now be impacted by the Overburden Emplacement Area. Two loci were not given specific management recommendations in the original assessment but will now be impacted;
- Site 37-2-2598 (QC02) is a scarred tree of high cultural heritage significance and, although lying in the surface subsidence zone, was not considered to be under threat of impact by Umwelt. If the surface subsides, periodic inspection by an arborist will be instigated under a proposed ACHMP. Should impacts/damage be detected, consideration will be given to relocating the tree to a suitable Keeping Place in consultation with the Aboriginal community;
- the remaining sites in the MAU survey area should be managed as defined by Umwelt (2008) assessment report using a combination of conservation (Saddlers Creek CA and in situ management) and salvage; and
- all other recommendations made in the Umwelt (2008) report remain valid.

Aboriginal Stakeholder Comments: One Aboriginal stakeholder group made comment regarding the proposed management of Aboriginal sites in the MAU survey area:

GWCHC agreed with the management actions (Appendix B).

No other groups made specific comment regarding sites within the MAU survey area.

9.4.4 Sites within South Pit Extension Area

The sites within the impact zone have already been collected under a Section 90 AHIP (AECOM in prep.).

Management Actions: the two remaining sites (JFMJS2 Locus A and JF/MJS4 Locus A and B) will continue to be managed in situ as per recommendations made in Umwelt (2007: 9.8).

Aboriginal Stakeholder Comments: One Aboriginal stakeholder group made comment regarding the proposed management of Aboriginal sites in the South Pit Extension Area:

GWCHC agreed with the management actions (Appendix B).

No other groups made specific comment regarding sites within the South Pit Extension Area.

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Confidence

141 S

Aboriginal Archaeology and Cultural Heritage
Impact Assessment

6067101_RPTFinalRev01_28Aug09

9.4.5 Sites within Bayswater No. 3

No further Aboriginal sites will be impacted as a result of the current Project. However, recent information suggests that continued expansion of Saddlers Pit may impact Aboriginal sites of high significance, particularly the grinding groove site 37-2-0731.

Management Actions:

- further research will be conducted on DECC site 37-2-0731 (grinding groove site) to assess the full extent of the site (see **Section 9.5.2** for more detailed information). If feasible, appropriate techniques will be devised to remove the grinding grooves intact and relocate to an appropriate Keeping Place, in consultation with the Aboriginal community.
- sites 37-2-0734, 37-2-0735, 37-2-0736, 37-2-0737, 37-2-1431, 37-2-1445 and 37-2-1446 are all scarred trees and will be conserved and managed in situ as a preferred management strategy. Should future mine plans include impacts to these sites, removal of the trees to an appropriate Keeping Place will be considered, in consultation with the Aboriginal community; and

all other Aboriginal sites within the Bayswater No. 3 ML will continue to be managed within current arrangements.

Aboriginal Stakeholder Comments: One Aboriginal stakeholder group made comment regarding the proposed management of Aboriginal sites in the Bayswater No. 3 survey area:

GWCHC agreed with the management actions (Appendix B).

No other groups made specific comment regarding sites within the Bayswater No. 3 survey area.

9.5 Sites of High Cultural Heritage Significance

Sites of particularly high cultural heritage value are discussed here in addition to discussions above. All sites will be specifically addressed within a new ACHMP that should be developed for the whole EA Boundary (see **Section 9.4.1**).

9.5.1 Scarred Trees

There are eight registered scarred trees in the EA Boundary, seven within the Bayswater No. 3 mining area and one in the MAU (**Figure 7**). Two additional scarred trees were identified within the Offset survey area but outside of the EA Boundary.

Bayswater No. 3 Scarred Trees (Sites 37-2-0734, 37-2-0735, 37-2-0736, 37-2-0737, 37-2-1431, 37-2-1445 and 37-2-1446): with current information availability, little is known about the seven scarred trees on the Bayswater No. 3 ML, although most appear to be outside the impact area of the current mine plan.

In 1997 Mt Arthur Coal was granted a Consent to Destroy for all sites within the Bayswater No. 3 ML (and it is presumed that included these sites) and this consent has now lapsed. Further review of the status of these trees is required. One tree – 37-2-1431 – appears to have been impacted by MacDonald's Pit.

- **QC02 (Site 37-2-2598):** this tree is located within the Quarry Creek catchment on the MAU ML. The site was identified by Umwelt (2008) as part of the archaeological survey for the MAU. The tree was assessed as having high heritage significance and lies within the surface subsidence (impact) zone for the underground mining operation. However, Umwelt's assessment indicated that

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there was unlikely to be any direct damage to the tree as a result of mining activities and that it should be conserved and managed in situ.

Specific management requirements are to be addressed within the MAU A CHMP as stipulated in the Project Approval conditions (**Table 46**).

MAC21 and MAC22 (no AHIMS nos. at present): these two trees were identified as part of the current survey within the Offset survey area. These trees should be conserved within a management zone created to offset impacts within the MAN ML and replace three existing HMZs. They will be managed under an ACHMP for the conservation zone within a larger all-encompassing ACHMP for the Mt Arthur Coal Complex.

Aboriginal Stakeholder Comments: One Aboriginal stakeholder group made comment regarding the proposed management of Aboriginal scarred trees within the EA Boundary:

GWCHC agreed that “specific management requirements are to be addressed within the Mount Arthur Underground Aboriginal Cultural Heritage Management Plan” (**Appendix B**). However, this action was only intended for QC02. Recommendations for Bayswater No. 3 scarred trees and MAC 21 and 22 were not specifically addressed.

No other groups made specific comment regarding sites within the Bayswater No. 3 survey area.

9.5.2 Axe Grinding Groove Sites

Three axe grinding groove sites are currently known to occur within the EA Boundary.

- **Site 37-2-0110 (Mount Arthur):** no information is currently held regarding this site. However it lies within the proposed Mount Arthur CA and will be conserved in perpetuity within this conservation zone.
- **Site 37-2-0111 (Fairford 1):** this site lies within the headwaters of a creek that runs off the north eastern slopes of Mount Arthur. The site was originally recorded by Dyll (1980) and consists of two grinding grooves set 1 m apart. The site was reinspected during the current survey and the grooves were measured as being 0.5 m apart.

The Project mine layout indicates that the site is within or immediately adjacent to the impact zone created by the proposed Mine Extension Area 2, albeit at the very southern extremity (**Figure 16**).

Management Action: Mt Arthur Coal will conserve the site in situ for the foreseeable future in accordance with the MAN ACHMP (to be incorporated into a new ACHMP). Beyond this, and only in the event that agreement is reached with DECC and the local Aboriginal community, they may be relocated to a keeping place to facilitate development at this extremity of the proposed mining area.

Site 37-2-0731 (LGH06): this site was originally recorded in 1993 as part of the survey for the Bayswater No. 3 EIS. At that time it was described as an artefact scatter with 10+ grinding grooves. In 1997 Mt Arthur Coal was granted consent to destroy for all sites within the Bayswater No. 3 mining area including LGH06. However, the grinding grooves were not destroyed and this consent has now lapsed.

Umwelt conducted some clearance of topsoil and subsequently advised Mt Arthur Coal that the site comprised of over 90 grooves and was of high significance. In November 2008 AECOM inspected the site and found that the main groove concentration was entirely covered with introduced sediment. The secondary concentration has some sediment, although many grooves are visible there.

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The site is of high cultural significance as an excellent representation of its type with high educational value. Scientific value stems from the site's representative value. The site is not rare, nor does it offer significant research potential for addressing current research questions.

The cultural significance and heritage values provide guidance for long term management. Given that the significance centres on educational potential, then so should long term management be directed to recovering the educational potential of the grooves. This may be achieved through an interpretive display accessible by the Aboriginal community and, possibly, by the public.

Mine plans for the Project were specifically redesigned to avoid the grooves such that it may remain and be managed in situ. However, agreement may be reached with the local Aboriginal community in the future to relocate the grooves to an alternative Keeping Place, which is more accessible to the local Aboriginal community and offers improved management options.

Management Action: Mt Arthur Coal will manage the grinding grooves in situ, and consider the removal of the grinding groove site, in consultation with the Aboriginal community, and relocation to a suitable Keeping Place.

Aboriginal Stakeholder Comments: Six Aboriginal stakeholder groups made comment regarding the proposed management of Saddlers Pit grinding grooves (37-2-0731), but only one group made comment regarding the overall management of grinding groove sites within the EA Boundary:

- Feedback from Aboriginal stakeholder groups regarding the Saddlers Pit grinding grooves is generally in favour of in situ management as a preferred option. Three groups (WLALC, YCS and CCC) identified this option as the only acceptable action. One group (CA) stated that relocation in a sensitive manner, and with a professional team with Aboriginal input, would be acceptable if in situ management was not an option due to impacts. One group (GWCHC) requested further research into both management options.

In separate correspondence, GWCHC agreed with management actions proposed for the three grinding groove sites (**Appendix B**).

No other groups made specific comment regarding sites within the Bayswater No. 3 survey area.

Table 47: Amended Management Recommendations for Aboriginal Sites Impacted by the Proposed Mine Extension Area 1

Site Name	Site Loci	AHIMS Site No. (DECC)	Site Type	Significance Rating (Kuskie)	Within HMZ?	Original Management Recommendation (Kuskie 1999a)*	Amended Management Recommendation
CC112	A, B, C, D	37-2-1601	Open camp site	Mod-high/low-mod	Yes	Consent to Destroy**	No change**
CC113 A,	B, C	37-2-1602	Open camp site	Mod-high/mod	Yes	Consent to Destroy**	No change**
CC114 (*MAN85)	A, B, C, D	37-2-1603 37-2-0329	Open camp site	Mod-high/mod	Yes	Consent to Destroy**	No change**
CC115 A,	B, C	37-2-1604	Open camp site	Mod-high/low-mod	Yes (according to Kuskie's mapping but AHIMS co-ordinates place it outside)	Consent to Destroy**	No change**
CC116 A		37-2-1605	Open camp site	High/mod	Yes	Consent to Destroy**	No change**
CC117	A, B, C, D, E, F, G, H, I, J, K	37-2-1606	Open camp site	High/mod	Yes	Consent to Destroy**	Surface collection
CC118	A, B, C, D, E, F, G	37-2-1607	Open camp site	High/mod	Yes	Consent to Destroy**	No change**
CC119	A, B, C, D	37-2-1608	Open camp site	High/mod	Yes	Consent to Destroy**	No change**

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Site Name	Site Loci	AHIMS Site No. (DECC)	Site Type	Significance Rating (Kuskie)	Within HMZ?	Original Management Recommendation (Kuskie 1999a)*	Amended Management Recommendation
CC120 A		37-2-1609	Open camp site	High/mod	Yes	Consent to Destroy**	No change**
CC121	A, B, C, D, E, F	37-2-1610	Open camp site	Mod-high/low-mod	No	Consent to Destroy**	No change**
CC124 (*MAN83)	A, B, C, D, E, F	37-2-1612 37-2-0327	Open camp site	Mod-high/low-mod	Partially within HMZ	Consent to Destroy**	No change**
CC125 (*MAN82, MAN84, MAN86)	A, B, C, D	37-2-1566 37-2-0328 37-2-0326 37-2-0330	Open camp site	High-mod	Partially within HMZ	Consent to Destroy**	No change**
MB41	A, B, D, E, F, G, H, J, L	37-2-1656	Open camp site	Mod-high/mod	Partially within HMZ	Consent to Destroy**	No change**
MB43	A, B, C, D	37-2-1657	Open camp site	Mod/high mod	No	Consent to Destroy	No change**
MB45 A		37-2-1658	Open camp site	Mod/high mod	Partially within HMZ	Consent to Destroy**	No change**
MB46	A, B, C, D, F	37-2-1659	Open camp site	Mod/high mod	Partially within HMZ	Consent to Destroy**	No change**
PK116	D, E, G	37-2-1737	Open camp site	Mod-high	Partially within HMZ	Consent to Destroy**	No change**
PK117	A, B, C, D, E, F	37-2-1738	Open camp site	High/mod	Partially within HMZ	Consent to Destroy**	Surface collection
PK119 A,	B	37-2-1740	Open camp site	High/mod	Yes	Consent to Destroy**	No change**

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Site Name	Site Loci	AHIMS Site No. (DECC)	Site Type	Significance Rating (Kuskie)	Within HMZ?	Original Management Recommendation (Kuskie 1999a)*	Amended Management Recommendation
PK121	B, C, D, E	37-2-1742	Open camp site	Mod-high/low-mod	Yes	Consent to Destroy**	No change**
PK122 A,	B	37-2-1743	Open camp site	Mod/low-mod	Yes	Consent to Destroy**	No change**
PK125	A, B, C, D	37-2-1744	Open camp site	Mod-high/low-mod	Yes	Consent to Destroy**	Surface collection
PK126	A, C, E	37-2-1745	Open camp site	Mod-high/low-mod	Partially within HMZ	Consent to Destroy**	No change**
PK127 A		37-2-1746	Open camp site	Mod-high/low-mod	Partially within HMZ	Consent to Destroy**	No change**
PK128 A		37-2-1747	Open camp site	Mod-high/mod	No	Consent to Destroy	No change**
PK129 A		37-2-1748	Open camp site	Mod/low-mod	Partially within HMZ	Consent to Destroy**	No change**

*Source: Kuskie (1999: 213-218)

** Consent to Destroy was originally recommended by Kuskie (1999) prior to the area becoming a Heritage Management Zone. These sites were then managed in situ as a conservation area. Amended management recommendations indicate "No change", meaning sites will be destroyed under this Project, or "Surface collection", meaning sites of high significance will be salvaged prior destruction. Note that under the provisions of Part 3A of the EP&A Act, Consents to Destroy (NPWS Section 90 AHIPs) are not required. Approval is vested in the Minister for Planning (see **Section 8.2.2**).

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147

Aboriginal Archaeology and Cultural Heritage Impact Assessment
S6067101_RPTFinalRev01_28Aug09

Table 48: Amended Management Recommendations for Aboriginal Sites Impacted by the Proposed Mine Extension Area 2

Site Name	Site Locs	AHIMS Site No. (DECC)	Site Type	Significance Rating (Kuskie)	Within HMZ?	Original Management Recommendation (Kuskie 1999a)*	Amended Management Recommendation****
CC1	A, B, C, E, F, G	37-2-1839	Open Camp Site	mod-high/low-mod	Edderton C	onservation	Surface collection
CC2 A,	B, C	37-2-1549	Open camp site	Mod-high/low-mod	No	Consent to Destroy**	No change**
CC4 A,	B, C	37-2-1546	Open camp site	Mod/low	No	Consent to Destroy**	No change**
CC7 (*MAN53, MAN54)	A, B, C, D, E, F	37-2-1550 and part 37-2-0299	Open camp site	Mod/low-mod	No	Consent to Destroy**	No change**
CC8	A, B, C, D, E, F, G, H, J, K, L	37-2-1551 and 37-2-0300	Open camp site	Mod-high/low-mod	No	Consent to Destroy**	No change**
CC9 A,	B	37-2-1552	Open camp site	Mod/low-mod	NW Slopes	Consent to Destroy**	No change**
CC10 A		37-2-1553	Open camp site	Mod-high/mod	NW Slopes	Consent to Destroy**	No change**
CC11 A		37-2-1554	Open camp site	Mod/low-mod	NW Slopes	Possible salvage alternative in lieu of BSC25 and 26 being conserved in (then) proposed BSC Conservation Zone***	No change**
CC12 A		37-2-1555	Open camp site	Mod-high/low-mod	NW Slopes	Consent to Destroy**	No change**

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148 S

Aboriginal Archaeology and Cultural Heritage Impact Assessment

6067101_RPTFinalRev01_28Aug09

Site Name	Site Loc	AHIMS Site No. (DECC)	Site Type	Significance Rating (Kuskie)	Within HMZ?	Original Management Recommendation (Kuskie 1999a)*	Amended Management Recommendation****
CC15	A, B, C, D, E	37-2-1556	Open camp site	Mod/low-mod No		Possible salvage alternative in lieu of BSC17 being conserved in (then) proposed BSC Conservation Zone***	No change**
LS1 A,	B, C, D	37-2-1622	Open Camp Site	high/mod E	dderton	Conservation	Surface collection
LS5	A, B, C, D, E	37-2-1623	Open Camp Site	mod-high/low-mod	Edderton C	onservation	Surface collection
MB1 A		37-2-1629	Open Camp Site	mod/low-mod E	dderton	Conservation	Destroy without Salvage
MB2 A		37-2-1630	Open Camp Site	high/mod E	dderton	Conservation	Destroy without Salvage
MB5 A		37-2-1631	Open camp site	High/mod N	o	Possible salvage	No change**
MB7 (*MAN60)	J, K, L, M, N, O, P, R, S	37-2-1632 and 37-2-0304	Open camp site	Mod-high/low-mod	No	Consent to Destroy**	No change**
MB53 A,	B	37-2-1663	Open camp site	Mod/low-mod	NW Slopes	Possible salvage alternative in lieu of BSC25 and 31 being conserved in proposed BSC Conservation Zone	No change**
MB56 A		37-2-1664	Open camp site	Mod/low-mod	NW Slopes	Consent to Destroy**	No change**

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Site Name	Site Loc	AHIMS Site No. (DECC)	Site Type	Significance Rating (Kuskie)	Within HMZ?	Original Management Recommendation (Kuskie 1999a)*	Amended Management Recommendation****
MB57 (*MAN51, MAN50, MAN49, MAN52, MAN53, Fairford3, MountArthur)	A, B, C, D, E, F, G, H, I, J, K, L, M	37-2-0121, 37-2-0128, 37-2-0295, 37-2-0296, 37-2-0297, part 37-2- 0299 and 37- 2-1665	Open camp site	High/mod	Partially within NW Slopes	Consent to Destroy**	No change**
MB58 A,	B, C, D	37-2-1666	Open camp site	Mod/low-mod	NW Slopes	Consent to Destroy**	No change**
MB59 A,	B	37-2-1667	Open camp site	High/mod	NW Slopes	Consent to Destroy**	No change**
MB62 (*MAN58, MAN61)	A, B, C, D, E, F, G, H, I	37-2-1668	Open camp site	Mod-high/low- mod	No	Consent to Destroy**	No change**
MB66 (*MtArthur, MAN56)	A, B, C, D, E	37-2-1671, 37-2-0108 and 37-2- 0305	Open camp site	Mod-high/low- mod	No	Consent to Destroy**	No change**
PK1 A		37-2-1672	Open Camp Site	high/mod E	dderton	Conservation	Surface collection
PK2 A,	B	37-2-1673	Open Camp Site	high/mod E	dderton	Conservation	Destroy without Salvage
PK3 A,	B	37-2-1674	Open Camp Site	high/mod E	dderton	Conservation	Destroy without Salvage

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Site Name	Site Loc	AHIMS Site No. (DECC)	Site Type	Significance Rating (Kuskie)	Within HMZ?	Original Management Recommendation (Kuskie 1999a)*	Amended Management Recommendation****
PK4 A		37-2-1675	Open Camp Site	high/mod E	dderton	Conservation	Destroy without Salvage
PK6 A		37-2-1676	Open Camp Site	high/mod E	dderton	Conservation	Destroy without Salvage
PK7 A,	B, C, D	37-2-1677	Open Camp Site	mod/low-mod E	dderton	Conservation	Destroy without Salvage
PK8 (*MAN70)	A, B, C, D, E, F, G, H, I, J, K, L, M, N, O, P	37-2-1678 and 37-2-0314	Open camp site	Mod-high/low-mod	No	Salvage (context not represented in proposed conservation zones)	No change**
PK10 A,	B, C, D	37-2-1679	Open camp site	Mod/low-mod N	o	Possible salvage	No change**
PK35 A		37-2-0128	Open camp site	Mod-high/low-mod	NW Slopes	Consent to Destroy	No change**
PK36 A		37-2-1696	Open camp site	Mod-high/mod	NW Slopes	Possible salvage alternative in lieu of BSC7 being conserved in proposed BSC Conservation Zone	No change**
PK40 A,	B, C, D	37-2-1697	Open camp site	Mod/low-mod	Partially within NW Slopes	Possible salvage**	No change**
PK42 A,	B, C, D	37-2-1698	Open camp site	Mod-high/low-mod	No	Consent to Destroy**	No change**
PK43	A, B, C, D, E, F, G	37-2-0298 and 37-2-1699	Open camp site	Mod-high/mod	Partially within NW Slopes	Salvage (context not represented in proposed conservation zones)**	No change**

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Site Name	Site Loci	AHIMS Site No. (DECC)	Site Type	Significance Rating (Kuskie)	Within HMZ?	Original Management Recommendation (Kuskie 1999a)*	Amended Management Recommendation****
PK44 A		37-2-1700	Open camp site	Mod/low-mod	No	Consent to Destroy**	No change**
PK143 (*Eden Valley)	A	37-2-1754 and 37-2-0125	Open camp site	Mod/low-mod	No	Consent to Destroy**	No change**
PK144 A		37-2-1755	Open camp site	Mod/low No		Salvage (context not represented in proposed conservation zones)	No change**
PK145 (unclear)		37-2-0119	Open camp site			Possible salvage alternative in lieu of BER1, BER5 and BER6 being conserved in proposed BER Conservation Zone	No change**
PK151 (*MAN65, MAN64, MAN63, MAN62, Fairford 4)	A, B, C, E, F, G, H, I, J, K	37-2-0120, 37-2-0308 and 37-2-1761	Open camp site	Mod-high/mod No		Possible salvage	No change**
PK152	A, B, C, E, F, G, J	37-2-0306, 37-2-0307, 37-2-0309, 37-2-0310 and 37-2-1762	Open camp site	High/mod N	o	Possible salvage alternative in lieu of BER1, BER5 and BER6 being conserved in proposed BER Conservation Zone	No change**
PK163 (*MAN55, MAN57, MAN59)	A, B, C, D, E, F, G, H, I, J	37-2-1771, 37-2-0301 and 37-2-0002	Open camp site	High/mod N	o	Possible salvage	No change**

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Site Name	Site Loci	AHIMS Site No. (DECC)	Site Type	Significance Rating (Kuskie)	Within HMZ?	Original Management Recommendation (Kuskie 1999a)*	Amended Management Recommendation****
PK164 A,	B, C, D	37-2-1772	Open camp site	High/mod	No	Consent to Destroy**	No change**
RP114	A, B, C, D, E	37-2-1836	Open camp site	High/mod	No	Consent to Destroy**	No change**
RP115	A, B, C, D, E	37-2-1837	Open camp site	High/mod	No	Consent to Destroy**	No change**
RP116	A, B, C, D, E	37-2-1838	Open camp site	Mod/low N	o	Possible salvage	No change**
BC7 (*Fairford 1)	A 37-	2-0111	Axe grinding grooves	Mod/low-mod No		No specific recommendations – Consent to Destroy?	No change**
BC8 A		37-2-1855	Open camp site	Mod/low-mod N	o	Possible salvage	No change**
BC9 A		37-2-1854	Open camp site	Mod/low-mod	No	Consent to Destroy**	No change**
BC12 A		37-2-1858	Open camp site	Mod/low-mod	No	Consent to Destroy**	No change**
BC15 A		37-2-1857	Open camp site	Mod/low-mod N	o	Possible salvage	No change**
BC17 A		37-2-1856	Open camp site	Mod-high/low-mod	No	Consent to Destroy**	No change**
BC18 A		37-2-1859	Open camp site	Mod/low-mod	No	Consent to Destroy**	No change**
Fairford 6	(not given)	37-2-0132	Open Camp Site	(not given)	Edderton	(not given)	Destroy without Salvage

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Site Name	Site Loc	AHIMS Site No. (DECC)	Site Type	Significance Rating (Kuskie)	Within HMZ?	Original Management Recommendation (Kuskie 1999a)*	Amended Management Recommendation****
Fairford 2	(not given)	37-2-0118	Open Camp Site	(not given)	Edderton	(not given)	Destroy without Salvage
MAC1	Not Applicable	-	Open camp site	low	No	Not Applicable	Destroy without Salvage
MAC2	Not Applicable	-	Open camp site	low	No	Not Applicable	Destroy without Salvage
MAC3	Not Applicable	-	Open camp site	low	No	Not Applicable	Destroy without Salvage
MAC4	Not Applicable	-	Open camp site	low	No	Not Applicable	Destroy without Salvage
MAC5	Not Applicable	-	Open camp site	low	No	Not Applicable	Destroy without Salvage
MAC6	Not Applicable	-	Open camp site	low	No	Not Applicable	Destroy without Salvage
MAC7	Not Applicable	-	Open camp site	low	No	Not Applicable	Destroy without Salvage
MAC8	Not Applicable	-	Open camp site	low	No	Not Applicable	Destroy without Salvage
MAC9	Not Applicable	-	Open camp site	low	No	Not Applicable	Destroy without Salvage
MAC10	Not Applicable	-	Open camp site	low	NW Slopes	Not Applicable	Destroy without Salvage
MAC11	Not Applicable	-	Open camp site	low	NW Slopes	Not Applicable	Destroy without Salvage

*Source: Kuskie (1999: 213-218)

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154 S

6067101_RPTFinalRev01_28Aug09

Environment

** Consent to Destroy was originally recommended by Kuskie (1999) prior to the area becoming a Heritage Management Zone. These sites were then managed in situ as a conservation area. Amended management recommendations indicate “No change”, meaning sites will be destroyed under this Project, or “Surface collection”, meaning sites of high significance will be salvaged prior destruction. Note that under the provisions of Part 3A of the EP&A Act, Consents to Destroy (NPWS Section 90 AHIPs) are not required. Approval is vested in the Minister for Planning (see **Section 8.2.2**).

*** BSC Conservation Area. This is one of two conservation areas in Bayswater No. 3 ML originally recommended by Kuskie (1999) as an offset for development of the MAN mine. It was not subsequently created. Alternative management zones were created within MAN ML instead, and part of the BSC Conservation Area has been incorporated into the Saddlers Creek Conservation Area (refer **Section 3.5**).

**** Sites that are recommended for “Destroy without Salvage” are sites that are not considered to have low archaeological significance. However, further advice is required from the Aboriginal community regarding the cultural (social) significance of these sites, and this may alter the management recommendation.

Table 49: Amended Management Recommendations for Aboriginal Sites Impacted by the Proposed Mine Extension Areas 3 and 4

Site Name	Site Loci	AHIMS Site No. (DECC)	Site Type	Significance Rating	Original Management Recommendation (Umwelt 2007, 2008)	Amended Management Recommendation
JF/MJS3	Unspecified (Umwelt 2007)	37-2-2236	Open camp site	Low-Moderate	Conduct surface salvage collection (in consultation with all relevant Aboriginal community groups)	No change
HR 10	Not Applicable	37-2-0759	Open camp site	(not given)	Not specified	Surface collection

Table 50: Amended Management Recommendations for Aboriginal Sites Impacted by the Overburden Emplacement Area

Site Name	Site Loci	Site No. (DECC)	Site Type	Significance	Original Management Recommendation (Umwelt 2008)	Amended Management Recommendation
SC02	1/1, 1/2, 3/1, 4/1, 9/1, 10/1, 10/2 and 12/1	37-2-2619	Isolated finds and Artefact scatter	Low (all loci)	Not impacted by subsidence zone. Management as per ACHMP (i.e. in situ management)	These sites will be impacted by the Overburden Emplacement Area. Surface collection
	4/2 and 11/1		Artefact scatter	Low (both loci)	Impacted by subsidence zone. Surface collection under Section 90 Consent to Destroy	Impacted by both subsidence zone and Overburden Emplacement Area. Surface collection
	9/2		Artefact scatter	Low	Not specified, but probably in situ conservation under ACHMP	This site will be impacted by the Overburden Emplacement Area. Surface collection
SC03	1/1, 1/2, 3/1, 3/3 and 4/1	(not listed)	Isolated finds and Artefact scatter	Low (all loci)	Impacted by subsidence zone. Surface collection under Section 90 Consent to Destroy	Impacted by both subsidence zone and Overburden Emplacement Area. Surface collection
	1/3 and 2/1		Artefact scatter and Isolated find	Low (both loci)	Not impacted by subsidence zone. Management as per ACHMP (i.e. in situ management)	These sites will be impacted by the Overburden Emplacement Area. Surface collection
SC05 1	/1, 1/4	(not listed)	Isolated find and Artefact scatter	Low	Not impacted by subsidence zone. Management as per ACHMP (i.e. in situ management)	These sites will be impacted by the Overburden Emplacement Area. Surface collection

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Aboriginal Archaeology and Cultural Heritage Impact Assessment

156 S

6067101_RPTFinalRev01_28Aug09

Site Name	Site Loci	Site No. (DECC)	Site Type	Significance	Original Management Recommendation (Umwelt 2008)	Amended Management Recommendation
	1/3, 1/5, 1/6, 1/7, 2/1, 2/2, 3/1, 3/2, 5/1, 6/1, 6/2, 7/1, 8/1, 9/1, 10/1, 10/2, 11/1, 12/1, 13/1 and 13/2		Isolated finds and Artefact scatter	Low	Impacted by subsidence zone. Surface collection under Section 90 Consent to Destroy	Impacted by both subsidence zone and Overburden Emplacement Area. Surface collection
	1/2		Artefact scatter	Low	Not specified, but probably in situ conservation under ACHMP	This site will be impacted by the Overburden Emplacement Area. Surface collection
SC06	2/1 Arte	(not listed)	fact scatter	Low	Not impacted by subsidence zone. Management as per ACHMP (i.e. in situ management)	This site will be impacted by the Overburden Emplacement Area. Surface collection
	2/2 and 2/3		Artefact scatter	Low	Impacted by subsidence zone. Surface collection under Section 90 Consent to Destroy	Impacted by both subsidence zone and Overburden Emplacement Area. Surface collection
SC26 1	/1	37-2-2657	Artefact scatter	Low	Impacted by subsidence zone. Surface collection under Section 90 Consent to Destroy	Impacted by both subsidence zone and Overburden Emplacement Area. Surface collection
HR2	(not applicable)	37-2-0751	Artefact scatter	(Not given)	Not given	Impacted by both subsidence zone and Overburden Emplacement Area. Surface collection
LFE1	(not applicable)	37-2-0709	Artefact scatter	(Not given)	Not given	Impacted by both subsidence zone and Overburden Emplacement Area. Surface collection

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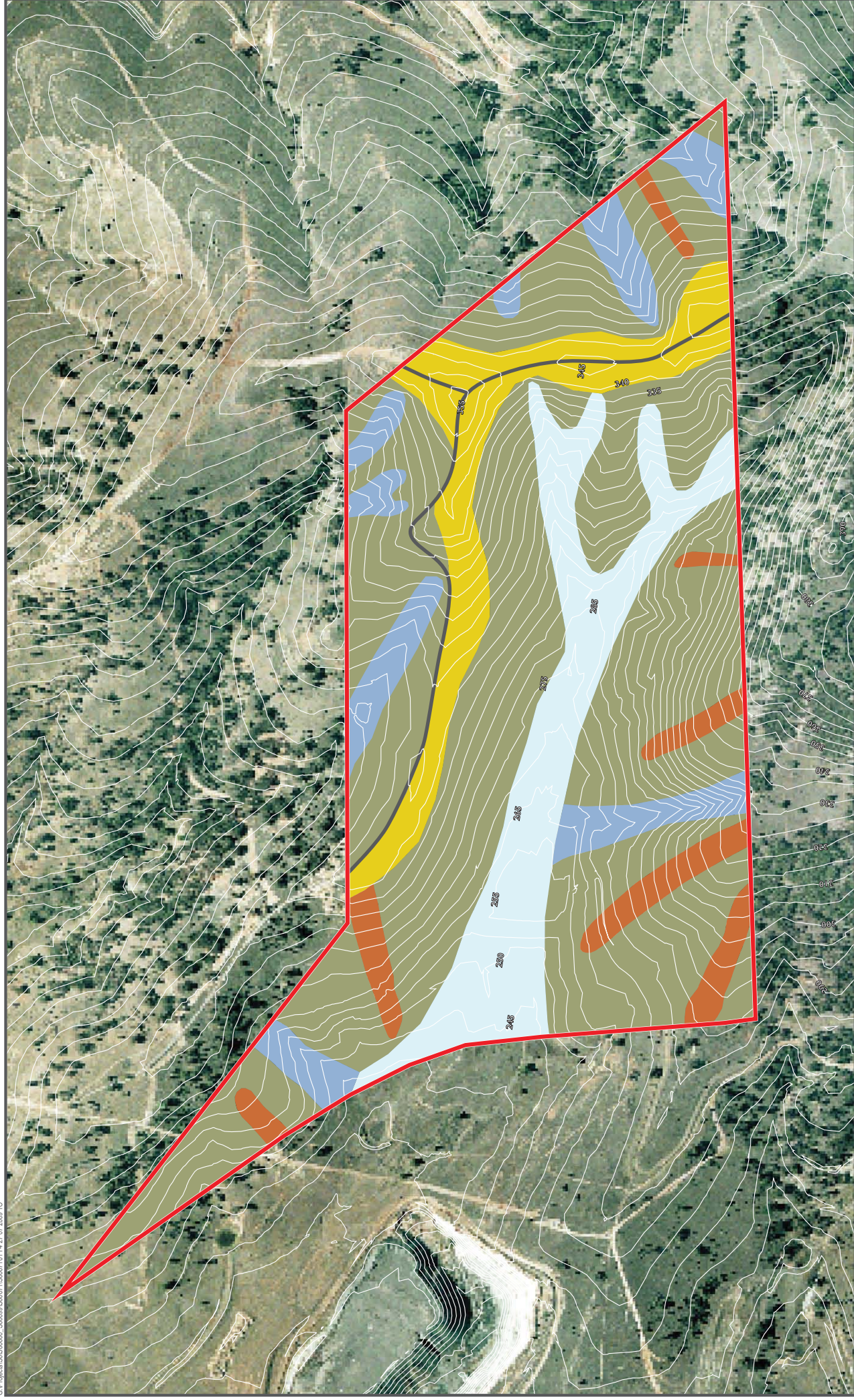
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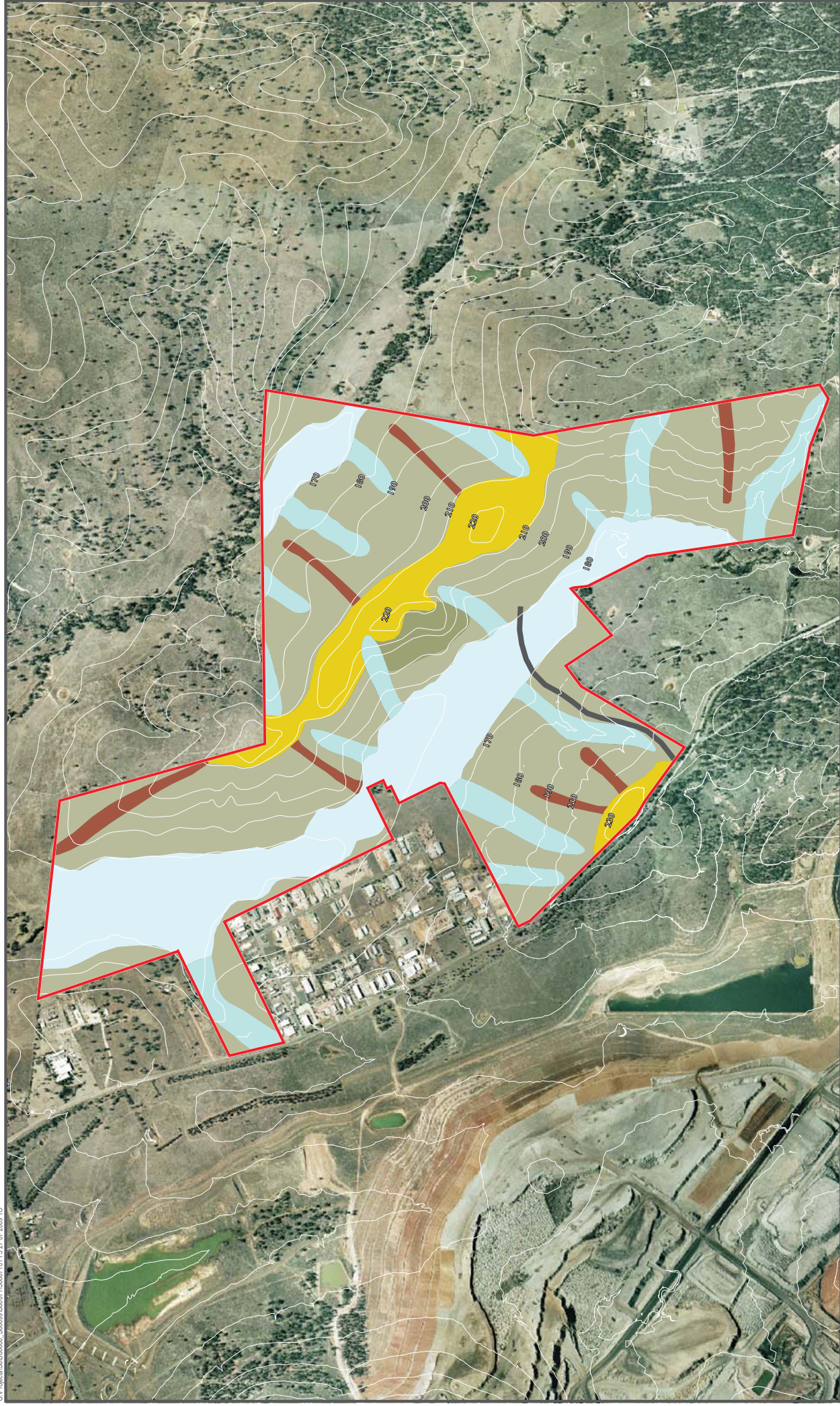
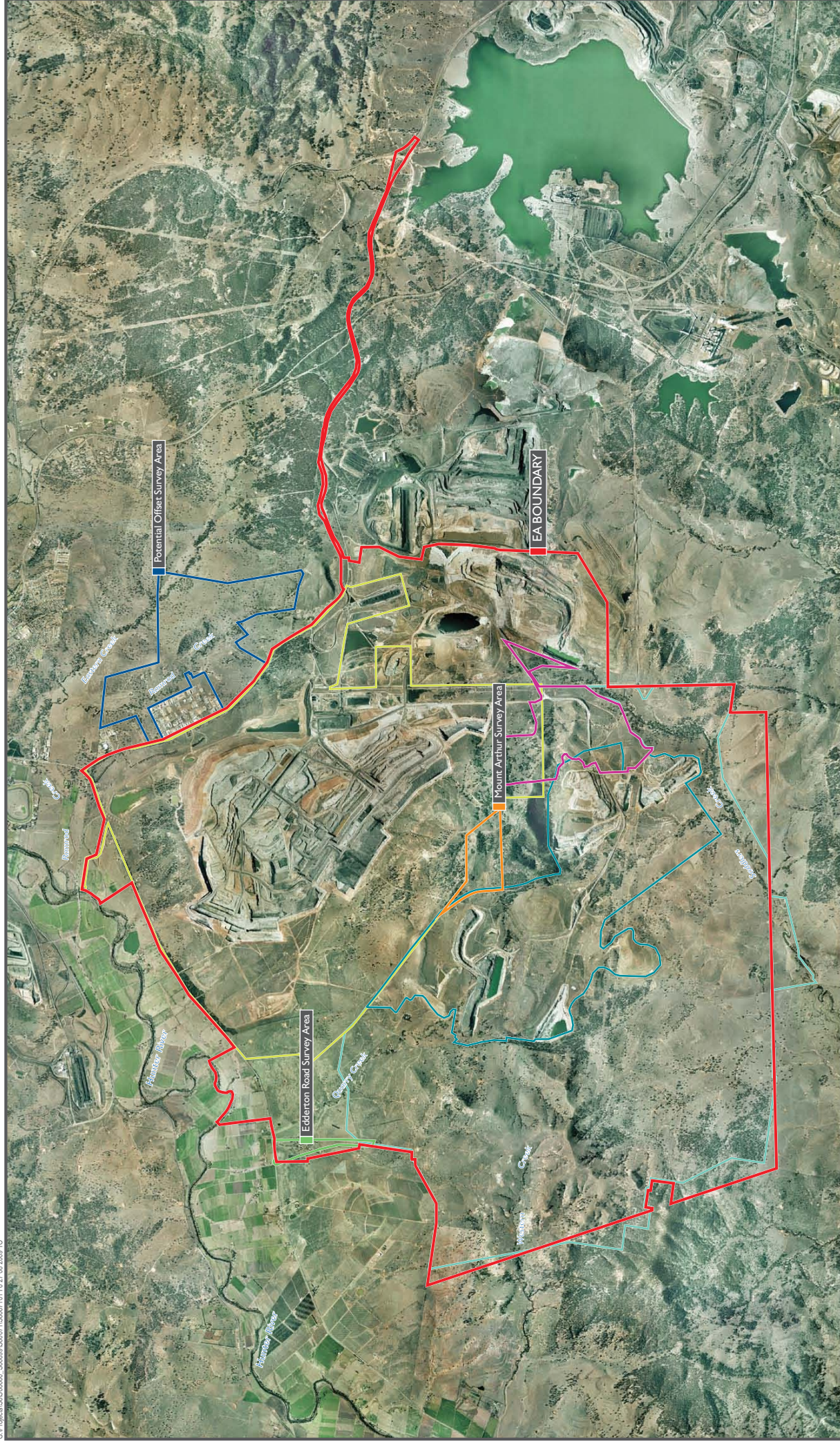


Figure 5



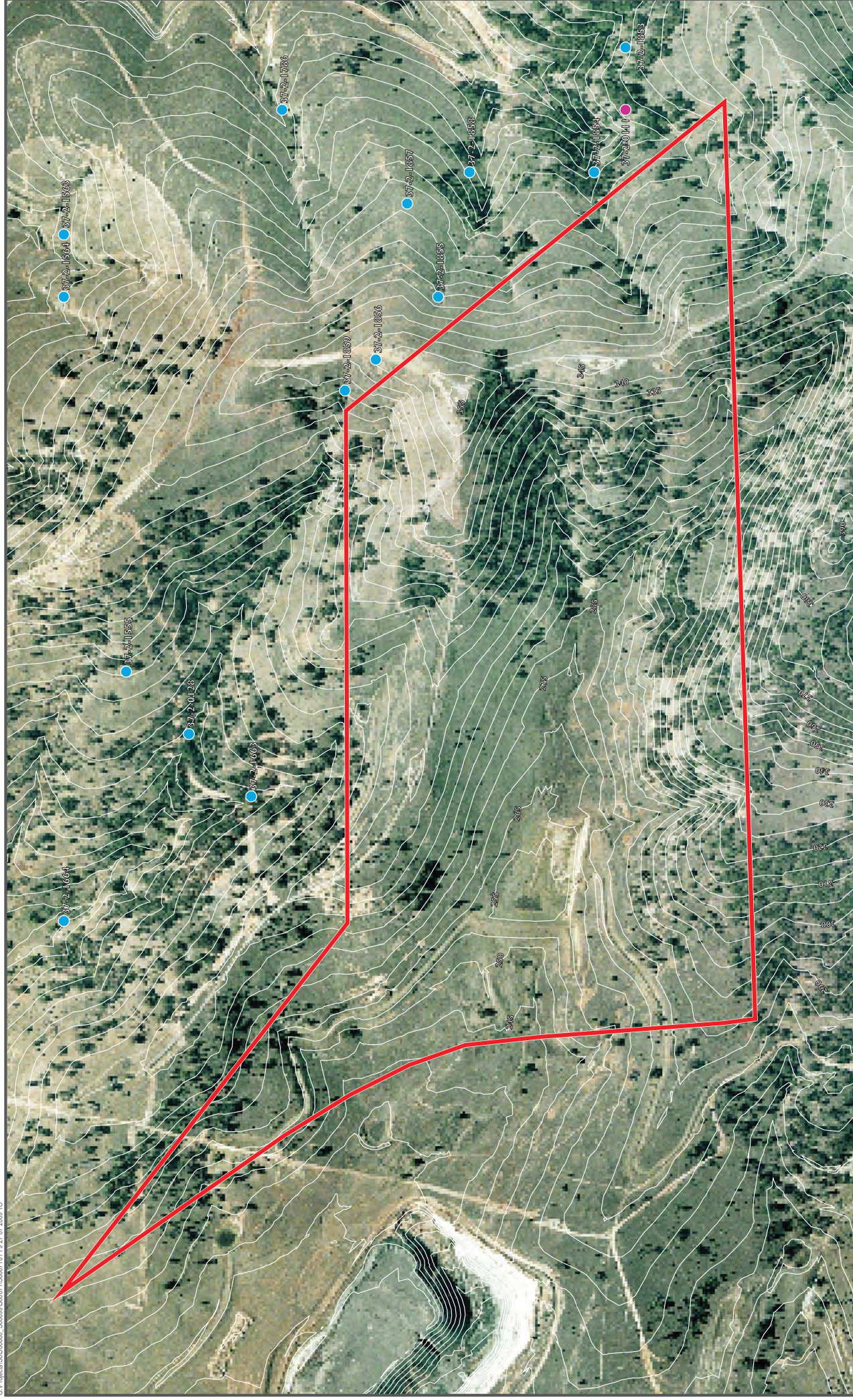


Figure 9

**AHIMS Search Results -
Mount Arthur Survey Area**

Hansen Bailey

Aboriginal Heritage Assessment

Mt Arthur Coal Consolidation Project

Environmental Assessment



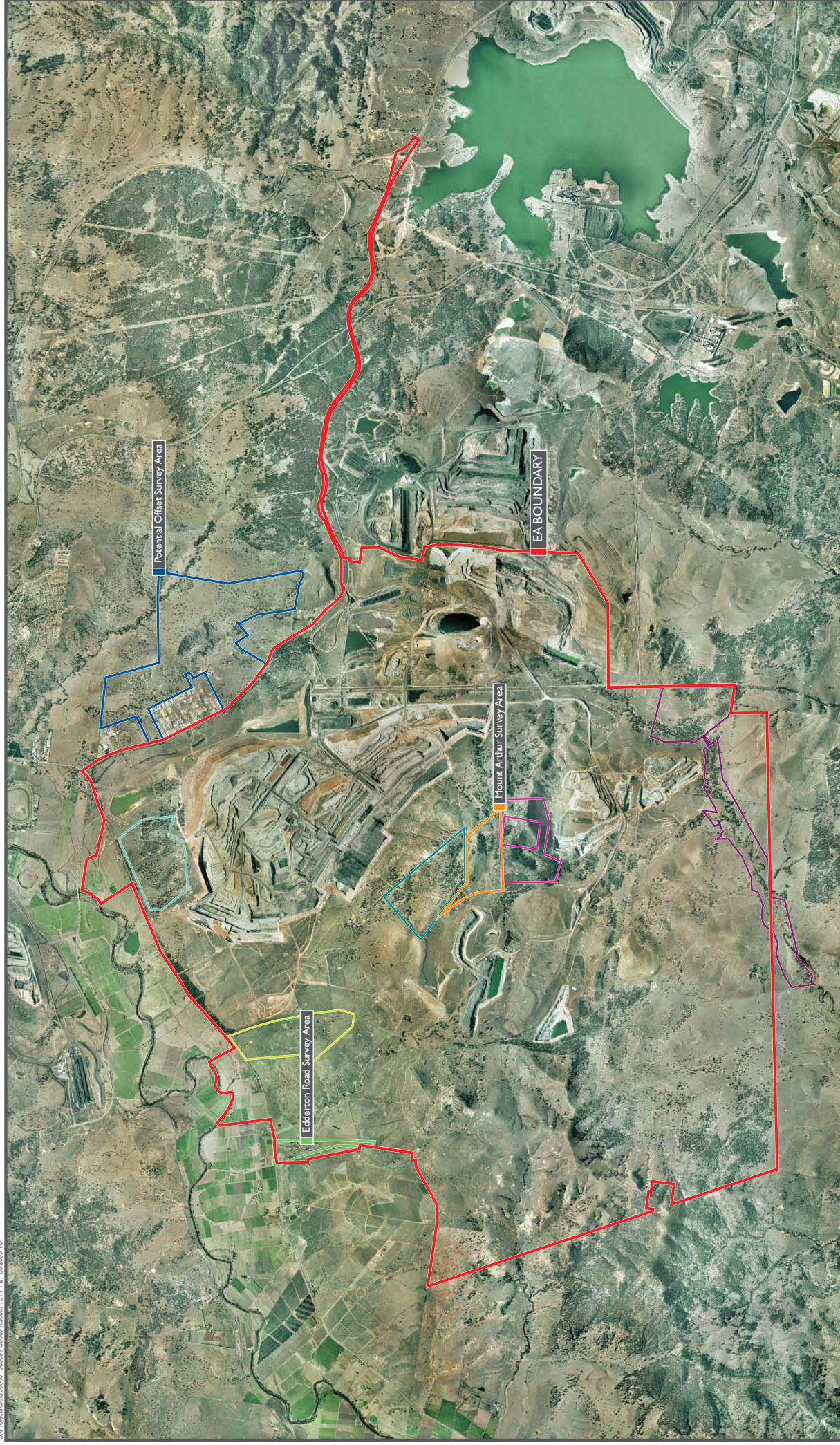
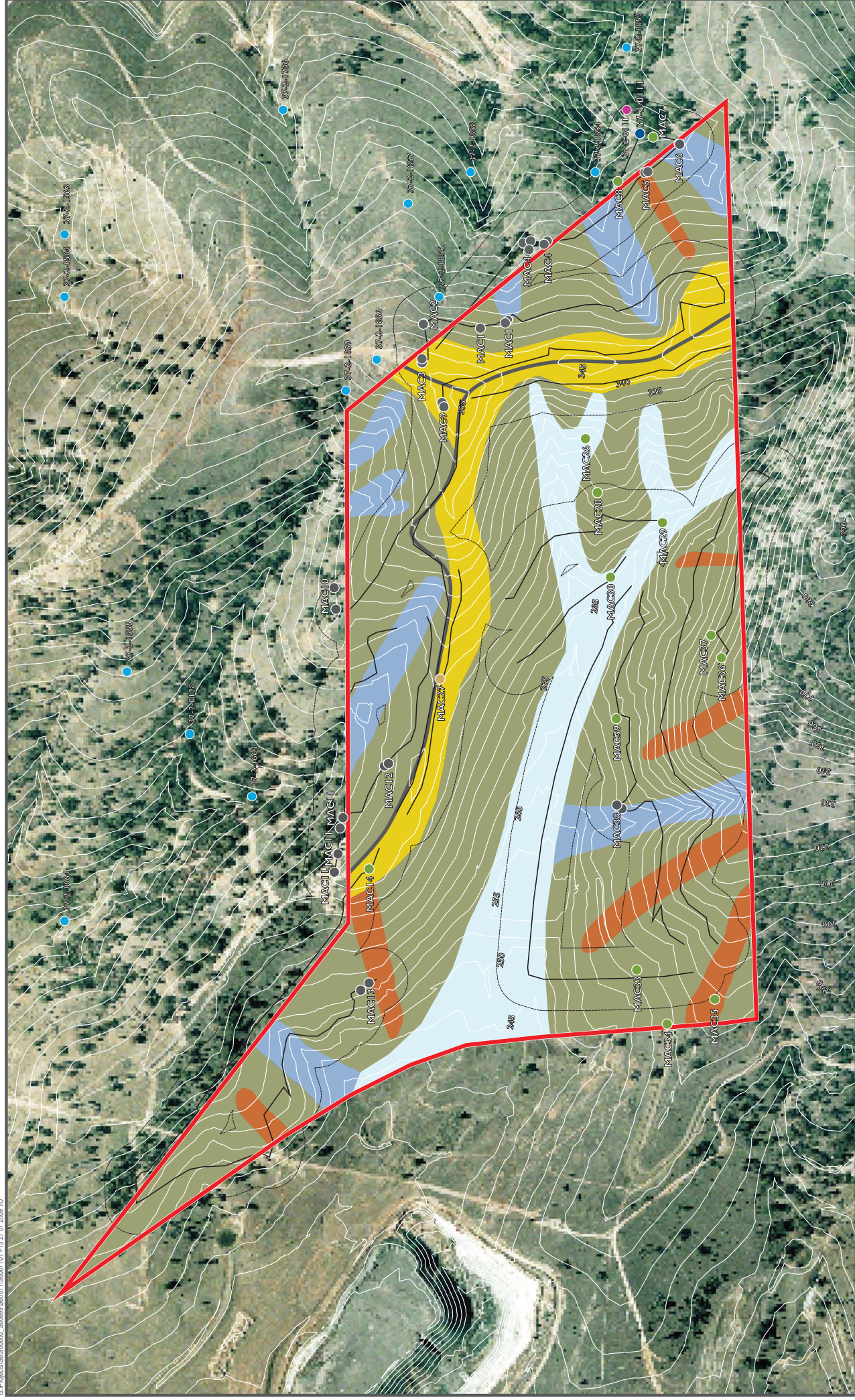


Figure 11

Conservation Areas and Heritage Management Zones at Mt Arthur Coal
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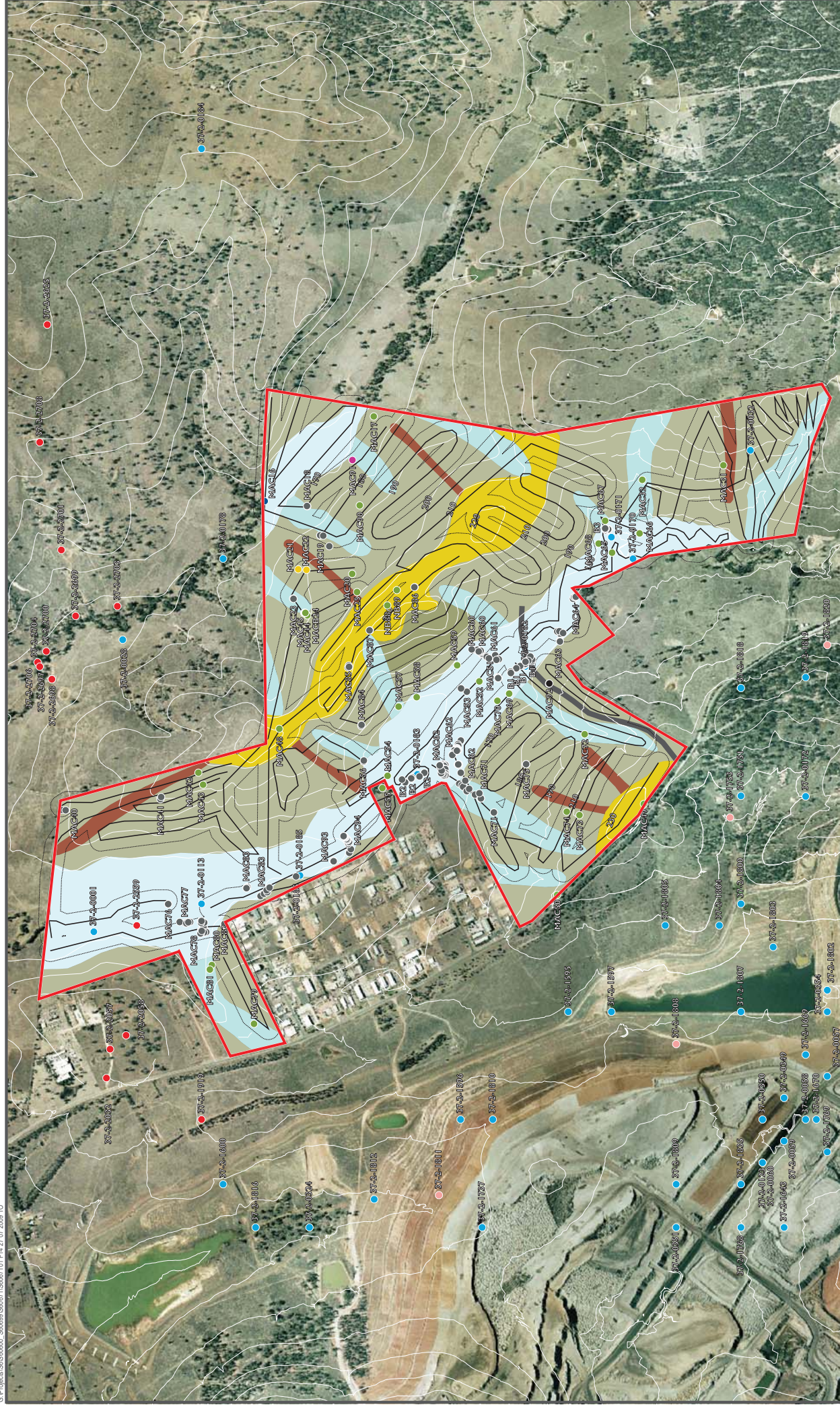


Figure 14 Survey Results and AHMS Records - Offset Survey Area

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Figure 15 | Macleans Hill Heritage Management

Isolated Find
No Type Defined
Open Camp Site



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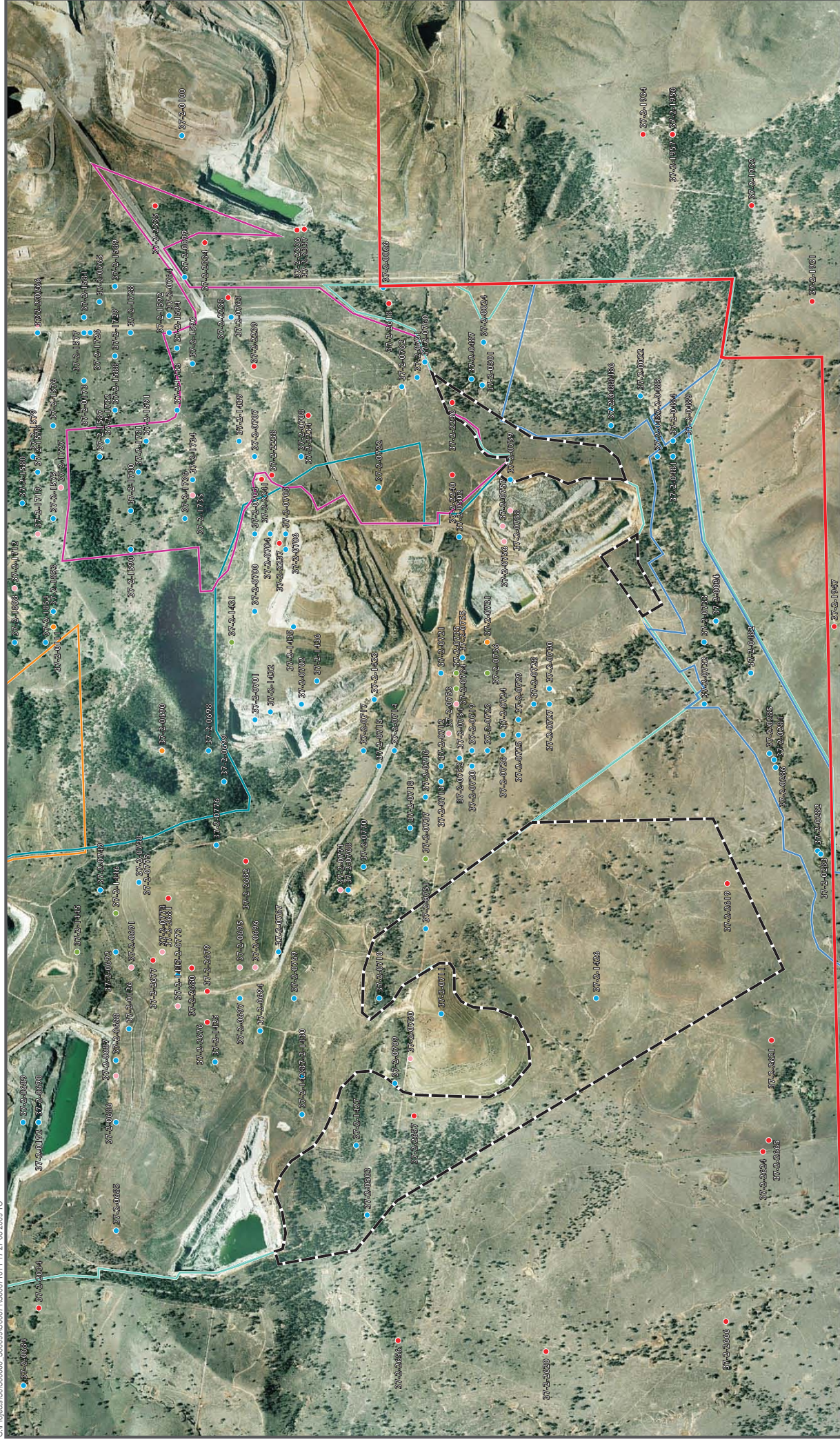
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Figure 16 Edderton Road, Northwest Slopes Heritage Management Zones and Mt Arthur North Extension Area

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 Environmental Assessment



- Axe Grinding Groove
- Isolated Find
- Type not defined
- Open Camp Site
- Quarry
- Scarred Tree
- Shelter with Deposit

- EA Boundary
- Saddlers Pit Extension and Emplacement Area
- Mt Arthur North (Kuskie, 1999)
- Mt Arthur Underground (Umwelt, 2007b)
- Bayswater 3 Mining Area (MacDonald and Davidson, 1999 & 2005)
- Mt Arthur South Pit Extension (Umwelt 2007a)
- Proposed Saddlers Creek Voluntary Conservation Area
- Mt Arthur Survey Area

Figure 17 Saddlers Pit Extension Area and Overburden Emplacement Area
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Plate P1: Example of thick pasture cover with patches of low closed forest in the background within the Mount Arthur survey area.



Plate P2: Typical low, thick pasture grass hampering visibility in the survey areas. This is within Mount Arthur survey area

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Plate P3: Example of ground cover on ridge crest offering higher archaeological visibility near Thomas Mitchell Drive in the Offset survey area



Plate P4: Example of taller stratum vegetation affecting ground surface visibility

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Plate P5: Erosion area along Ramrod Creek in Offset survey area



Plate P6: Large areas of sheetwash erosion found in Mount Arthur survey area

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Plate P7: Bondi Point found in Offset survey area

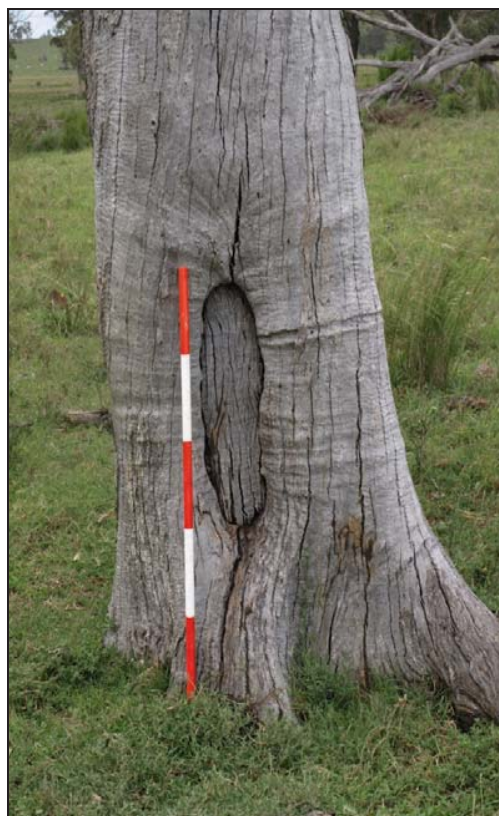


Plate P8: Scarred tree at MAC21 in the Offset survey area

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Plate P9: Scarred tree found at MAC22 in the Offset survey area



Plate P10: Hatchet head found at MAC24 in the Offset survey area

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Plate P11: Site view of grinding groove site 37-2-0111



Plate P12: Close up of grinding grooves at 37-2-0111

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Plate P13: Close up of grinding grooves at site 37-2-0731

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Environment

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Environment

Appendix A

AHIMS Search Results (Survey Areas Only)

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Environment

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Environment



Your reference : Mt Arthur Coal 3
Our reference : AHIMS #25046

ENSR Australia
PO Box 726
Pymble NSW 2073

17 FEB 2009

Friday, 13 February 2009

Attention: Rick Buller

Dear Sir or Madam:

Re: AHIMS Search for the following area at Mt Arthur Coal 3; Zone: 56; E: 292000 - 293000; N: 6420000 - 6422000

I am writing in response to your recent inquiry in respect to Aboriginal objects and Aboriginal places registered with the NSW Department of Environment and Climate Change (DECC) at the above location.

A search of the DECC Aboriginal Heritage Information Management System (AHIMS) has shown that 1 Aboriginal objects and Aboriginal places are recorded in or near the above location. Please refer to the attached report for details.

The information derived from the AHIMS search is only to be used for the purpose for which it was requested. It is not to be made available to the public.

The following qualifications apply to an AHIMS search:

- AHIMS only includes information on Aboriginal objects and Aboriginal places that have been provided to DECC;
- Large areas of New South Wales have not been the subject of systematic survey or recording of Aboriginal history. These areas may contain Aboriginal objects and other heritage values which are not recorded on AHIMS;
- Recordings are provided from a variety of sources and may be variable in their accuracy. When an AHIMS search identifies Aboriginal objects in or near the area it is recommended that the exact location of the Aboriginal object be determined by re-location on the ground; and
- The criteria used to search AHIMS are derived from the information provided by the client and DECC assumes that this information is accurate.

All Aboriginal places and Aboriginal objects are protected under the *National Parks and Wildlife Act 1974* (NPW Act) and it is an offence to destroy, damage or deface them without the prior consent of the DECC Director-General. An Aboriginal object is considered to be known if:

- It is registered on AHIMS;
- It is known to the Aboriginal community; or

- It is located during an investigation of the area conducted for a development application.

If you considering undertaking a development activity in the area subject to the AHIMS search, DECC would recommend that an Aboriginal Heritage Assessment be undertaken. You should consult with the relevant consent authority to determine the necessary assessment to accompany your development application.

Yours Sincerely

A handwritten signature in black ink, appearing to read 'S. Freeburn', with a stylized, cursive script.

Freeburn, Shannon
Administrator
Information Systems & Assessment Section
Culture & Heritage Division
Phone: 02 9585 6471
Fax: 02 9585 6094



List of Sites (List - Short)

Mount Arthur Coal Mine 3

Grid Reference Type = AGD (Australian Geodetic Datum), Zone = 56, Easting From = 292000, Easting to = 293000, Northing From = 6420000, Northing to = 6422000, Feature Search Type = AHIMS Features

Site ID	Site Name	Datum	Zone	Easting	Northing	Context	Site Features	Site Types (recorded prior to June 2001 Shelter with Deposit	Recording (Primary) Donnelly	Reports (Catalogue Number) 380	State Arch. Box No (for office use only) NRS/177798/1/183
37-1-0097	bow river;	AGD	56	292379	6420350	Enclosed Shelter	AFT : -				
		Status	Valid								
		Primary Contact							Permit(s)		



Your reference : Mt Arthur Coal 2
Our reference : AHIMS #25045

ENSR Australia
PO Box 726
Pymble NSW 2073

17 FEB 2009

Friday, 13 February 2009

Attention: Rick Bullers

Dear Sir or Madam:

Re: AHIMS Search for the following area at Mt Arthur Coal 2; Zone: 56; E: 297000 - 300000; N: 6417500 - 641900

I am writing in response to your recent inquiry in respect to Aboriginal objects and Aboriginal places registered with the NSW Department of Environment and Climate Change (DECC) at the above location.

A search of the DECC Aboriginal Heritage Information Management System (AHIMS) has shown that 65 Aboriginal objects and Aboriginal places are recorded in or near the above location. Please refer to the attached report for details.

The information derived from the AHIMS search is only to be used for the purpose for which it was requested. It is not to be made available to the public.

The following qualifications apply to an AHIMS search:

- AHIMS only includes information on Aboriginal objects and Aboriginal places that have been provided to DECC;
- Large areas of New South Wales have not been the subject of systematic survey or recording of Aboriginal history. These areas may contain Aboriginal objects and other heritage values which are not recorded on AHIMS;
- Recordings are provided from a variety of sources and may be variable in their accuracy. When an AHIMS search identifies Aboriginal objects in or near the area it is recommended that the exact location of the Aboriginal object be determined by re-location on the ground; and
- The criteria used to search AHIMS are derived from the information provided by the client and DECC assumes that this information is accurate.

All Aboriginal places and Aboriginal objects are protected under the *National Parks and Wildlife Act 1974* (NPW Act) and it is an offence to destroy, damage or deface them without the prior consent of the DECC Director-General. An Aboriginal object is considered to be known if:

- It is registered on AHIMS;
- It is known to the Aboriginal community; or

- It is located during an investigation of the area conducted for a development application.

If you considering undertaking a development activity in the area subject to the AHIMS search, DECC would recommend that an Aboriginal Heritage Assessment be undertaken. You should consult with the relevant consent authority to determine the necessary assessment to accompany your development application.

Yours Sincerely

A handwritten signature in black ink, appearing to read 'S. Freeburn', with a stylized, cursive script.

Freeburn, Shannon
Administrator
Information Systems & Assessment Section
Culture & Heritage Division
Phone: 02 9585 6471
Fax: 02 9585 6094



List of Sites (List - Short)

Mount Arthur Coal Mine

Grid Reference Type = AGD (Australian Geodetic Datum), Zone = 56, Easting From = 297000, Easting to = 300000, Northing From = 6417500, Northing to = 6419000, Feature Search Type = AHIMS Features

Site ID	Site Name	Datum	Zone	Easting	Northing	Context	Site Features	Site Types (recorded prior to June 2001 Axe Grinding Groove)	Recording (Primary)	Reports (Catalogue Number)	State Arch. Box No (for office use only)
<u>37-2-0111</u>	<u>Fairford 1</u>	AGD	56	298600	6417700	Open Site	GDG :- Status Valid		Dyall	316	NRS/17798/1/189
	Primary Contact										
<u>37-2-0128</u>	<u>Mt Arthur:</u>	AGD	56	297600	6418400	Open Site	AFT :- Status Valid	Open Camp Site	Dyall	316	NRS/17798/1/189
	Primary Contact										
<u>37-2-0193</u>	<u>Whites Creek North Arm</u>	AGD	56	299300	6418600	Open Site	AFT :- Status Valid	Open Camp Site	Dyall		NRS/17798/1/190
	Primary Contact										
<u>37-2-0322</u>	<u>MAN 78: Mt Arthur North:</u>	AGD	56	298250	6419000	Open Site	AFT :- Status Valid	Open Camp Site	Koettig	1203, 1204	NRS/17798/1/192
	Primary Contact										
<u>37-2-1553</u>	<u>CC10</u>	AGD	56	297300	6419000	Open Site	AFT :- Status Valid	Open Camp Site	Permit(s) 147 Unknown Author		NRS/17798/1/204
	Primary Contact										
<u>37-2-1554</u>	<u>CC11</u>	AGD	56	297300	6418700	Open Site	AFT :- Status Valid	Open Camp Site	Permit(s) Unknown Author		NRS/17798/1/204
	Primary Contact										
<u>37-2-1555</u>	<u>Cc12</u>	AGD	56	297700	6418500	Open Site	AFT :- Status Valid	Open Camp Site	Permit(s) Unknown Author		NRS/17798/1/204
	Primary Contact										
<u>37-2-1559</u>	<u>CC19</u>	AGD	56	298600	6418700	Open Site	AFT :- Status Valid	Open Camp Site	Permit(s) Unknown Author		NRS/17798/1/204
	Primary Contact								Permit(s) 1384		



List of Sites (List - Short)

Mount Arthur Coal Mine

Grid Reference Type = AGD (Australian Geodetic Datum), Zone = 56, Easting From = 297000, Easting to = 300000, Northing From = 6417500, Northing to = 6419000, Feature Search Type = AHIMS Features

Site ID	Site Name	Datum	Zone	Easting	Northing	Context	Site Features	Site Types (recorded prior to June 2001)	Recording (Primary)	Reports (Catalogue Number)	State Arch. Box No (for office use only)
<u>37-2-1561</u>	<u>CC22</u>	AGD	56	298500	6418900	Open Site	AFT :-	Open Camp Site	Unknown Author		NRS/17798/1/204
		Status Valid									
	Primary Contact										
<u>37-2-1562</u>	<u>CC23</u>	AGD	56	298500	6418700	Open Site	AFT :-	Open Camp Site	Unknown Author		NRS/17798/1/204
		Status Valid									
	Primary Contact										
<u>37-2-1563</u>	<u>CC24</u>	AGD	56	298400	6418600	Open Site	AFT :-	Open Camp Site	Unknown Author		NRS/17798/1/204
		Status Valid									
	Primary Contact										
<u>37-2-1564</u>	<u>CC27</u>	AGD	56	298300	6418600	Open Site	AFT :-	Open Camp Site	Unknown Author		NRS/17798/1/204
		Status Valid									
	Primary Contact										
<u>37-2-1565</u>	<u>CC29</u>	AGD	56	298200	6418800	Open Site	AFT :-	Open Camp Site	Unknown Author		NRS/17798/1/204
		Status Valid									
	Primary Contact										
<u>37-2-1568</u>	<u>CC33</u>	AGD	56	298100	6418800	Open Site	AFT :-	Open Camp Site	Unknown Author		NRS/17798/1/204
		Status Valid									
	Primary Contact										
<u>37-2-1569</u>	<u>CC36</u>	AGD	56	298000	6418900	Open Site	AFT :-	Open Camp Site	Unknown Author		NRS/17798/1/204
		Status Valid									
	Primary Contact										
<u>37-2-1575</u>	<u>CC43</u>	AGD	56	299300	6417700	Open Site	AFT :-	Open Camp Site	Unknown Author		NRS/17798/1/204
		Status Valid									
	Primary Contact										



List of Sites (List - Short)

Mount Arthur Coal Mine

Grid Reference Type = AGD (Australian Geodetic Datum), Zone = 56, Easting From = 297000, Easting to = 300000, Northing From = 6417500, Northing to = 6419000, Feature Search Type = AHIMS Features

Site ID	Site Name	Datum	Zone	Easting	Northing	Context	Site Features	Site Types (recorded prior to June 2001)	Recording (Primary)	Reports (Catalogue Number)	State Arch. Box No (for office use only)
<u>37-2-1576</u>	<u>CC44</u>	AGD	56	299800	6417700	Open Site	AFT : -	Open Camp Site	Unknown Author		NRS/17798/1/204
		Status	Valid								
		Primary Contact									
<u>37-2-1578</u>	<u>82CC46</u>	AGD	56	299600	6417800	Open Site	AFT : -	Open Camp Site	Permit(s) 1384 Unknown Author		NRS/17798/1/204
		Status	Valid								
		Primary Contact									
<u>37-2-1579</u>	<u>CC47</u>	AGD	56	299700	6417830	Open Site	AFT : -	Open Camp Site	Permit(s) 1384 Unknown Author		NRS/17798/1/204
		Status	Valid								
		Primary Contact									
<u>37-2-1580</u>	<u>CC48</u>	AGD	56	299400	6417900	Open Site	AFT : -	Open Camp Site	Permit(s) 1384 Unknown Author		NRS/17798/1/204
		Status	Valid								
		Primary Contact									
<u>37-2-1644</u>	<u>MB22</u>	AGD	56	299700	6418500	Open Site	AFT : -	Open Camp Site	Permit(s) 1384 Unknown Author		NRS/17798/1/205
		Status	Valid								
		Primary Contact									
<u>37-2-1645</u>	<u>MB23</u>	AGD	56	299750	6418400	Open Site	AFT : -	Open Camp Site	Permit(s) Unknown Author		NRS/17798/1/205
		Status	Valid								
		Primary Contact									
<u>37-2-1646</u>	<u>MB24</u>	AGD	56	299800	6418400	Open Site	AFT : -	Open Camp Site	Permit(s) 1384 Unknown Author		NRS/17798/1/205
		Status	Valid								
		Primary Contact									
<u>37-2-1647</u>	<u>MB27</u>	AGD	56	299800	6418500	Open Site	AFT : -	Open Camp Site	Permit(s) 1384 Unknown Author		NRS/17798/1/205
		Status	Valid								
		Primary Contact									



List of Sites (List - Short)

Mount Arthur Coal Mine

Grid Reference Type = AGD (Australian Geodetic Datum), Zone = 56, Easting From = 297000, Northing From = 6417500, Northing to = 6419000, Feature Search Type = AHIMS Features

Site ID	Site Name	Datum Zone	Eastings	Northing Context	Site Features	Site Types (recorded prior to June 2001)	Recording (Primary)	Reports (Catalogue Number)	State Arch. Box No (for office use only) NRS/17798/1/205
<u>37-2-1648</u>	<u>MB28</u>	AGD	56 299900	6418500 Open Site	AFT :-	Open Camp Site	Unknown Author		
		Status Valid							
		Primary Contact							
<u>37-2-1649</u>	<u>MB29</u>	AGD	56 299800	6418700 Open Site	AFT :-	Open Camp Site	Permit(s) 1384 Unknown Author		NRS/17798/1/205
		Status Valid							
		Primary Contact							
<u>37-2-1650</u>	<u>MB30</u>	AGD	56 299900	6418600 Open Site	AFT :-	Open Camp Site	Permit(s) Unknown Author		NRS/17798/1/205
		Status Valid							
		Primary Contact							
<u>37-2-1651</u>	<u>MB32</u>	AGD	56 299950	6418600 Open Site	AFT :-	Open Camp Site	Permit(s) Unknown Author		NRS/17798/1/205
		Status Valid							
		Primary Contact							
<u>37-2-1652</u>	<u>MB33</u>	AGD	56 299900	6418700 Open Site	AFT :-	Open Camp Site	Permit(s) Unknown Author		NRS/17798/1/205
		Status Valid							
		Primary Contact							
<u>37-2-1654</u>	<u>MB38</u>	AGD	56 299600	6419000 Open Site	AFT :-	Open Camp Site	Permit(s) Unknown Author		NRS/17798/1/205
		Status Valid							
		Primary Contact							
<u>37-2-1663</u>	<u>MB53</u>	AGD	56 297500	6418300 Open Site	AFT :-	Open Camp Site	Permit(s) Unknown Author		NRS/17798/1/205
		Status Valid							
		Primary Contact							
<u>37-2-1664</u>	<u>MB56</u>	AGD	56 297300	6418600 Open Site	AFT :-	Open Camp Site	Permit(s) Unknown Author		NRS/17798/1/205
		Status Valid							
		Primary Contact							



List of Sites (List - Short)

Mount Arthur Coal Mine

Grid Reference Type = AGD (Australian Geodetic Datum), Zone = 56, Easting From = 297000, Easting to = 300000, Northing From = 6417500, Northing to = 6419000, Feature Search Type = AHIMS Features

Site ID	Site Name	Datum	Zone	Easting	Northing	Context	Site Features	Site Types (recorded prior to June 2001)	Recording (Primary)	Reports (Catalogue Number)	State Arch. Box No (for office use only)
<u>37-2-1666</u>	<u>MB58</u>	AGD	56	297000	6418800	Open Site	AFT :- Status Valid Primary Contact	Open Camp Site	Unknown Author		NRS/17798/1/205
<u>37-2-1695</u>	<u>PK35</u>	AGD	56	297750	6418900	Open Site	AFT :- Status Valid Primary Contact	Open Camp Site	Permit(s) Kuskie		NRS/17798/1/206
<u>37-2-1696</u>	<u>PK36</u>	AGD	56	297500	6419000	Open Site	AFT :- Status Valid Primary Contact	Open Camp Site	Permit(s) Kuskie		NRS/17798/1/206
<u>37-2-1711</u>	<u>PK62</u>	AGD	56	298900	6418000	Open Site	AFT :- Status Valid Primary Contact	Isolated Find	Permit(s) Kuskie		NRS/17798/1/206
<u>37-2-1712</u>	<u>PK65</u>	AGD	56	298850	6417950	Open Site	AFT :- Status Valid Primary Contact	Isolated Find	Permit(s) 1384 Kuskie		NRS/17798/1/206
<u>37-2-1713</u>	<u>PK69</u>	AGD	56	299500	6418100	Open Site	AFT :- Status Valid Primary Contact	Open Camp Site	Permit(s) 1384 Kuskie		NRS/17798/1/206
<u>37-2-1714</u>	<u>PK70</u>	AGD	56	299750	6418200	Open Site	AFT :- Status Valid Primary Contact	Isolated Find	Permit(s) 1384 Kuskie		NRS/17798/1/206
<u>37-2-1715</u>	<u>PK71</u>	AGD	56	299800	6418200	Open Site	AFT :- Status Valid Primary Contact	Isolated Find	Permit(s) 1384 Kuskie		NRS/17798/1/206
									Permit(s) 1384		



List of Sites (List - Short)

Mount Arthur Coal Mine

Grid Reference Type = AGD (Australian Geodetic Datum), Zone = 56, Easting From = 297000, Easting to = 300000, Northing From = 6417500, Northing to = 6419000, Feature Search Type = AHIMS Features

Site ID	Site Name	Datum	Zone	Easting	Northing	Context	Site Features	Site Types (recorded prior to June 2001)	Recording (Primary)	Reports (Catalogue Number)	State Arch. Box No (for office use only) NRS/17798/1/206
<u>37-2-1719</u>	<u>PK67</u>	AGD	56	299200	6417800	Open Site	AFT :-	Isolated Find	Kuskie		NRS/17798/1/206
		Status	Valid								
		Primary Contact									
<u>37-2-1725</u>	<u>PK91</u>	AGD	56	299900	6418500	Open Site	AFT :-	Open Camp Site	Permit(s) 1384 Kuskie		NRS/17798/1/206
		Status	Valid								
		Primary Contact									
<u>37-2-1727</u>	<u>PK93</u>	AGD	56	299500	6417650	Open Site	AFT :-	Isolated Find	Permit(s) 1384 Kuskie		NRS/17798/1/206
		Status	Valid								
		Primary Contact									
<u>37-2-1776</u>	<u>RP7</u>	AGD	56	299500	6418500	Open Site	AFT :-	Open Camp Site	Permit(s) 1384 Unknown Author		NRS/17798/1/207
		Status	Valid								
		Primary Contact									
<u>37-2-1777</u>	<u>RP9</u>	AGD	56	299350	6418500	Open Site	AFT :-	Open Camp Site	Permit(s) 1384 Unknown Author		NRS/17798/1/207
		Status	Valid								
		Primary Contact									
<u>37-2-1778</u>	<u>RP10</u>	AGD	56	299300	6418400	Open Site	AFT :-	Open Camp Site	Permit(s) 1384 Unknown Author		NRS/17798/1/207
		Status	Valid								
		Primary Contact									
<u>37-2-1779</u>	<u>RP11</u>	AGD	56	299250	6418200	Open Site	AFT :-	Open Camp Site	Permit(s) Unknown Author		NRS/17798/1/207
		Status	Valid								
		Primary Contact									
<u>37-2-1780</u>	<u>RP12</u>	AGD	56	299200	6418200	Open Site	AFT :-	Open Camp Site	Permit(s) Unknown Author		NRS/17798/1/207
		Status	Valid								
		Primary Contact									



List of Sites (List - Short)

Mount Arthur Coal Mine

Grid Reference Type = AGD (Australian Geodetic Datum), Zone = 56, Easting From = 297000, Easting to = 300000, Northing From = 6417500, Northing to = 6419000, Feature Search Type = AHIMS Features

Site ID	Site Name	Datum	Zone	Easting	Northing	Context	Site Features	Site Types (recorded prior to June 2001 Isolated Find	Recording (Primary) Unknown Author	Reports (Catalogue Number)	State Arch. Box No (for office use only) NRS/17798/1/207
<u>37-2-1781</u>	<u>RP13</u>	AGD	56	299350	6418200	Open Site	AFT :- Status Valid Primary Contact				
<u>37-2-1782</u>	<u>RP19</u>	AGD	56	299050	6418000	Open Site	AFT :- Status Valid Primary Contact	Isolated Find	Permit(s) Unknown Author		NRS/17798/1/207
<u>37-2-1783</u>	<u>RP21</u>	AGD	56	299000	6418400	Open Site	AFT :- Status Valid Primary Contact	Open Camp Site	Permit(s) 1384 Unknown Author		NRS/17798/1/207
<u>37-2-1784</u>	<u>RP22</u>	AGD	56	299000	6418500	Open Site	AFT :- Status Valid Primary Contact	Open Camp Site	Permit(s) Unknown Author		NRS/17798/1/207
<u>37-2-1785</u>	<u>RP25</u>	AGD	56	299220	6418500	Open Site	AFT :- Status Valid Primary Contact	Open Camp Site	Permit(s) Unknown Author		NRS/17798/1/207
<u>37-2-1786</u>	<u>RP26</u>	AGD	56	298600	6418250	Open Site	AFT :- Status Valid Primary Contact	Open Camp Site	Permit(s) Unknown Author		NRS/17798/1/207
<u>37-2-1787</u>	<u>RP28</u>	AGD	56	299200	6418700	Open Site	AFT :- Status Valid Primary Contact	Open Camp Site	Permit(s) 1384 Unknown Author		NRS/17798/1/207
<u>37-2-1788</u>	<u>RP29</u>	AGD	56	299100	6418900	Open Site	AFT :- Status Valid Primary Contact	Open Camp Site	Permit(s) Unknown Author		NRS/17798/1/207



List of Sites (List - Short)

Mount Arthur Coal Mine

Grid Reference Type = AGD (Australian Geodetic Datum), Zone = 56, Easting From = 297000, Easting to = 300000, Northing From = 6417500, Northing to = 6419000, Feature Search Type = AHIMS Features

Site ID	Site Name	Datum Zone	Easting	Northing Context	Site Features	Site Types (recorded prior to June 2001 Open Camp Site	Recording (Primary) Unknown Author	Reports (Catalogue Number)	State Arch. Box No (for office use only) NRS/17798/1/207
<u>37-2-1789</u>	<u>RP31</u>	AGD	56 298900	6418900 Open Site	AFT :- Status Valid Primary Contact	Open Camp Site	Unknown Author		
<u>37-2-1790</u>	<u>RP32</u>	AGD	56 298800	6418900 Open Site	AFT :- Status Valid Primary Contact	Open Camp Site	Unknown Author		NRS/17798/1/207
<u>37-2-1853</u>	<u>BC3</u>	AGD	56 298700	6417700 Open Site	AFT :- Status Valid Primary Contact	Open Camp Site	Unknown Author		NRS/17798/1/208
<u>37-2-1854</u>	<u>BC9</u>	AGD	56 298500	6417750 Open Site	AFT :- Status Valid Primary Contact	Open Camp Site	Unknown Author		NRS/17798/1/208
<u>37-2-1855</u>	<u>BC8(location need to be checked)</u>	AGD	56 298300	6418000 Open Site	AFT :- Status Valid Primary Contact	Open Camp Site	Unknown Author		NRS/17798/1/208
<u>37-2-1856</u>	<u>BC17</u>	AGD	56 298200	6418100 Open Site	AFT :- Status Valid Primary Contact	Open Camp Site	Unknown Author		NRS/17798/1/208
<u>37-2-1857</u>	<u>BC15</u>	AGD	56 298450	6418050 Open Site	AFT :- Status Valid Primary Contact	Open Camp Site	Unknown Author		NRS/17798/1/208
<u>37-2-1858</u>	<u>BC12</u>	AGD	56 298500	6417950 Open Site	AFT :- Status Valid Primary Contact	Open Camp Site	Unknown Author		NRS/17798/1/208



List of Sites (List - Short)

Mount Arthur Coal Mine

Grid Reference Type = AGD (Australian Geodetic Datum), Zone = 56, Easting From = 297000, Easting to = 300000, Northing From = 6417500, Northing to = 6419000, Feature Search Type = AHIMS Features

Site ID	Site Name	Datum	Zone	Easting	Northing	Context	Site Features	Site Types (recorded prior to June 2001 Open Camp Site	Recording (Primary) Kuskie	Reports (Catalogue Number)	State Arch. Box No (for office use only) NRS/177798/1/208
<u>37-2-1859</u>	<u>BC18</u>	AGD	56	298150	6418150	Open Site	AFT : -				
		Status	Valid								
		Primary Contact							Permit(s)		



Your reference : Mount Arthur Coal Mine
Our reference : AHIMS #24738

ENSR Australia
PO Box 726
Pymble NSW 2073

17 FEB 2009

Friday, 13 February 2009

Attention: Rick Bullers

Dear Sir or Madam:

**Re: AHIMS Search for the following area at Mount Arthur Coal Mine,
Muswellbrook.; Zone: 56; E: 299000 - 305000; N: 6419000 - 6425000**

I am writing in response to your recent inquiry in respect to Aboriginal objects and Aboriginal places registered with the NSW Department of Environment and Climate Change (DECC) at the above location.

A search of the DECC Aboriginal Heritage Information Management System (AHIMS) has shown that 111 Aboriginal objects and Aboriginal places are recorded in or near the above location. Please refer to the attached report for details.

The information derived from the AHIMS search is only to be used for the purpose for which it was requested. It is not to be made available to the public.

The following qualifications apply to an AHIMS search:

- AHIMS only includes information on Aboriginal objects and Aboriginal places that have been provided to DECC;
- Large areas of New South Wales have not been the subject of systematic survey or recording of Aboriginal history. These areas may contain Aboriginal objects and other heritage values which are not recorded on AHIMS;
- Recordings are provided from a variety of sources and may be variable in their accuracy. When an AHIMS search identifies Aboriginal objects in or near the area it is recommended that the exact location of the Aboriginal object be determined by re-location on the ground; and
- The criteria used to search AHIMS are derived from the information provided by the client and DECC assumes that this information is accurate.

All Aboriginal places and Aboriginal objects are protected under the *National Parks and Wildlife Act 1974* (NPW Act) and it is an offence to destroy, damage or deface them without the prior consent of the DECC Director-General. An Aboriginal object is considered to be known if:

- It is registered on AHIMS;
- It is known to the Aboriginal community; or

- It is located during an investigation of the area conducted for a development application.

If you considering undertaking a development activity in the area subject to the AHIMS search, DECC would recommend that an Aboriginal Heritage Assessment be undertaken. You should consult with the relevant consent authority to determine the necessary assessment to accompany your development application.

Yours Sincerely



Freeburn, Shannon
Administrator
Information Systems & Assessment Section
Culture & Heritage Division
Phone: 02 9585 6471
Fax: 02 9585 6094



List of Sites (List - Short)

Mount Arthur Coal Mine

Grid Reference Type = AGD (Australian Geodetic Datum), Zone = 56, Easting From = 299000, Northing From = 6420000, Northing to = 6425000, Feature Search Type = AHIMS Features

Site ID	Site Name	Datum Zone	Easting	Northing	Context	Site Features	Site Types	Recording	Reports	State Arch. Box No
<u>37-2-0001</u>	<u>Yammanie/Muswellbrook:</u>	AGD	56	300370	6424500	Open Site	AFT :- Status Valid	Brayshaw	953	NRS/17798/1/188
	Primary Contact									
<u>37-2-0023</u>	<u>White's Creek</u>	AGD	56	300330	6420682	Open Site	AFT :- Status Valid	Dyall	310, 98357, 98373	NRS/17798/1/188
	Primary Contact									
<u>37-2-0028</u>	<u>Ramrod Creek:</u>	AGD	56	301724	6424366	Open Site	AFT :- Status Valid	Dyall	310	NRS/17798/1/188
	Primary Contact									
<u>37-2-0032</u>	<u>Ramrod Creek</u>	AGD	56	302602	6421456	Open Site	AFT :- Status Valid	Dyall	310, 449	NRS/17798/1/188
	Primary Contact									
<u>37-2-0052</u>	<u>MAN 13:MT Arthur North:</u>	AGD	56	300000	6420600	Open Site	AFT :- Status Valid	Koettig	1203, 1204, 98357, 98373	NRS/17798/1/188
	Primary Contact									
<u>37-2-0054</u>	<u>Man 14:Jerrys Plains:</u>	AGD	56	300100	6420600	Open Site	AFT :- Status Valid	Koettig	1203, 1204, 98357, 98373	NRS/17798/1/188
	Primary Contact									
<u>37-2-0055</u>	<u>MAN 15:Mt Arthur North:</u>	AGD	56	299900	6420800	Open Site	AFT :- Status Valid	Koettig	1203, 1204	NRS/17798/1/188
	Primary Contact									
<u>37-2-0056</u>	<u>MAN 16:Mt Arthur North:</u>	AGD	56	299900	6420900	Open Site	AFT :- Status Valid	Koettig	1203, 1204	NRS/17798/1/188
	Primary Contact									



Site ID	Site Name	Datum Zone	Easting	Northing	Context	Site Features	Site Types (recorded prior to June 2001)	Recording (Primary)	Reports (Catalogue Number)	State Arch. Box No (for office use only)
37-2-0057	MAN 17:Mt Arthur North;	AGD	56 299700	6421100	Open Site	AFT :- Status Valid	Open Camp Site	Koettig	1203, 1204	NRS/17798/1/188
37-2-0058	Man 18;Jerrys Plains;	Primary Contact						Permit(s) 147		
		AGD	56 299500	6421200	Open Site	AFT :- Status Valid	Open Camp Site	Koettig	1203, 1204	NRS/17798/1/188
37-2-0059	Man 19;Jerrys Plains;	Primary Contact						Permit(s) 147		
		AGD	56 299400	6421300	Open Site	AFT :- Status Valid	Open Camp Site	Koettig	1203, 1204	NRS/17798/1/188
37-2-0060	Man 20;	Primary Contact						Permit(s) 147		
		AGD	56 299300	6421400	Open Site	AFT :- Status Valid	Open Camp Site	Koettig	936, 1203, 1204	NRS/17798/1/188
37-2-0061	MAN 21:Mt Arthur North;	Primary Contact						Permit(s)		
		AGD	56 300150	6420550	Open Site	AFT :- Status Valid	Open Camp Site	Koettig	1203, 1204, 98357, 98373	NRS/17798/1/189
37-2-0113	Ramrod Creek;	Primary Contact						Permit(s) 147		
		AGD	56 300500	6424000	Open Site	AFT :- Status Valid	Open Camp Site	Dyall	316	NRS/17798/1/189
37-2-0123	Whites Creek;	Primary Contact						Permit(s)		
		AGD	56 299300	6421400	Open Site	AFT :- Status Valid	Open Camp Site	Dyall	316	NRS/17798/1/189
37-2-0167	Bayswater;Bayswater No.2 Colliery Site 7;	Primary Contact						Permit(s)		
		AGD	56 302600	6420400	Open Site	AFT :- Status Valid	Open Camp Site	Hughes	98357, 98373	NRS/17798/1/190



List of Sites (List - Short)

Mount Arthur Coal Mine

Grid Reference Type = AGD (Australian Geodetic Datum), Zone = 56, Easting From = 299000, Northing From = 6420000, Northing to = 6425000, Feature Search Type = AHIMS Features

Site ID	Site Name	Datum	Zone	Easting	Northing	Context	Site Features	Site Types (recorded prior to June 2001)	Recording (Primary)	Reports (Catalogue Number)	State Arch. Box No (for office use only)
<u>37-2-0168</u>	<u>Bayswater:Bayswater No.2 Colliery Site 6;</u>	AGD	56	302300	6420700	Open Site	AFT : -	Open Camp Site	Hughes	98357, 98373	NRS/17798/1/190
	Status Valid										
	Primary Contact										
<u>37-2-0170</u>	<u>Bayswater:Bayswater No.2 Colliery Site 4;</u>	AGD	56	302100	6422000	Open Site	AFT : -	Open Camp Site	Permit(s) Hughes		NRS/17798/1/190
	Status Valid										
	Primary Contact										
<u>37-2-0171</u>	<u>Bayswater:Bayswater No.2 Colliery Site 3;</u>	AGD	56	302200	6422100	Open Site	AFT : -	Open Camp Site	Permit(s) Hughes		NRS/17798/1/190
	Status Valid										
	Primary Contact										
<u>37-2-0172</u>	<u>Bayswater Bayswater No.2 Colliery Site 2</u>	AGD	56	300998	6421200	Open Site	AFT : -	Open Camp Site	Permit(s) Hughes		NRS/17798/1/190
	Status Valid										
	Primary Contact										
<u>37-2-0175</u>	<u>Whites Creek:North Arm;</u>	AGD	56	300000	6420800	Open Site	AFT : -	Open Camp Site	Permit(s) Dyall	98357, 98373	NRS/17798/1/190
	Status Valid										
	Primary Contact										
<u>37-2-0178</u>	<u>Ramrod Creek;</u>	AGD	56	302100	6423900	Open Site	AFT : -	Open Camp Site	Permit(s) Dyall		NRS/17798/1/190
	Status Valid										
	Primary Contact										
<u>37-2-0182</u>	<u>Ramrod Creek;</u>	AGD	56	301600	6422500	Open Site	AFT : -	Open Camp Site	Permit(s) Brayshaw		NRS/17798/1/190
	Status Valid										
	Primary Contact										
<u>37-2-0183</u>	<u>Ramrod Creek;</u>	AGD	56	301100	6423000	Open Site	AFT : -	Open Camp Site	Permit(s) Brayshaw		NRS/17798/1/190
	Status Valid										
	Primary Contact										



List of Sites (List - Short)

Mount Arthur Coal Mine

Grid Reference Type = AGD (Australian Geodetic Datum), Zone = 56, Easting From = 299000, Easting to = 305000, Northing From = 6420000, Northing to = 6425000, Feature Search Type = AHIMS Features

Site ID	Site Name	Datum	Zone	Eastings	Northing	Context	Site Features	Site Types	Recording	Reports	State Arch. Box No
37-2-0184	<u>Ramrod Creek.</u>	AGD	56	304000	6424000	Open Site	AFT : -	Open Camp Site	(Primary) Brayshaw	172	NRS/17798/1/190
		Status	Valid								
		Primary Contact									
37-2-0185	<u>Ramrod Creek Site B4</u>	AGD	56	300631	6423544	Open Site	AFT : -	Open Camp Site	Permit(s) Brayshaw, French, Mathews	172	NRS/17798/1/190
		Status	Valid								
		Primary Contact									
37-2-0187	<u>Ramrod Creek;</u>	AGD	56	305000	6423500	Open Site	AFT : -	Open Camp Site	Permit(s) Brayshaw	172	NRS/17798/1/190
		Status	Valid								
		Primary Contact									
37-2-0290	<u>MAN 12: Mt Arthur North;</u>	AGD	56	300000	6420500	Open Site	AFT : -	Open Camp Site	Permit(s) Koettig	1203, 1204, 98357, 98373	NRS/17798/1/192
		Status	Valid								
		Primary Contact									
37-2-0324	<u>MAN 80: Mt Arthur North;</u>	AGD	56	299000	6423500	Open Site	AFT : -	Open Camp Site	Permit(s) 147 Koettig	1203, 1204	NRS/17798/1/192
		Status	Valid								
		Primary Contact									
37-2-0349	<u>MAN 26: Mt Arthur North;</u>	AGD	56	299600	6421300	Open Site	AFT : -	Open Camp Site	Permit(s) 147 Koettig	1203, 1204	NRS/17798/1/192
		Status	Valid								
		Primary Contact									
37-2-0350	<u>MAN 27: Mt Arthur North;</u>	AGD	56	299500	6421400	Open Site	AFT : -	Open Camp Site	Permit(s) 147 Koettig	1203, 1204	NRS/17798/1/192
		Status	Valid								
		Primary Contact									
37-2-0351	<u>MAN 28: Mt Arthur North;</u>	AGD	56	299000	6421800	Open Site	AFT : -	Open Camp Site	Permit(s) 147 Koettig	1203, 1204	NRS/17798/1/193
		Status	Valid								
		Primary Contact									



List of Sites (List - Short)

Mount Arthur Coal Mine

Grid Reference Type = AGD (Australian Geodetic Datum); Zone = 56, Easting From = 299000, Easting to = 305000, Northing From = 6420000, Northing to = 6425000, Feature Search Type = AHIMS Features

Site ID	Site Name	Datum	Zone	Eastings	Northing	Context	Site Features	Site Types	Recording	Reports	State Arch. Box No
<u>37-2-0354</u>	<u>MAN 24: Mt Arthur North:</u>	AGD	56	300000	6421100	Open Site	AFT : -	(recorded prior to June 2001) Open Camp Site	(Primary) Koettig	1203, 1204	NRS/17798/1/193
		Status	Valid								
	Primary Contact										
<u>37-2-0355</u>	<u>MAN 23: Mt Arthur North:</u>	AGD	56	300000	6421000	Open Site	AFT : -	Open Camp Site	Permit(s) 147 Koettig	1203, 1204, 98357, 98373	NRS/17798/1/193
		Status	Valid								
	Primary Contact										
<u>37-2-0356</u>	<u>MAN 22: Mt Arthur North:</u>	AGD	56	300100	6420800	Open Site	AFT : -	Open Camp Site	Permit(s) 147 Koettig	1203, 1204, 98357, 98373	NRS/17798/1/193
		Status	Valid								
	Primary Contact										
<u>37-2-1595</u>	<u>CC97</u>	AGD	56	300000	6422300	Open Site	AFT : -	Open Camp Site	Permit(s) 147 Unknown Author		NRS/17798/1/204
		Status	Valid								
	Primary Contact										
<u>37-2-1596</u>	<u>CC98</u>	AGD	56	299500	6422800	Open Site	AFT : -	Open Camp Site	Permit(s) Unknown Author		NRS/17798/1/204
		Status	Valid								
	Primary Contact										
<u>37-2-1597</u>	<u>CC99</u>	AGD	56	300000	6422100	Open Site	AFT : -	Open Camp Site	Permit(s) Unknown Author		NRS/17798/1/204
		Status	Valid								
	Primary Contact										
<u>37-2-1600</u>	<u>CC107</u>	AGD	56	299200	6423900	Open Site	AFT : -	Open Camp Site	Permit(s) Unknown Author		NRS/17798/1/204
		Status	Valid								
	Primary Contact										
<u>37-2-1620</u>	<u>CC134</u>	AGD	56	300100	6420500	Open Site	AFT : -	Open Camp Site	Permit(s) Unknown Author	98357, 98373	NRS/17798/1/204
		Status	Valid								
	Primary Contact										



List of Sites (List - Short)

Mount Arthur Coal Mine

Grid Reference Type = AGD (Australian Geodetic Datum), Zone = 56, Easting From = 299000, Easting to = 305000, Northing From = 6420000, Northing to = 6425000, Feature Search Type = AHIMS Features

Site ID	Site Name	Datum	Zone	Eastings	Northing	Context	Site Features	Site Types	Recording	Reports	State Arch. Box No
<u>37-2-1642</u>	<u>MB20</u>	AGD	56	299000	6420800	Open Site	AFT : - Status Valid	Open Camp Site	(Primary) Unknown Author	(Catalogue Number) NRS/17798/1/205	
		Primary Contact									
<u>37-2-1643</u>	<u>MB21</u>	AGD	56	299000	6421300	Open Site	AFT : - Status Valid	Open Camp Site	Permit(s) Unknown Author		NRS/17798/1/205
		Primary Contact									
<u>37-2-1655</u>	<u>MB39</u>	AGD	56	299000	6420000	Open Site	AFT : - Status Valid	Open Camp Site	Permit(s) Unknown Author		NRS/17798/1/205
		Primary Contact									
<u>37-2-1669</u>	<u>MB63</u>	AGD	56	299800	6421200	Open Site	AFT : - Status Valid	Open Camp Site	Permit(s) Unknown Author		NRS/17798/1/205
		Primary Contact									
<u>37-2-1670</u>	<u>MB65</u>	AGD	56	299500	6421150	Open Site	AFT : - Status Valid	Open Camp Site	Permit(s) Unknown Author		NRS/17798/1/205
		Primary Contact									
<u>37-2-1737</u>	<u>PK116</u>	AGD	56	299000	6422700	Open Site	AFT : - Status Valid	Open Camp Site	Permit(s) Kuskie		NRS/17798/1/207
		Primary Contact									
<u>37-2-1751</u>	<u>PK136</u>	AGD	56	301000	6421500	Open Site	AFT : - Status Valid	Open Camp Site	Permit(s) Kuskie		NRS/17798/1/207
		Primary Contact									
<u>37-2-1752</u>	<u>PK139</u>	AGD	56	301100	6421000	Open Site	AFT : - Status Valid	Isolated Find	Permit(s) Kuskie	98357, 98373	NRS/17798/1/207
		Primary Contact									
		Permit(s)									



List of Sites (List - Short)

Mount Arthur Coal Mine

Grid Reference Type = AGD (Australian Geodetic Datum), Zone = 56, Easting From = 299000, Northing From = 6420000, Northing to = 6425000, Feature Search Type = AHIMS Features

Site ID	Site Name	Datum	Zone	Easting	Northing	Context	Site Features	Site Types (recorded prior to June 2001)	Recording (Primary)	Reports (Catalogue Number)	State Arch. Box No (for office use only) NRS/17798/1/207
<u>37-2-1753</u>	<u>PK141</u>	AGD	56	300900	6421550	Open Site	AFT : -	Isolated Find	Kuskie		
		Status Valid									
		Primary Contact									
<u>37-2-1768</u>	<u>PK158</u>	AGD	56	299000	6421500	Open Site	AFT : -	Open Camp Site	Permit(s) Kuskie		NRS/17798/1/207
		Status Valid									
		Primary Contact									
<u>37-2-1769</u>	<u>PK159</u>	AGD	56	299350	6421100	Open Site	AFT : -	Open Camp Site	Permit(s) Kuskie		NRS/17798/1/207
		Status Valid									
		Primary Contact									
<u>37-2-1770</u>	<u>PK161</u>	AGD	56	299700	6420750	Open Site	AFT : -	Isolated Find	Permit(s) Kuskie		NRS/17798/1/207
		Status Valid									
		Primary Contact									
<u>37-2-1775</u>	<u>RP3</u>	AGD	56	299500	6420000	Open Site	AFT : -	Open Camp Site	Permit(s) Unknown Author		NRS/17798/1/207
		Status Valid									
		Primary Contact									
<u>37-2-1798</u>	<u>RP43</u>	AGD	56	300600	6420250	Open Site	AFT : -	Open Camp Site	Permit(s) Unknown Author	98357, 98373	NRS/17798/1/207
		Status Valid									
		Primary Contact									
<u>37-2-1799</u>	<u>RP44</u>	AGD	56	300500	6420800	Open Site	AFT : -	Open Camp Site	Permit(s) Unknown Author	98357, 98373	NRS/17798/1/207
		Status Valid									
		Primary Contact									
<u>37-2-1800</u>	<u>RP46</u>	AGD	56	300500	6421500	Open Site	AFT : -	Open Camp Site	Permit(s) Unknown Author		NRS/17798/1/207
		Status Valid									
		Primary Contact									



List of Sites (List - Short)

Mount Arthur Coal Mine

Grid Reference Type = AGD (Australian Geodetic Datum), Zone = 56, Easting From = 299000, Northing From = 6420000, Northing to = 6425000, Feature Search Type = AHIMS Features

Site ID	Site Name	Datum	Zone	Easting	Northing	Context	Site Features	Site Types (recorded prior to June 2001)	Recording (Primary)	Reports (Catalogue Number)	State Arch. Box No (for office use only)
<u>37-2-1801</u>	<u>RP47</u>	AGD	56	300150	6420900	Open Site	AFT :-	Open Camp Site	Unknown Author	98357, 98373	NRS/17798/1/207
		Status	Valid								
		Primary Contact									
<u>37-2-1802</u>	<u>RP48</u>	AGD	56	300100	6421100	Open Site	AFT :-	Open Camp Site	Unknown Author		NRS/17798/1/207
		Status	Valid						Permit(s)		
		Primary Contact									
<u>37-2-1803</u>	<u>RP51</u>	AGD	56	300300	6421350	Open Site	AFT :-	Open Camp Site	Unknown Author		NRS/17798/1/207
		Status	Valid						Permit(s)		
		Primary Contact									
<u>37-2-1804</u>	<u>RP53</u>	AGD	56	300400	6421600	Open Site	AFT :-	Open Camp Site	Unknown Author		NRS/17798/1/207
		Status	Valid						Permit(s)		
		Primary Contact									
<u>37-2-1805</u>	<u>RP55</u>	AGD	56	300400	6421850	Open Site	AFT :-	Open Camp Site	Unknown Author		NRS/17798/1/207
		Status	Valid						Permit(s)		
		Primary Contact									
<u>37-2-1807</u>	<u>RP56</u>	AGD	56	300000	6421500	Open Site	AFT :-	Open Camp Site	Unknown Author		NRS/17798/1/207
		Status	Valid						Permit(s)		
		Primary Contact									
<u>37-2-1808</u>	<u>RP57</u>	AGD	56	299850	6421800	Open Site	AFT :-	Isolated Find	Unknown Author		NRS/17798/1/207
		Status	Valid						Permit(s)		
		Primary Contact									
<u>37-2-1809</u>	<u>RP59</u>	AGD	56	299200	6421800	Open Site	AFT :-	Open Camp Site	Unknown Author	98449	NRS/17798/1/207
		Status	Valid						Permit(s)		
		Primary Contact									



List of Sites (List - Short)

Mount Arthur Coal Mine

Grid Reference Type = AGD (Australian Geodetic Datum), Zone = 56, Easting From = 299000, Easting to = 305000, Northing From = 6420000, Northing to = 6425000, Feature Search Type = AHIMS Features

Site ID	Site Name	Datum	Zone	Easting	Northing	Context	Site Features	Site Types (recorded prior to June 2001)	Recording (Primary)	Reports (Catalogue Number)	State Arch. Box No (for office use only)
<u>37-2-1810</u>	<u>RP60</u>	AGD	56	299500	6422650	Open Site	AFT : -	Open Camp Site	Unknown Author		NRS/17798/1/207
		Status Valid									
	Primary Contact										
<u>37-2-1811</u>	<u>RP61</u>	AGD	56	299150	6422900	Open Site	AFT : -	Isolated Find	Permit(s)		NRS/17798/1/207
		Status Valid							Unknown Author		
	Primary Contact										
<u>37-2-1812</u>	<u>RP63</u>	AGD	56	299130	6423200	Open Site	AFT : -	Open Camp Site	Permit(s)		NRS/17798/1/207
		Status Valid							Unknown Author		
	Primary Contact										
<u>37-2-1813</u>	<u>RP64</u>	AGD	56	300990	6420700	Open Site	AFT : -	Open Camp Site	Permit(s)	98357, 98373	NRS/17798/1/207
		Status Valid							Unknown Author		
	Primary Contact										
<u>37-2-1816</u>	<u>RP67</u>	AGD	56	299000	6423750	Open Site	AFT : -	Open Camp Site	Permit(s)		NRS/17798/1/208
		Status Valid							Unknown Author		
	Primary Contact										
<u>37-2-1818</u>	<u>RP70</u>	AGD	56	301500	6421500	Open Site	AFT : -	Open Camp Site	Permit(s)		NRS/17798/1/208
		Status Valid							Unknown Author		
	Primary Contact										
<u>37-2-1819</u>	<u>RP76</u>	AGD	56	301550	6421200	Open Site	AFT : -	Open Camp Site	Permit(s)		NRS/17798/1/208
		Status Valid							Unknown Author		
	Primary Contact										
<u>37-2-1820</u>	<u>RP77</u>	AGD	56	301700	6421100	Open Site	AFT : -	Isolated Find	Permit(s)		NRS/17798/1/208
		Status Valid							Unknown Author		
	Primary Contact										
									Permit(s) 1384		



List of Sites (List - Short)

Mount Arthur Coal Mine

Grid Reference Type = AGD (Australian Geodetic Datum), Zone = 56, Easting From = 299000, Northing From = 6420000, Northing to = 6425000, Feature Search Type = AHIMS Features

Site ID	Site Name	Datum Zone	Easting	Northing Context	Site Features	Site Types (recorded prior to June 2001)	Recording (Primary)	Reports (Catalogue Number)	State Arch. Box No (for office use only)
<u>37-2-1821</u>	<u>RP82</u>	AGD	56 301700	6420900 Open Site	AFT : -	Open Camp Site	Unknown Author	98357, 98373	NRS/17798/1/208
		Status Valid							
		Primary Contact							
<u>37-2-1822</u>	<u>RP84</u>	AGD	56 301850	6420850 Open Site	AFT : -	Open Camp Site	Unknown Author	98357, 98373	NRS/17798/1/208
		Status Valid							
		Primary Contact							
<u>37-2-1823</u>	<u>RP86</u>	AGD	56 301400	6420800 Open Site	AFT : -	Open Camp Site	Unknown Author	98357, 98373	NRS/17798/1/208
		Status Valid							
		Primary Contact							
<u>37-2-1824</u>	<u>RP94</u>	AGD	56 301600	6420600 Open Site	AFT : -	Open Camp Site	Unknown Author	98357, 98373	NRS/17798/1/208
		Status Valid							
		Primary Contact							
<u>37-2-1825</u>	<u>RP98</u>	AGD	56 302000	6420500 Open Site	AFT : -	Open Camp Site	Unknown Author	98357, 98373	NRS/17798/1/208
		Status Valid							
		Primary Contact							
<u>37-2-1834</u>	<u>RP112</u>	AGD	56 300200	6420500 Open Site	AFT : -	Open Camp Site	Unknown Author	98357, 98373	NRS/17798/1/208
		Status Valid							
		Primary Contact							
<u>37-2-1835</u>	<u>RP113</u>	AGD	56 299200	6421500 Open Site	AFT : -	Open Camp Site	Unknown Author	98449	NRS/17798/1/208
		Status Valid							
		Primary Contact							
<u>37-2-1850</u>	<u>RL4</u>	AGD	56 303200	6420300 Open Site	AFT : -	Open Camp Site	Kuskie	98357, 98373	NRS/17798/1/208
		Status Valid							
		Primary Contact							



List of Sites (List - Short)

Mount Arthur Coal Mine

Grid Reference Type = AGD (Australian Geodetic Datum), Zone = 56, Easting From = 299000, Easting to = 305000, Northing From = 6420000, Northing to = 6425000, Feature Search Type = AHIMS Features

Site ID	Site Name	Datum	Zone	Easting	Northing	Context	Site Features	Site Types (recorded prior to June 2001)	Recording (Primary)	Reports (Catalogue Number)	State Arch. Box No (for office use only)
<u>37-2-1919</u>	<u>CC100</u>	AGD	56	299500	6424000	Open Site	AFT : - Status Valid	None	Kuskie		NRS/17798/1/209
	Primary Contact										
<u>37-2-2006</u>	<u>Ramrod Creek</u>	AGD	56	302681	6420472	Open Site	AFT : 27 Status Valid	None	French, Mathews		NRS/17798/1/210
	Primary Contact										
<u>37-2-2032</u>	<u>Thomas Mitchell Industrial 1</u>	AGD	56	299693	6424441	Open Site	AFT : 1 Status Valid	None	McCardle	99644	NRS/17798/1/210
	Primary Contact										
<u>37-2-2057</u>	<u>Thomas Mitchell Industrial 2</u>	AGD	56	299826	6424424	Open Site	AFT : 2 Status Valid	None	McCardle		NRS/17798/1/210
	Primary Contact										
<u>37-2-2058</u>	<u>Thomas Mitchell Industrial 3</u>	AGD	56	299890	6424350	Open Site	AFT : 3 Status Valid	None	McCardle		NRS/17798/1/210
	Primary Contact										
<u>37-2-2323</u>	<u>Ramrod R16</u>	GDA	56	304353	6420590	Open Site	AFT : 1 Status Valid	None	Permit(s) 2427, 2556 Archaeological Risk Assessment Services		
	Primary Contact										
<u>37-2-2324</u>	<u>Ramrod R17</u>	GDA	56	304333	6420486	Open Site	AFT : 1 Status Valid	None	Permit(s) Archaeological Risk Assessment Services		
	Primary Contact										
<u>37-2-2329</u>	<u>Ramrod R11</u>	GDA	56	304886	6420480	Open Site	AFT : 1 Status Valid	None	Permit(s) Archaeological Risk Assessment Services		
	Primary Contact										



List of Sites (List - Short)

Mount Arthur Coal Mine

Grid Reference Type = AGD (Australian Geodetic Datum), Zone = 56, Easting From = 299000, Easting to = 305000, Northing From = 6420000, Northing to = 6425000, Feature Search Type = AHIMS Features

Site ID	Site Name	Datum	Zone	Eastings	Northing	Context	Site Features	Site Types (recorded prior to June 2001)	Recording (Primary)	Reports (Catalogue Number)	State Arch. Box No (for office use only)
<u>37-2-2330</u>	<u>Ramrod R12</u>	GDA	56	304779	6420491	Open Site	AFT : 1	None	Archaeological Risk Assessment Services		
		Status	Valid								
		Primary Contact									
<u>37-2-2331</u>	<u>Ramrod R13</u>	GDA	56	304076	6420394	Open Site	AFT : 1	None	Archaeological Risk Assessment Services		
		Status	Valid								
		Primary Contact									
<u>37-2-2332</u>	<u>Ramrod R14</u>	AGD	56	304265	6420669	Open Site	AFT : 1	None	Archaeological Risk Assessment Services		
		Status	Valid								
		Primary Contact									
<u>37-2-2333</u>	<u>Ramrod R15</u>	GDA	56	304350	6420584	Open Site	AFT : 1	None	Archaeological Risk Assessment Services		
		Status	Valid								
		Primary Contact									
<u>37-2-2338</u>	<u>Ramrod R1</u>	GDA	56	303622	6420533	Open Site	AFT : -	None	Archaeological Risk Assessment Services		
		Status	Valid								
		Primary Contact									
<u>37-2-2339</u>	<u>Ramrod R2</u>	GDA	56	303676	6420568	Open Site	AFT : -	None	Archaeological Risk Assessment Services		
		Status	Valid								
		Primary Contact									
<u>37-2-2340</u>	<u>Ramrod R3</u>	GDA	56	303739	6420466	Open Site	AFT : -, PAD : -	None	Archaeological Risk Assessment Services		
		Status	Valid								
		Primary Contact									
<u>37-2-2341</u>	<u>Ramrod R4</u>	GDA	56	303691	6420285	Open Site	AFT : -, PAD : -	None	Archaeological Risk Assessment Services		
		Status	Valid								
		Primary Contact									



List of Sites (List - Short)

Mount Arthur Coal Mine

Grid Reference Type = AGD (Australian Geodetic Datum), Zone = 56, Easting From = 299000, Easting to = 305000, Northing From = 6420000, Northing to = 6425000, Feature Search Type = AHIMS Features

Site ID	Site Name	Datum	Zone	Eastings	Northing	Context	Site Features	Site Types (recorded prior to June 2001)	Recording (Primary)	Reports (Catalogue Number)	State Arch. Box No (for office use only)
<u>37-2-2344</u>	<u>Ramrod R7</u>	GDA	56	305043	6420543	Open Site	AFT : -	None	Hamm		
		Status	Valid								
		Primary Contact									
<u>37-2-2559</u>	<u>Thomas Mitchell Drive PAD 1</u>	AGD	56	300400	6424300	Open Site	PAD : -	None	McCardle		
		Status	Valid								
		Primary Contact									
<u>37-2-2625</u>	<u>M-STH1</u>	GDA	56	303185	6424716	Open Site	AFT : 1	None	Permit(s) ERM Australia	2823, 2824	
		Status	Valid								
		Primary Contact									
<u>37-2-2697</u>	<u>YAS 5</u>	AGD	56	301541	6424694	Open Site	AFT : 8	None	Permit(s) Davies	2925, 2933	
		Status	Valid								
		Primary Contact									
<u>37-2-2698</u>	<u>YST 1</u>	AGD	56	301541	6424694	Open Site	TRE : 1	None	Permit(s) Davies		
		Status	Valid								
		Primary Contact									
<u>37-2-2699</u>	<u>YAS 1</u>	AGD	56	301835	6424584	Open Site	AFT : 32	None	Permit(s) Davies		
		Status	Valid								
		Primary Contact									
<u>37-2-2700</u>	<u>YAS 3</u>	AGD	56	301670	6424720	Open Site	AFT : 15	None	Permit(s) Davies		
		Status	Valid								
		Primary Contact									
<u>37-2-2701</u>	<u>YAS 4</u>	AGD	56	302140	6424650	Open Site	AFT : 8	None	Permit(s) Davies		
		Status	Valid								
		Primary Contact									
		Primary Contact									



List of Sites (List - Short)

Mount Arthur Coal Mine

Grid Reference Type = AGD (Australian Geodetic Datum), Zone = 56, Easting From = 299000, Easting to = 305000, Northing From = 6420000, Northing to = 6425000, Feature Search Type = AHIMS Features

Site ID	Site Name	Datum	Zone	Easting	Northing	Context	Site Features	Site Types (recorded prior to June 2001)	Recording (Primary)	Reports (Catalogue Number)	State Arch. Box No (for office use only)
<u>37-2-2702</u>	<u>YAS 6</u>	AGD	56	301400	6424910	Open Site	AFT : 3	None	Davies		
		Status	Valid								
		Primary Contact									
<u>37-2-2703</u>	<u>YAS 7</u>	AGD	56	301880	6424390	Open Site	AFT : 4	None	Davies		
		Status	Valid								
		Primary Contact									
<u>37-2-2704</u>	<u>YIF 1</u>	AGD	56	301620	6424760	Open Site	AFT : 1	None	Davies		
		Status	Valid								
		Primary Contact									
<u>37-2-2705</u>	<u>YIF 2</u>	AGD	56	301490	6424800	Open Site	AFT : 1	None	Davies		
		Status	Valid								
		Primary Contact									
<u>37-2-2706</u>	<u>YIF 3</u>	AGD	56	301600	6424750	Open Site	AFT : 1	None	Davies		
		Status	Valid								
		Primary Contact									
<u>37-2-2707</u>	<u>YIF 4</u>	AGD	56	302460	6424910	Open Site	AFT : 1	None	Davies		
		Status	Valid								
		Primary Contact									
<u>37-2-2708</u>	<u>YIF 5</u>	AGD	56	302640	6424750	Open Site	AFT : 1	None	Davies		
		Status	Valid								
		Primary Contact									

Appendix B

Records of Aboriginal Community Consultation

Use or disclosure of data contained on this sheet is subject to the restriction on the distribution page of this document.

Commercial in Confidence

Aboriginal Archaeology and Cultural Heritage
Impact Assessment

S

6067101_RPTFinalRev01_28Aug09

Environment

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Commercial in Confidence

Aboriginal Archaeology and Cultural Heritage
Impact Assessment

S

6067101_RPTFinalRev01_28Aug09

Environment



Mt Arthur Coal Consolidation Project

Aboriginal Archaeology and Cultural Heritage Assessment

For Aboriginal and Cultural Heritage Stakeholders

28 January 2008



bhpbilliton
resourcing the future

Agenda

1. Welcome
2. Background
3. Project Overview
4. Proposed Assessment Methodology
4. Next Steps
5. General Discussion & Feedback
6. Questions



Welcome / Site Safety Information

1. Welcome – Sign on / register attendance
2. Introductions
3. Emergency Alarm / exit points to the building
4. Toilets and conveniences

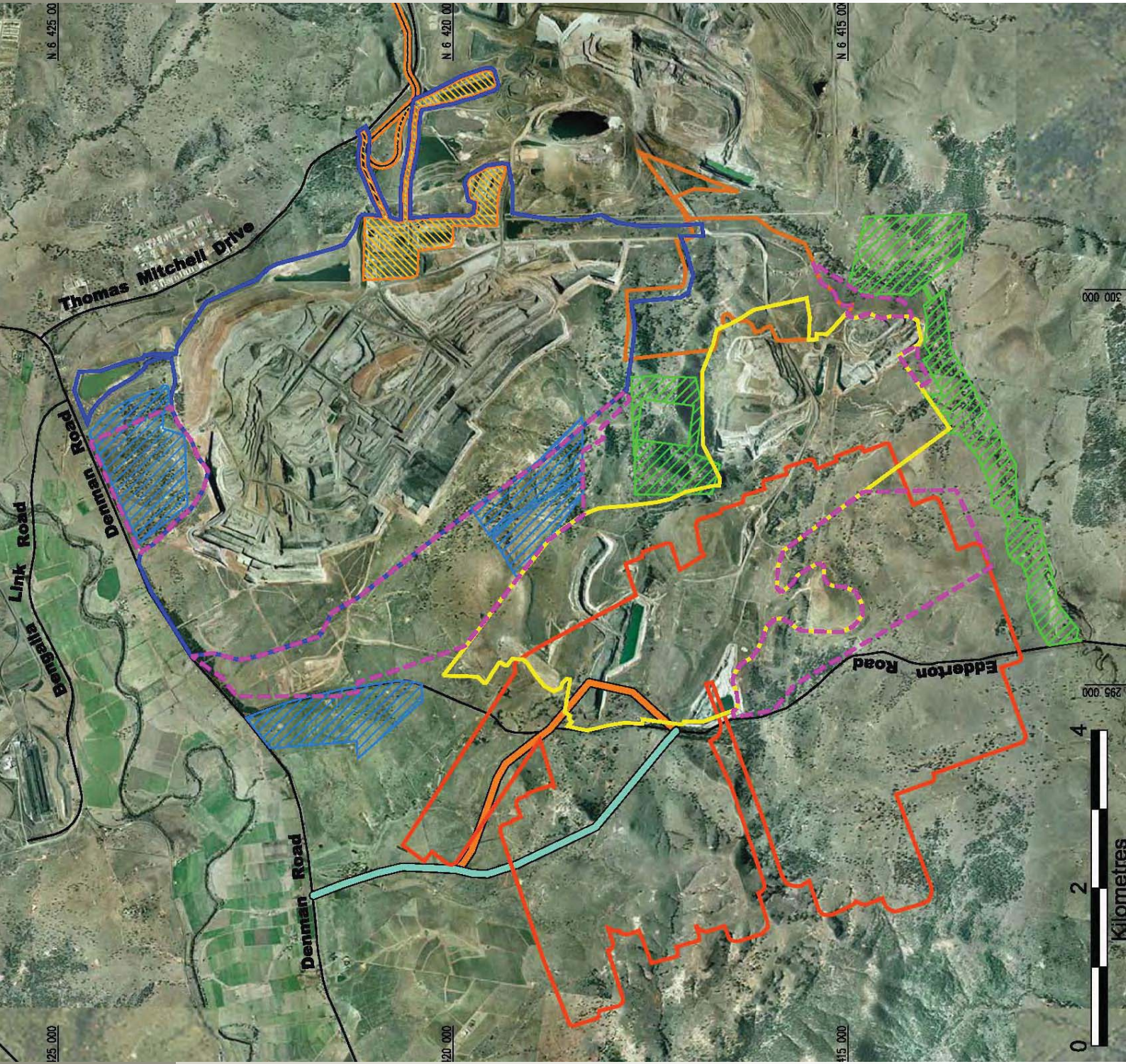


Mt Arthur Coal Background

- Early 1960's - Open cut mining commences in Bayswater No. 2.
- 1995 - Approval to mine at Bayswater No. 3 granted.
- 2000 – Approval granted for the Bayswater Rail Line.
- 2001 - Approval granted for the Mt Arthur North (MAN) mine, located immediately west of Bayswater No. 2.
- 2006 – Approval granted to allow the construction of an exploration adit and extraction of a bulk sample.
- January 2008 – Approval granted for the South Pit Extension to extend the approved MAN mining area further south to recover additional coal resources.
- December 2007 - Approval granted for the Mt Arthur Underground project

Project Background

- Mt Arthur Coal is applying for a new Project Approval under Part 3A of the EP&A Act
- The Project includes:
 - An extension of the mine footprint to uncover additional coal reserves within the current MLs
 - An 8 Mtpa increase in ROM coal production
 - Relocation of Edderton Road from 2019
 - Disturbance of three Heritage Management Zones (Edderton Road, Macleans Hills and North west slopes)
 - Upgrade of existing Mt Arthur Coal CHPP
 - An increase in rail capacity to match ROM coal production and including the construction of a second rail load out facility and conveyor
 - Modifications to existing infrastructure
 - Additional employees to increase the total approved workforce to 2,108 at peak production.



Previous Archaeological Studies

- Mt Arthur Coal has been subject to at least 16 detailed Aboriginal heritage assessments and archaeological salvage since 1980.
- The extensive level of Aboriginal archaeological investigation and research conducted to date at Mt Arthur Coal has provided a comprehensive record of Aboriginal Cultural Heritage across the region, and is one of the most comprehensive survey and salvage programs undertaken in the Hunter Valley.
- The most significant of the archaeological assessments relevant to the Project included:
 - Mt Arthur North EIS Survey (Kuskie, 1999)
 - Mt Arthur North Archaeological Salvage (Kuskie and Clarke, 2004)
 - South Pit Extension EA Survey (Umwelt, 2006)
 - Mt Arthur Underground EA Survey (Umwelt, 2007)

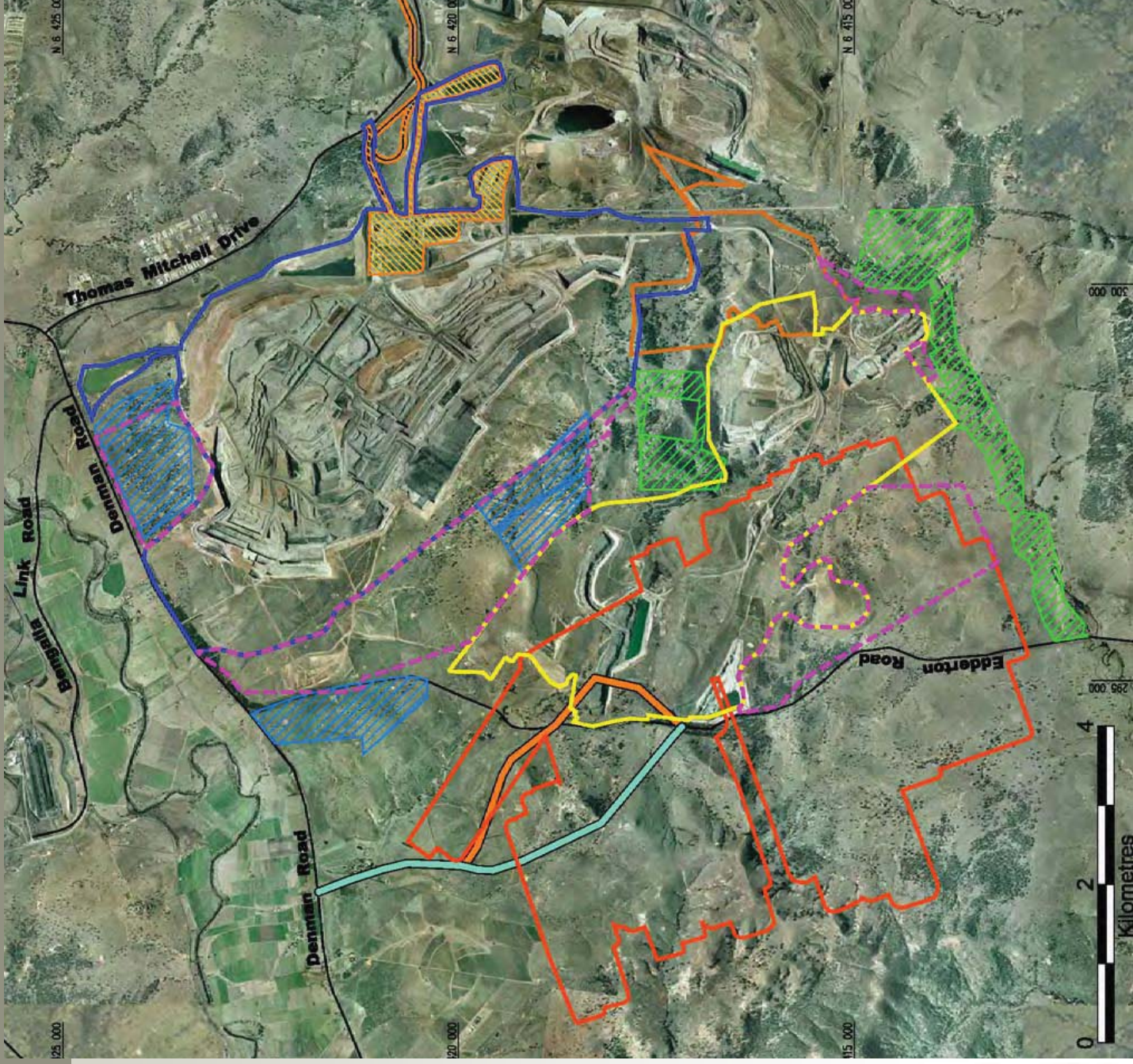


Previous Archaeological Studies (cont.)

- As part of the MAN approval, Mt Arthur Coal was required to establish the following offset measures:
 - Mt Arthur Voluntary Conservation Area (VCA) and
 - Three Heritage Management Zones (HMZ) at Edderton Road, Macleans Hill and North west Slopes.
- As part of the Mt Arthur Underground assessment, the following commitments were made and consultation on these will commence prior to longwall mining:
 - Establishment of the Saddlers Creek VCA
 - Funding and construction of a Keeping Place
 - ‘Collections Training’ for five Aboriginal stakeholders
 - Construction of a facility suitable for use by the Aboriginal community for teaching purposes and
 - Training up to one member of the registered Aboriginal stakeholder groups ... in relation to site recording and artefact recording and basic analysis”

Mt Arthur Coal Existing Offsets Areas





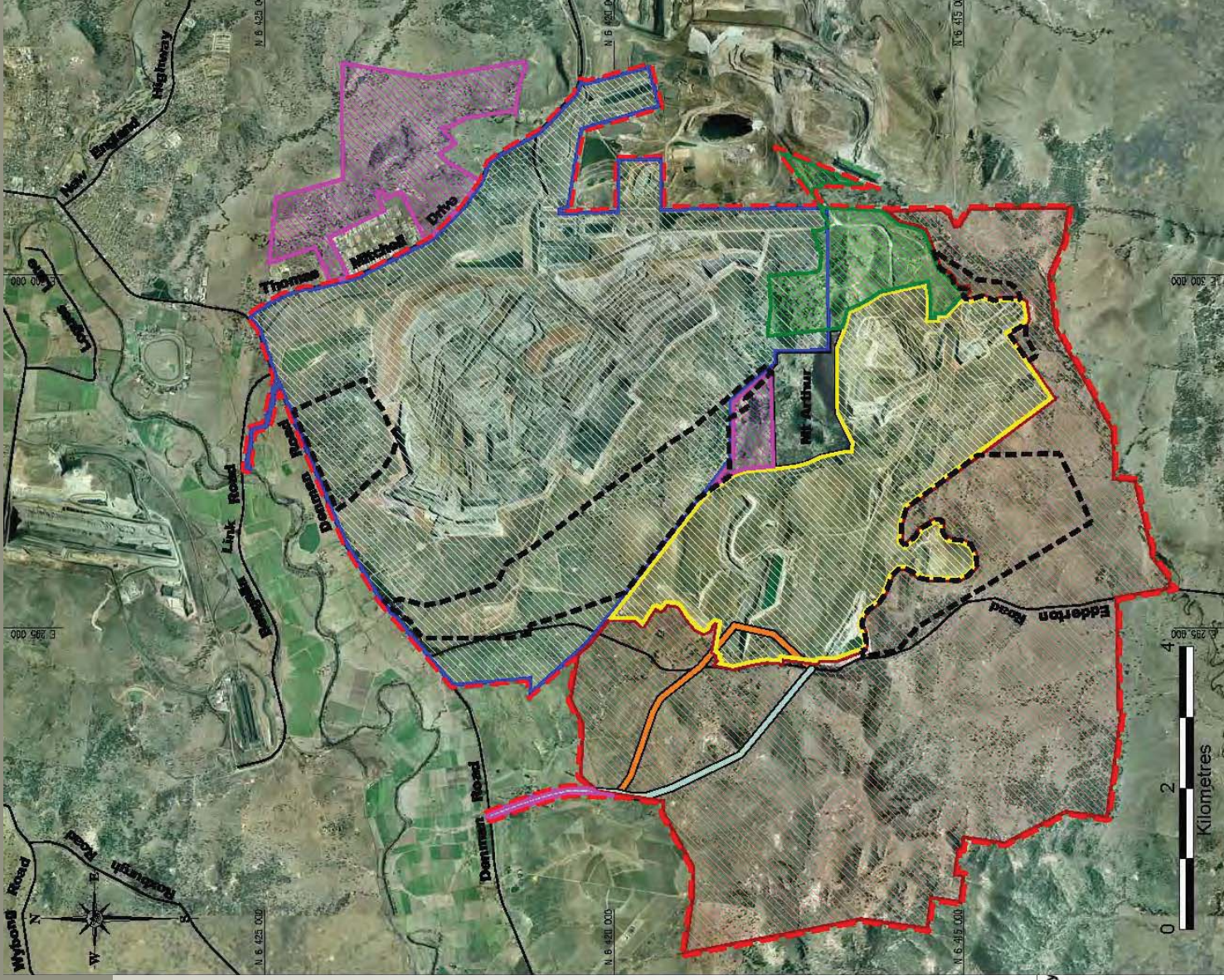
- MAN 21 Year Disturbance Limit
- Baywater 3 Mining Area (MAU EA)
- MAC Consolidation Extension Area
- MAU Disturbance Area
- South Pit Disturbance Footprint
- Current Infrastructure
- Edderton Road Realignment Option 1
- Edderton Road Realignment Option 2
- MAN Heritage Management Zones
- Voluntary Conservation Areas



Proposed Methodology

- An Aboriginal Archaeological and Cultural Heritage Assessment will be undertaken for the Project, facilitated by ENSR Australia (Neville Baker)
- Hansen Bailey (Melissa Walker) will coordinate the fieldwork, and liaise with the Aboriginal community to compile a cultural heritage statement.
- The field survey will be undertaken over two areas totalling 89 ha which have not previously been surveyed, including:
 - Along the alternative alignments for the Edderton Road diversion
 - To the north of Mt Arthur required for mining; and
- A further area to the east of Mt Arthur Coal (587 ha) will also be surveyed to assess its value as a possible offset for the proposed disturbance of existing Heritage Management Zones





- MAC Consolidation Coal Extension Boundary
- Mt Arthur North Survey Area (2001)
- MAC South Pit Survey Area (2007)
- Mt Arthur Underground Survey Area (2008)
- Bayswater 3 Mining Area (1993)
- MAC Consolidation EA Survey Boundary
- Areas To Be Surveyed
- Edgerton Road Realignment Option 1
- Edgerton Road Realignment Option 2

Proposed Methodology (cont.)

- The field work will include:
 - Consultation with Aboriginal community representatives to identify cultural values of the Survey Area and places of significance that should be considered
 - Survey area in transects covering all parts of the Survey Areas spaced at 5 m centres
 - Recording of all Aboriginal sites and features of interest by high accuracy Differential GPS (incl. type, raw material, size, cortex etc.)
- The expected duration of the field work is **11 days** planned for the **early – mid March 2009**.
- Up to **six (6) representatives** will be required for the fieldwork each day.
- If more than six (6) representatives are nominated by the groups, then Hansen Bailey (in consultation with the Aboriginal Community) will seek to accommodate all interested groups equally by establishing a works roster enabling rotation of people on the project



Proposed Methodology (cont.)

- All fieldworkers will be offered the same conditions of engagement
- The rate of pay for this project is \$550 /per day. A day is considered to be eight (8) hours from sign on (i.e. 8 am – 4 pm). Where a full eight (8) hours is not completed in any one day a rate of \$68.75 will be paid for each hour of work completed
- Travel expenses of \$50 (maximum) can also be claimed for those who drive to site
- Key selection criteria:
 - Reasonable & fair representation of all stakeholder groups in the area
 - Having experienced/competent people who can offer the greatest value to the project
 - OH&S requirements for working on the site
 - The budget for the project
 - Registered groups (i.e. insurances, work cover, professional indemnity, etc. in place).



Field Surveys

- All participants of the site inspection are required to have the following:
 - Cotton Long sleeve shirt and long pants;
 - Hard hat;
 - Steel capped boots (lace up);
 - Safety Glasses;
 - Gloves; and
 - Reflective vest / stripes.
- All participants are required to sign in as visitors and must be accompanied at all times
- Aboriginal Community Groups must be able to display that they have all relevant insurances and Work Cover



Cultural Heritage Statement

- Hansen Bailey will organise meetings with the key Aboriginal Stakeholder groups to discuss the **Cultural Heritage Values** of the Survey Areas and surrounds
- Those groups wishing to participate in the Cultural Heritage meetings should contact Melissa to register an interest in being involved in that part of the project
- The meetings will be scheduled at a later date at times convenient to the various stakeholder groups
- The purpose of these meetings is to ensure all relevant Cultural Heritage issues are documented for consideration in the final report.
- Hansen Bailey will prepare a report summarising the findings from the meetings and throughout the consultation process for inclusion in the Aboriginal Archaeological Impact Assessment

Next Steps

- Copies of the ENSR Australia Survey Methodology as discussed today will be provided to each meeting attendee
- In accordance with the DECC Guidelines, there is a 21 day period for review of the methodology and to provide comment to Hansen Bailey in relation to the survey methodology
- All correspondence relating to the methodology for the survey should be provided to Melissa Walker by **24 February 2009**
- All responses will be considered and where appropriate recommendations from the community will be incorporated into the methodology proposed for this work



Survey Methodology Comments Cont.

- If you wish to discuss the survey methodology following our meeting, please contact Melissa

Melissa Walker's Contact details

Mail:

Hansen Bailey Environmental Consultants
6/127-129 John Street
Singleton, NSW, 2330

E-mail:

mwalker@hansenbailey.com.au

Fax:

(02) 6575 2001

Phone:

(02) 6575 2005

Questions?



ENSR Australia Pty Ltd (ENSR) ABN 34 060 204 702
PO Box 726 PYMBLE NSW 2073
T+61 2 8484 8999 F+61 2 8484 8989 www.ensr.com.au

15 October 2008

Ms Melissa Walker
Environmental Scientist
Hansen Bailey Pty Ltd
PO Box 473
Singleton NSW 2330

Dear Melissa,

Re: Mt Arthur Coal Consolidation of Approvals - Methodology for Additional Aboriginal Heritage Survey

This letter provides a methodology for consultation with the Aboriginal community in accordance with the National Parks & Wildlife Act 1974: Part 6 Approvals – Interim Community Consultation Requirements for Applicants.

The purpose of the assessment is to identify the Aboriginal heritage values of the small area within Mt Arthur Coal's mining area not previously addressed by any previous Aboriginal heritage survey.

This methodology has been developed according to the following principles.

We acknowledge that over the ages Aboriginal people have walked over every part of the land and that all of the land holds value for Aboriginal people today.

We know from past heritage surveys that some parts of the landscape with more Aboriginal heritage material than other parts.

We want to focus our efforts on identifying the Aboriginal heritage places, sites and objects that have the greatest value in telling the story of Aboriginal occupation.

Often not every metre of the development area can be surveyed. But we can understand the cultural landscape by focussing more on the most sensitive areas and less on the areas where there may be the odd stone flake or two (however for this project all parts will be surveyed due to the small size of the study area).

Aboriginal heritage values will be identified from the following methods:

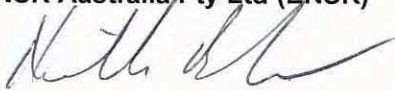
- consultation with the Aboriginal community to identify social values of the study area and places of special significance that should be considered;
- a search of the Aboriginal Heritage Information Management System (Aboriginal Sites Register) for records of previously registered Aboriginal sites
- a review of past Aboriginal heritage reports covering the study area
- a review of environmental characteristics to develop a landscape map of possible archaeological site location; and
- targeted archaeological survey incorporating:

- transects covering all parts of the "areas to be surveyed" located just north of Mt Arthur as shown on the attached map.
 - survey in transects by survey members spaced at around 5 metres apart;
 - recording of all Aboriginal sites and features of interest by high accuracy DGPS.
- The archaeological survey will allow the development of a Aboriginal heritage values map and assessment covering all of the subject development area (area of proposed infrastructure).

I would be happy to review any comments on this methodology.

Yours sincerely,

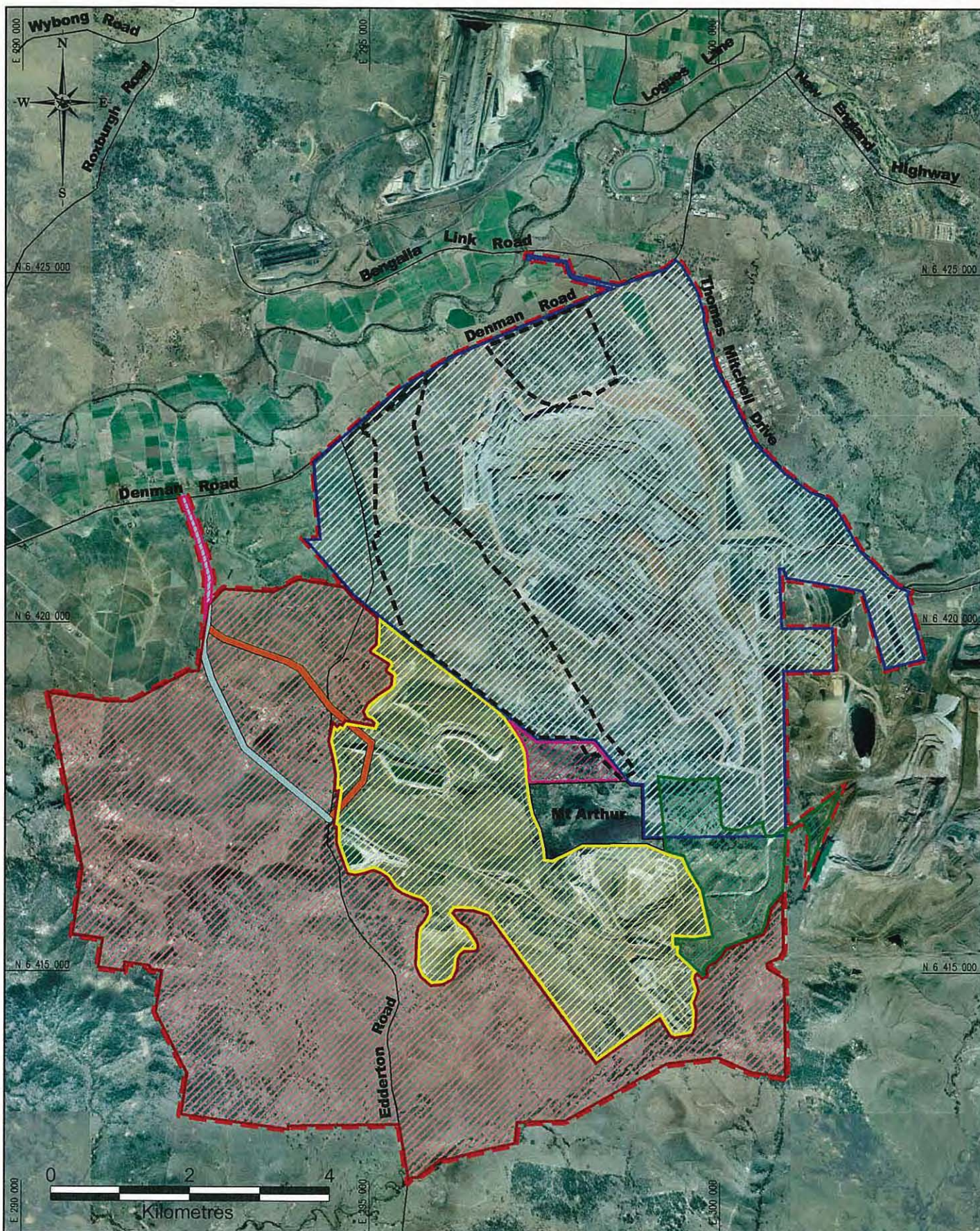
ENSR Australia Pty Ltd (ENSR)



Neville Baker

Principal Archaeologist

Enclosures: Figure 1 MAC EA Survey Area (Hansen Bailey/BHP Billiton)



MT ARTHUR COAL

MAC Consolidation EA Survey Area

- MAC Consolidation Coal Extraction Boundary
- Mt Arthur North Survey Area (2001)
- MAC South Pit Survey Area (2007)
- Mt Arthur Underground Survey Area (2008)
- Bayswater 3 Mining Area (1993)
- MAC Consolidation EA Survey Boundary
- Areas To Be Surveyed
- Edderton Road Realignment Option 1
- Edderton Road Realignment Option 2

Hansen Bailey



Co-ordinate System: MGA Zone 56

Sources: Umwelt (2007 & 2008), Dames & Moore (2001)

Cad File: 03441A.dwg

Date: 23.09.08

Drawn: JD

Figure
1

Return Fax: (02) 6575 2001

Attention: Melissa Walker

**RE: MT ARTHUR COAL CONSOLIDATION PROJECT - METHODOLOGY FOR
ADDITIONAL ABORIGINAL HERITAGE SURVEY
Aboriginal Stakeholder Group.**

I have read and have understood the Mt Arthur Coal Consolidation Project -
Methodology for Additional Aboriginal Heritage Survey which has been prepared by
ENSR Australia. 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 on in February 2009, a
representative from our Group:

Would like to attend / Does not wish to attend

Our nominated representative attending the field work for the Mt Arthur Coal
Additional Aboriginal Heritage Survey will be:

Additionally, we support Hansen Baileys application to access data from the AHIMS
database.

Signed in support: *[Signature]* 16. A. NABOGANY AVE MUSWELLBROOK

On behalf of (Group): *ABORIGINAL NATIVE TITLE CONSULTANTS*

Date: *4.2.09*

Return Fax: (02) 6575 2001

Attention: Melissa Walker

**RE: MT ARTHUR COAL CONSOLIDATION PROJECT – METHODOLOGY FOR
ADDITIONAL ABORIGINAL HERITAGE SURVEY**

Aboriginal Stakeholder Group: _____

I have read and have understood the Mt Arthur Coal Consolidation Project – Methodology for Additional Aboriginal Heritage Survey which has been prepared by ENSR Australia. 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:

No Comment

Further, in regard to the field work to be undertaken on **16 March 2009**, a representative from our Group:

☒ **Would like to attend**

☐ **Does not wish to attend**

Our nominated representative attending the field work for the Mt Arthur Coal Additional Aboriginal Heritage Survey will be:

Signed in support: *M. Matthews*

On behalf of (Group) *ABORIGINAL NATIVE TITLE CONSULTANTS*

Date: *4.2.09*

Return Fax: (02) 6575 2001

Attention: Melissa Walker

**RE: MT ARTHUR COAL CONSOLIDATION PROJECT – METHODOLOGY FOR
ADDITIONAL ABORIGINAL HERITAGE SURVEY**

Aboriginal Stakeholder Group: _____

I have read and have understood the Mt Arthur Coal Consolidation Project – Methodology for Additional Aboriginal Heritage Survey which has been prepared by ENSR Australia. 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:

No Comment

Further, in regard to the field work to be undertaken on in March 2009, a representative from our Group:

☒ Would like to attend

☐ Does not wish to attend

Our nominated representative attending the field work for the Mt Arthur Coal Additional Aboriginal Heritage Survey will be:

Signed in support: *Lloyd Matthews*

On behalf of (Group): *Bullen Bullen Consultants*

Date: *4.1.09*

Return Fax: (02) 6575 2001

Attention: Melissa Walker

**RE: MT ARTHUR COAL CONSOLIDATION PROJECT - METHODOLOGY FOR
ADDITIONAL ABORIGINAL HERITAGE SURVEY
Aboriginal Stakeholder Group:**

I have read and have understood the Mt Arthur Coal Consolidation Project -
Methodology for Additional Aboriginal Heritage Survey which has been prepared by
ENSR Australia. 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 on In February 2009, a
representative from our Group:

Would like to attend / Does not wish to attend

Our nominated representative attending the field work for the Mt Arthur Coal
Additional Aboriginal Heritage Survey will be:

Additionally, we support Hansen Baileys application to access data from the AHIMS
database.

Signed in support: *Sheryl Matthews*

On behalf of (Group): *Bulken Bulken 16 B. MAHOGANY AVE*

Date: *4-2-09*

Muswell Block,



Cacatua Culture Consultants

Entity of Cacatua General Services

ABN 83 774 580 518

4th February 2009

Melissa Walker
Environmental Scientist
Hansen Bailey
PO Box 473
Singleton NSW 2330

RE: **Mt Arthur coal Consolidation Project - Methodology for Additional Aboriginal Heritage Survey**

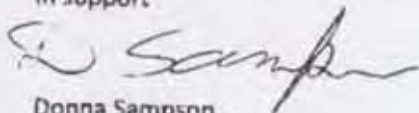
Melissa,

We have read and discussed the Mt Arthur coal Consolidation Project - Methodology for Additional Aboriginal Heritage Survey which has been prepared by ENSR Australia. We would like to comment in regards to the fieldwork (3.1) second paragraph re: the spacing of representatives at 5 metre intervals this distance we feel would not give a true and correct survey, we believe that the distance should be spaced at 2 metre intervals as this would give each representative a realistic area of a metre on either side to survey. With all other aspects that were enclosed with your letter we agree that the Survey Methodology is adequate and consistent with the views and wishes of the local Aboriginal Community.

Further, in regards to the field work to be undertaken in February 2009, Cacatua Culture Consultants would like to attend. At this stage George Sampson we continue to be our representative. To follow this letter is a copy of our insurances for your records.

Additionally, we support Hansen Baileys application to access data from the AHIMS database.

In support



Donna Sampson
Administration

22 Ibis Parade, Woodberry NSW 2322
Ph 02 4964 4685 • Fax 02 4964 4635

Return Fax: (02) 6575 2001

Attention: Melissa Walker

**RE: MT ARTHUR COAL CONSOLIDATION PROJECT – METHODOLOGY FOR
ADDITIONAL ABORIGINAL HERITAGE SURVEY
Aboriginal Stakeholder Group:**

I have read and have understood the Mt Arthur Coal Consolidation Project – Methodology for Additional Aboriginal Heritage Survey which has been prepared by ENSR Australia. 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 on in February 2009, a representative from our Group:

Would like to attend / Does not wish to attend

Our nominated representative attending the field work for the Mt Arthur Coal Additional Aboriginal Heritage Survey will be:

michele Stair or Lamer-lee Stair

Additionally, we support Hansen Baileys application to access data from the AHIMS database.

Signed in support: M Stair

On behalf of (Group): G.w.m.r. Consultants

Date: 4/32/09

Return Fax: (02) 6575 2001

Attention: Melissa Walker

**RE: MT ARTHUR COAL CONSOLIDATION PROJECT - METHODOLOGY FOR
ADDITIONAL ABORIGINAL HERITAGE SURVEY**

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

I have read and have understood the Mt Arthur Coal Consolidation Project -
Methodology for Additional Aboriginal Heritage Survey which has been prepared by
ENSR Australia. 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 on in **February 2009**, a
representative from our Group:

Would like to attend / ~~Does not wish to attend~~

Our nominated representative attending the field work for the Mt Arthur Coal
Additional Aboriginal Heritage Survey will be:

BARRY STAIR

Additionally, we support Hansen Baileys application to access data from the AHIMS
database.

Signed in support: **B. Stair**

On behalf of (Group): **Hunter Valley Aboriginal Corporation**

Date: **3.2.09**

Return Fax: (02) 6575 2001

Attention: Melissa Walker

**RE: MT ARTHUR COAL CONSOLIDATION PROJECT – METHODOLOGY FOR
ADDITIONAL ABORIGINAL HERITAGE SURVEY**

Aboriginal Stakeholder Group: _____

I have read and have understood the Mt Arthur Coal Consolidation Project – Methodology for Additional Aboriginal Heritage Survey which has been prepared by ENSR Australia. 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:

No comments

Further, in regard to the field work to be undertaken on **In March 2009**, a representative from our Group:

☒ Would like to attend

☐ Does not wish to attend

Our nominated representative attending the field work for the Mt Arthur Coal Additional Aboriginal Heritage Survey will be:

Coleen Star R

Signed in support: *C. Arch Bol D*

On behalf of (Group): *Hunter Valley Consultants*

Date: *4.2.09*

Return Fax: (02) 6575 2001

Attention: Melissa Walker

**RE: MT ARTHUR COAL CONSOLIDATION PROJECT - METHODOLOGY FOR
ADDITIONAL ABORIGINAL HERITAGE SURVEY
Aboriginal Stakeholder Group:**

I have read and have understood the Mt Arthur Coal Consolidation Project -
Methodology for Additional Aboriginal Heritage Survey which has been prepared by
ENSR Australia. 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 on in February 2009, a
representative from our Group:

Would like to attend / Does not wish to attend

Our nominated representative attending the field work for the Mt Arthur Coal
Additional Aboriginal Heritage Survey will be:

Additionally, we support Hansen Baileys application to access data from the AHIMS
database.

Signed in support: CHRISTINE AACHSOLD

On behalf of (Group): Hunter Valley Cultural Consultants

Date: 4-2-09

Return Fax: (02) 6575 2001

Attention: Melissa Walker

**RE: MT ARTHUR COAL CONSOLIDATION PROJECT – METHODOLOGY FOR
ADDITIONAL ABORIGINAL HERITAGE SURVEY
Aboriginal Stakeholder Group**

I have read and have understood the Mt Arthur Coal Consolidation Project –
Methodology for Additional Aboriginal Heritage Survey which has been prepared by
ENSR Australia. 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 on in February 2009, a
representative from our Group:

Would like to attend / Does not wish to attend

Our nominated representative attending the field work for the Mt Arthur Coal
Additional Aboriginal Heritage Survey will be:

JUSTIN MATTHEWS

Additionally, we support Hansen Baileys application to access data from the AHIMS
database.

Signed in support: **Geoffrey Matthews**

On behalf of (Group): **MWUGGA CONSULTANTS**

Date: **4.2.09**

Return Fax: (02) 6575 2001

Attention: Melissa Walker

RE: MT ARTHUR COAL CONSOLIDATION PROJECT - METHODOLOGY FOR
ADDITIONAL ABORIGINAL HERITAGE SURVEY

Aboriginal Stakeholder Group: MINGGA CONSULTANTS

I have read and have understood the Mt Arthur Coal Consolidation Project - Methodology for Additional Aboriginal Heritage Survey which has been prepared by ENSR Australia. 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:

NO COMMENTS

Further, in regard to the field work to be undertaken on in March 2009, a representative from our Group:

☒ Would like to attend

☐ Does not wish to attend

Our nominated representative attending the field work for the Mt Arthur Coal Additional Aboriginal Heritage Survey will be:

JUSTIN MATTHEWS

Signed in support: Clifford Matthews

On behalf of (Group): MINGGA CONSULTANTS

Date: 4.2.09

Return Fax: (02) 6575 2001

Attention: Melissa Walker

RE: MT ARTHUR COAL CONSOLIDATION PROJECT - METHODOLOGY FOR
ADDITIONAL ABORIGINAL HERITAGE SURVEY

Aboriginal Stakeholder Group: Ungaroo Cultural + Community Service

I have read and have understood the Mt Arthur Coal Consolidation Project - Methodology for Additional Aboriginal Heritage Survey which has been prepared by ENSR Australia. 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:

I don't have a problem with it

Further, in regard to the field work to be undertaken on in March 2009, a representative from our Group:

☒ Would like to attend

☐ Does not wish to attend

Our nominated representative attending the field work for the Mt Arthur Coal Additional Aboriginal Heritage Survey will be:

Rhonda Ward or

Samantha Ward

Signed in support: R. Ward

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

Date: 4-2-09

Return Fax: (02) 6575 2001

Attention: Melissa Walker

**RE: MT ARTHUR COAL CONSOLIDATION PROJECT – METHODOLOGY FOR
ADDITIONAL ABORIGINAL HERITAGE SURVEY
Aboriginal Stakeholder Group:**

I have read and have understood the Mt Arthur Coal Consolidation Project –
Methodology for Additional Aboriginal Heritage Survey which has been prepared by
ENSR Australia. 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:

None

Further, in regard to the field work to be undertaken on in February 2009, a
representative from our Group:

Would like to attend / Does not wish to attend

Our nominated representative attending the field work for the Mt Arthur Coal
Additional Aboriginal Heritage Survey will be:

We like to attend

Additionally, we support Hansen Baileys application to access data from the AHIMS
database.

Signed in support: R Ward

On behalf of (Group): UCCS

Date: 4-2-09

Return Fax: (02) 6575 2001

Attention: Melissa Walker

**RE: MT ARTHUR COAL CONSOLIDATION PROJECT – METHODOLOGY FOR
ADDITIONAL ABORIGINAL HERITAGE SURVEY
Aboriginal Stakeholder Group:**

I have read and have understood the Mt Arthur Coal Consolidation Project –
Methodology for Additional Aboriginal Heritage Survey which has been prepared by
ENSR Australia. 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:

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.....

Further, in regard to the field work to be undertaken on in February 2009, a
representative from our Group:

Would like to attend / ~~Does not wish to attend~~

Our nominated representative attending the field work for the Mt Arthur Coal
Additional Aboriginal Heritage Survey will be:

Darrel Matthews

Additionally, we support Hansen Baileys application to access data from the AHIMS
database.

Signed in support: *[Signature]*

On behalf of (Group):

Upper Hunter Heritage Consultants

Date:

4.2.09

Return Fax: (02) 6575 2001

Attention: Melissa Walker

**RE: MT ARTHUR COAL CONSOLIDATION PROJECT – METHODOLOGY FOR
ADDITIONAL ABORIGINAL HERITAGE SURVEY**

Aboriginal Stakeholder Group: Upper Hunter Heritage Consultants

I have read and have understood the Mt Arthur Coal Consolidation Project – Methodology for Additional Aboriginal Heritage Survey which has been prepared by ENSR Australia. 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.

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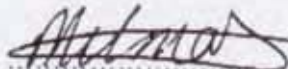
Further, in regard to the field work to be undertaken on **In March 2009**, a representative from our Group:

☒ Would like to attend

☐ Does not wish to attend

Our nominated representative attending the field work for the Mt Arthur Coal Additional Aboriginal Heritage Survey will be:

Darrel Matthews

Signed in support: 

On behalf of (Group):

Upper Hunter Heritage Consultants

Date:

4.2.09

Return Fax: (02) 6575 2001

Attention: Melissa Walker

**RE: MT ARTHUR COAL CONSOLIDATION PROJECT - METHODOLOGY FOR
ADDITIONAL ABORIGINAL HERITAGE SURVEY
Aboriginal Stakeholder Group:**

I have read and have understood the Mt Arthur Coal Consolidation Project -
Methodology for Additional Aboriginal Heritage Survey which has been prepared by
ENSR Australia. 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:

I AGREE WITH THE METHODOLOGY REPORT.

Further, in regard to the field work to be undertaken on in February 2009, a
representative from our Group:

Would like to attend / ~~Does not wish to attend~~

Our nominated representative attending the field work for the Mt Arthur Coal
Additional Aboriginal Heritage Survey will be:

Barry French.

Additionally, we support Hansen Baileys application to access data from the AHIMS
database.

Signed in support:

Barry B. French.

On behalf of (Group):

JANGANAHA PTY LTD.

Date:

2 09

Return Fax: (02) 6575 2001

Attention: Melissa Walker

RE: MT ARTHUR COAL CONSOLIDATION PROJECT - METHODOLOGY FOR
ADDITIONAL ABORIGINAL HERITAGE SURVEY

Aboriginal Stakeholder Group: JARRAHALU. Pty. Ltd.

I have read and have understood the Mt Arthur Coal Consolidation Project - Methodology for Additional Aboriginal Heritage Survey which has been prepared by ENSR Australia. 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:

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.....

Further, in regard to the field work to be undertaken on in March 2009, a representative from our Group

☒ Would like to attend

☐ Does not wish to attend

Our nominated representative attending the field work for the Mt Arthur Coal Additional Aboriginal Heritage Survey will be

BARRY FRENCH.

Signed in support

Barry. b. French.

On behalf of (Group):

JARRAHALU. Pty Ltd.

Date:

4 . 2 . 09

Return Fax: (02) 6575 2001

Attention: Melissa Walker

**RE: MT ARTHUR COAL CONSOLIDATION PROJECT – METHODOLOGY FOR
ADDITIONAL ABORIGINAL HERITAGE SURVEY**

Aboriginal Stakeholder Group: GUDAWAA WALANG

I have read and have understood the Mt Arthur Coal Consolidation Project – Methodology for Additional Aboriginal Heritage Survey which has been prepared by ENSR Australia. 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 on **In March 2009**, a representative from our Group:

☒ Would like to attend

☐ Does not wish to attend

Our nominated representative attending the field work for the Mt Arthur Coal Additional Aboriginal Heritage Survey will be:

ANN HICKEY

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

Signed in support: Ann Hickey

On behalf of (Group): GUDAWAA WALANG

Date: 5.2.2009

Return Fax: (02) 6575 2001

Attention: Melissa Walker

**RE: MT ARTHUR COAL CONSOLIDATION PROJECT - METHODOLOGY FOR
ADDITIONAL ABORIGINAL HERITAGE SURVEY**

**Aboriginal Stakeholder Group: HUNTER VALLEY NATURAL & CULTURAL
RESOURCES MANAGEMENT**

I have read and have understood the Mt Arthur Coal Consolidation Project -
Methodology for Additional Aboriginal Heritage Survey which has been prepared by
ENSR Australia. 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:

I AGREE WITH SURVEY METHODOLOGY.

Further, in regard to the field work to be undertaken on in February 2009, a
representative from our Group:

Would like to attend Does not wish to attend

Our nominated representative attending the field work for the Mt Arthur Coal
Additional Aboriginal Heritage Survey will be:

DAVID FRENCH

Additionally, we support Hansen Baileys application to access data from the AHIMS
database

Signed in support: David French

On behalf of (Group):

HUNTER VALLEY NATURAL & CULTURAL
RESOURCE MANAGEMENT

Date:

5/2/09

Return Fax: (02) 6575 2001

Attention: Melissa Walker

**RE: MT ARTHUR COAL CONSOLIDATION PROJECT – METHODOLOGY FOR
ADDITIONAL ABORIGINAL HERITAGE SURVEY**

Aboriginal Stakeholder Group: HUNTER VALLEY NATURAL & CULTURAL
RESOURCES MANAGEMENT

I have read and have understood the Mt Arthur Coal Consolidation Project – Methodology for Additional Aboriginal Heritage Survey which has been prepared by ENSR Australia. 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 on in March 2009, a representative from our Group:

☐ Would like to attend

☐ Does not wish to attend

Our nominated representative attending the field work for the Mt Arthur Coal Additional Aboriginal Heritage Survey will be:

Signed in support:

David French

On behalf of (Group):

HUNTER VALLEY NATURAL & CULTURAL

Date:

5/2/09

RESOURCES MANAGEMENT

Return Fax: (02) 6575 2001

Attention: Melissa Walker

**RE: MT ARTHUR COAL CONSOLIDATION PROJECT – METHODOLOGY FOR
ADDITIONAL ABORIGINAL HERITAGE SURVEY**

Aboriginal Stakeholder Group: WATTAKA WCC SERVICES

I have read and have understood the Mt Arthur Coal Consolidation Project – Methodology for Additional Aboriginal Heritage Survey which has been prepared by ENSR Australia. 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:

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

Further, in regard to the field work to be undertaken on **In March 2009**, a representative from our Group:

☒ Would like to attend ☐ Does not wish to attend

Our nominated representative attending the field work for the Mt Arthur Coal Additional Aboriginal Heritage Survey will be:

DES Hickey
.....
.....

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

Signed in support: Des Hickey
.....

On behalf of (Group): WATTAKA
.....

Date: 5/2/09
.....

Return Fax: (02) 6575 2001

Attention: Melissa Walker

**RE: MT ARTHUR COAL CONSOLIDATION PROJECT – METHODOLOGY FOR
ADDITIONAL ABORIGINAL HERITAGE SURVEY**

Aboriginal Stakeholder Group: WONNARUA CULTURE HERITAGE

I have read and have understood the Mt Arthur Coal Consolidation Project – Methodology for Additional Aboriginal Heritage Survey which has been prepared by ENSR Australia. 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 on in **March 2009**, a representative from our Group:

☒ Would like to attend

☐ Does not wish to attend

Our nominated representative attending the field work for the Mt Arthur Coal Additional Aboriginal Heritage Survey will be:

Joseph Griffiths or Shannon Griffiths

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

Signed in support: J. Griffiths

On behalf of (Group): WONNARUA CULTURE HERITAGE

Date: 5/2/09

00-02-09 10:40 FROM SUMMIT GESSHOCK 0245510674 1-223 1001/001 1-340

Return Fax: (02) 6575 2001

Attention: Melissa Walker

**RE: MT ARTHUR COAL CONSOLIDATION PROJECT - METHODOLOGY FOR
ADDITIONAL ABORIGINAL HERITAGE SURVEY**

Aboriginal Stakeholder Group: Culturally Aware

I have read and have understood the Mt Arthur Coal Consolidation Project - Methodology for Additional Aboriginal Heritage Survey which has been prepared by ENSR Australia. 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:

I have viewed the proposed methodology and agree with the Survey Strategy put forward. I am familiar with the survey area and the significance this land holds for the Aboriginal community, its cultural landscape and oral history.

Further, in regard to the field work to be undertaken on in March 2009, a representative from our Group:

☒ Would like to attend

☐ Does not wish to attend

Our nominated representative attending the field work for the Mt Arthur Coal Additional Aboriginal Heritage Survey will be: HAVE INCLUDED A FEW NAMES FOR BACK UPS IN CASE PROBLEMS MAY ARISE

Joshua Crese, Maree Waugh, Georgina Berry, Kirstin Berry,

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

Signed in support: Tracey Kone

On behalf of (Group): Culturally Aware

Date: 6/2/09

Return Fax: (02) 6575 2001

Attention: Melissa Walker

**RE: MT ARTHUR COAL CONSOLIDATION PROJECT – METHODOLOGY FOR
ADDITIONAL ABORIGINAL HERITAGE SURVEY
Aboriginal Stakeholder Group:**

I have read and have understood the Mt Arthur Coal Consolidation Project –
Methodology for Additional Aboriginal Heritage Survey which has been prepared by
ENSR Australia. 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:

Muswellbrook Cultural Centre agrees with methodology
at the Mt Arthur meeting with Hansen
only.

Further, in regard to the field work to be undertaken on **in February 2009**, a
representative from our Group:

Would like to attend / ~~Does not wish to attend~~

Our nominated representative attending the field work for the Mt Arthur Coal
Additional Aboriginal Heritage Survey will be:

David Herten or Brian Herten would like to be consulted
for project at Mt Arthur.

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

Signed in support: B. Herten

On behalf of (Group): Muswellbrook Cultural Centre

Date: 6-2-09

Return Fax: (02) 6575 2001

Attention: Melissa Walker

RE: MT ARTHUR COAL CONSOLIDATION PROJECT – METHODOLOGY FOR
ADDITIONAL ABORIGINAL HERITAGE SURVEY

Aboriginal Stakeholder Group: GINARR CULTURAL SERVICES

I have read and have understood the Mt Arthur Coal Consolidation Project – Methodology for Additional Aboriginal Heritage Survey which has been prepared by ENSR Australia. 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: GINARR CULTURAL SERVICES

☒ Agrees with the content

☐ Disagrees with the content

We would like to make the following comments on the Survey Methodology:

NO COMMENT AT THIS TIME

Further, in regard to the field work to be undertaken on **16 March 2009**, a representative from our Group:

☒ Would like to attend

☐ Does not wish to attend

Our nominated representative attending the field work for the Mt Arthur Coal Additional Aboriginal Heritage Survey will be:

KATHLEEN STEWARD / KINCHELA

Signed In support: [Signature]

On behalf of (Group): GINARR CULTURAL SERVICES

Date: 7-2-2009

Return Fax: (02) 6575 2001

Attention: Melissa Walker

RE: MT ARTHUR COAL CONSOLIDATION PROJECT - METHODOLOGY FOR
ADDITIONAL ABORIGINAL HERITAGE SURVEY

Aboriginal Stakeholder Group: GINARR CULTURAL SERVICES

I have read and have understood the Mt Arthur Coal Consolidation Project -
Methodology for Additional Aboriginal Heritage Survey which has been prepared by
ENSR Australia. 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:

..... NO COMMENT AT THIS TIME
.....
.....

Further, in regard to the field work to be undertaken on in February 2009, a
representative from our Group:

Would like to attend / ~~Does not wish to attend~~

Our nominated representative attending the field work for the Mt Arthur Coal
Additional Aboriginal Heritage Survey will be:

..... KATHLEEN STEWART (KINSEHLA)
.....

Additionally, we support Hansen Baileys application to access data from the AHIMS
database.

Signed In support: 

On behalf of (Group): GINARR CULTURAL SERVICES

Date: 7-2-2009

Return Fax: (02) 6575 2001

Attention: Melissa Walker

**RE: MT ARTHUR COAL CONSOLIDATION PROJECT – METHODOLOGY FOR
ADDITIONAL ABORIGINAL HERITAGE SURVEY**

Aboriginal Stakeholder Group

Wanamal LALC

I have read and have understood the Mt Arthur Coal Consolidation Project – Methodology for Additional Aboriginal Heritage Survey which has been prepared by ENSR Australia. 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 on in **March 2009**, a representative from our Group:

☒ Would like to attend

☐ Does not wish to attend

Our nominated representative attending the field work for the Mt Arthur Coal Additional Aboriginal Heritage Survey will be:

BRUCE TUNKS

Signed in support:

On behalf of (Group):

Date:

10/2/09

Return Fax: (02) 6575 2001

Attention: Melissa Walker

**RE: MT ARTHUR COAL CONSOLIDATION PROJECT - METHODOLOGY FOR
ADDITIONAL ABORIGINAL HERITAGE SURVEY**

Aboriginal Stakeholder Group: Hunter Valley Cultural Surveying

I have read and have understood the Mt Arthur Coal Consolidation Project - Methodology for Additional Aboriginal Heritage Survey which has been prepared by ENSR Australia. 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 on in **March 2009**, a representative from our Group:

☒ Would like to attend

☐ Does not wish to attend

Our nominated representative attending the field work for the Mt Arthur Coal Additional Aboriginal Heritage Survey will be:

Duke Hickory

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

Signed in support: Al Ly

On behalf of (Group): Hunter Valley Cultural Surveying

Date: 12.2.09

Return Fax: (02) 6575 2001

Attention: Melissa Walker

RE: MT ARTHUR COAL CONSOLIDATION PROJECT – METHODOLOGY FOR
ADDITIONAL ABORIGINAL HERITAGE SURVEY

Aboriginal Stakeholder Group: WONN1 CONTRACTING

I have read and have understood the Mt Arthur Coal Consolidation Project – Methodology for Additional Aboriginal Heritage Survey which has been prepared by ENSR Australia. 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:

THE WONN1 CONTRACTING NATIVE TITLE GROUP
WISHES TO BE INVOLVED IN ALL ASPECTS OF DECISIONS
RELATING TO ANY OFFSET AREAS PLEASE. a.c.fletcher.

Further, in regard to the field work to be undertaken on **in March 2009**, a representative from our Group:

☒ Would like to attend

☐ Does not wish to attend

Our nominated representative attending the field work for the Mt Arthur Coal Additional Aboriginal Heritage Survey will be:

Arthur C. Fletcher
PETER WILLIAMS

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

Signed in support: a.c.fletcher

On behalf of (Group): WONN1 CONTRACTING

Date: 12-2-09

04 Feb 2009 12:41PM Hansen Bailey

0265752001

p. 4

Return Fax: (02) 6575 2001**Attention: Melissa Walker****RE: MT ARTHUR COAL CONSOLIDATION PROJECT – METHODOLOGY FOR
ADDITIONAL ABORIGINAL HERITAGE SURVEY****Aboriginal Stakeholder Group:** VALLEY CULTURE

I have read and have understood the Mt Arthur Coal Consolidation Project – Methodology for Additional Aboriginal Heritage Survey which has been prepared by ENSR Australia. 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 on in March 2009, a representative from our Group:

☒ Would like to attend☐ Does not wish to attend

Our nominated representative attending the field work for the Mt Arthur Coal Additional Aboriginal Heritage Survey will be:

ELIZABETH HOWARD

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

Signed in support: 

On behalf of (Group): VALLEY CULTURE (LARRY VAN VLIET)

Date: 15.2.09



AHIMS LA [no.] 122
AHIMS service. [no.]

Licensee copy ☐
Copy to be retained by Licensee

Licensor copy ☐
Copy to be posted back to

DECC

Aboriginal Heritage Information Licence Agreement

Between the Department of
Environment and Climate Change and
[Mount Arthur Coal (ENSR, Australia)]



Department of Environment and Climate Change

[26/03/2009]

Details initialised by:

→ _____ ←
Licensor contact person

→  ←
Licensee contact person

CONTENTS

INTRODUCTION	2
ACROYMNS, DEFINITIONS AND INTERPRETATION	4
2. TERMS OF THIS LICENCE AGREEMENT	6
3. PAYMENT SCHEDULE FOR THIS LICENCE AGREEMENT	6
4. ABORIGINAL HERITAGE INFORMATION TO BE PROVIDED FOR THE TERM OF THIS LICENCE AGREEMENT	6
5. CONDITIONS OF USE	7
7. ABORIGINAL COMMUNITY ENDORSEMENT SOUGHT FOR THE RELEASE OF THIS ABORIGINAL HERITAGE INFORMATION	8
8. DURATION AND RENEWAL OF THIS AGREEMENT	9
9. TERMINATION OF THIS AGREEMENT	9
10. NOTICES	10
11. ASSIGNMENT	10
12. VARIATION OR WAIVER	10
13. GOVERNING LAW	11

Details initialled by:

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→ _____ ←
Licensor contact person

→  ←
Licensee contact person

THIS ABORIGINAL HERITAGE INFORMATION LICENCE AGREEMENT

is made on [26/03/2009]

BETWEEN Cheryl Brown, Head AHU, Information Systems and Assessment Section/CHD of the DEPARTMENT of ENVIRONMENT AND CLIMATE CHANGE, 43 Bridge Street/Hurstville 2220.

AND

Rick Bullers, Project Manager – Senior Archaeologist Mount Arthur Coal (ENSR – EA heritage project), NSW, 2073]

INTRODUCTION

This Licence Agreement will direct the release of Aboriginal Heritage Information by the Licensor to the Licensee. The release of this information by the Licensor to the Licensee is based on a recognised need for the Licensee to have access to specific Aboriginal Heritage Information. The Licensee will often be required to seek the endorsement of the relevant Aboriginal communities (as identified by the Licensor) before Aboriginal Heritage Information can be released by the Licensor.

The Licensor therefore provides this information on the understanding that the information will be used by the Licensee to identify and protect Aboriginal sites and heritage where ever possible. The Licensee should carry out this role where ever practicable in partnership with the relevant Aboriginal community organisations.

The principle objectives of this Licence Agreement are to ensure that:

1. The Licensee seeks the endorsement of any relevant Aboriginal community organisations (as identified by the Licensor) for the release and use of this Aboriginal Heritage Information;
2. Aboriginal Heritage Information is provided by the Licensor and used by the Licensee in a manner that respects the sensitive nature of this information;
3. The Licensee has access to Aboriginal Heritage Information that will assist it in making informed decisions for the management and protection of Aboriginal heritage and sites.

Details initialled by:

3

→ _____ ←
Licensor contact person

→  ←
Licensee contact person

THE PARTIES AGREE:

ACROYMNS, DEFINITIONS AND INTERPRETATION

1.1 In this Licence Agreement the following acronyms apply:

AHIMS: Aboriginal Heritage Information Management System
AHIU: Aboriginal Heritage Information Unit, Information Systems and Assessment Section
IS&AS: Information Systems and Assessment Section, Policy and Knowledge Branch
PK&B: Policy and Knowledge Branch, Culture and Heritage Division
CHD: Culture and Heritage Division, Department of Environment and Climate Change
DECC Department of Environment and Climate Change
GIS: Geographic Information System

1.2 In this Licence Agreement the following definitions apply:

"Aboriginal Heritage Information" means information on Sites recorded in the AHIMS.

"AHIMS Registrar" means the Aboriginal position that is responsible for ensuring that all external access to Aboriginal Heritage Information stored on AHIMS is appropriate.

"Contact Persons" will be the nominee staff of the Licensee and the Licensor who should be contacted in relation to this Licence Agreement listed in Annexure E.

"Director-General DECC" means the Director-General of the Department of Environment and Climate Change and includes any person for the time being acting as such.

"Further Information Contact Person" means the person who has been nominated as the person who may provide further information about a Restricted Site.

"GIS layer" means information provided in a digital format that can be used in Arcview GIS (format being either a shapefile or digital spreadsheet with separate zone, eastings and northings).

"Licensee" means (the Licensee organisation) and where not repugnant to the context includes the Licensee's staff, agents and contractors.

"Licensor" means the Director-General of DECC and his or her successors in title and where not repugnant to the context includes the Department of Environment and Climate Change and the employees and agents of that Department.

"Licence Agreement" means this Aboriginal Heritage Information Licence Agreement and all Annexures to and variations of this Licence Agreement.

Details initialised by:

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→ _____ ←
Licensor contact person

→  ←
Licensee contact person

"Minister" means the Minister for the time being responsible for the Department of Environment and Climate Change.

"Restricted Site" means any Site that has a restriction placed on access to Aboriginal Heritage Information contained on the AHIMS.

"Site" means any Aboriginal object (as defined in *the National Parks and Wildlife Act 1974*) or other place of importance or significance to Aboriginal people that are recorded on the AHIMS.

"Standard Site Information" means the information referred to in clause 4.2 of this Licence Agreement.

1.3 In this Licence Agreement unless the context otherwise requires:

1.3.1 words denoting the singular number shall include the plural and vice versa;

1.3.2 words denoting any gender shall include all genders;

1.3.3 words denoting individuals shall include corporations and vice versa; and

1.3.4 a reference to any party or to any Government Department or Authority or to any other person, corporation or association shall be a reference to them as so constituted from time to time and shall include their successors and permitted assigns and in the case of a Government Department or Authority means the body which at the relevant time substantially fulfils the functions of that Government Department or Authority.

1.4 Joint and Several Liability

Any covenant or agreement on the part of or in favour of two or more persons shall be deemed to bind them or be in favour of them jointly and each of them severally.

1.5 Counterparts

This Licence Agreement may consist of counterparts and the counterparts taken together constitute one and the same instrument.

Details initialled by:

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→ _____ ←
Licensor contact person

→  ←
Licensee contact person

2. TERMS OF THIS LICENCE AGREEMENT

- 2.1. The Licensor hereby grants the Licensee a non-exclusive and non-transferable Licence to use the Aboriginal Heritage Information described in Annexure A, subject always to the conditions in this Licence Agreement.
- 2.2 The Aboriginal Heritage Information and copyright and other intellectual property rights in the Aboriginal Heritage Information are and shall remain the property of the copyright holder.
- 2.3 This Licence Agreement constitutes the entire agreement between the parties and supersedes all communications, negotiations, arrangements and agreements, either oral or written, between the parties with respect to the subject matter of this Licence Agreement. No modifications to this Licence Agreement shall be effective unless in writing signed by the parties.

3. PAYMENT SCHEDULE FOR THIS LICENCE AGREEMENT

The Licensee will pay the Licensor in accordance with Annexure C of this Licence Agreement for Aboriginal Heritage Information provided by the Licensor.

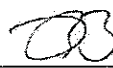
4. ABORIGINAL HERITAGE INFORMATION TO BE PROVIDED FOR THE TERM OF THIS LICENCE AGREEMENT

- 4.1 Aboriginal Heritage Information (as indicated in Annexure A) will be provided by the Licensor to the Licensee in accordance with the information supply and fee schedule in Annexure C.
- 4.2 The Licensee acknowledges and accepts that the Licensor may provide Aboriginal Heritage Information with respect to any site in a format that the Licensor deems appropriate.
- 4.3 **Standard Site Information will include information in the following format:**
- i) Aboriginal site unique identification number;
 - ii) Aboriginal site name;
 - iii) Grid Reference Type (AMG or GDA);
 - iv) Grid Reference Zone;
 - v) Grid Reference Easting;
 - vi) Grid Reference Northing;
 - vii) Site Feature(s) provided for all non-restricted sites;
 - viii) Site Type(s): used for sites recorded prior to June 2001;
 - ix) Recorder name;
 - x) Recording date;
 - xi) Report catalogue number: for further site information as held in reports on the AHIMS catalogue of reports.

Details initialled by:

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→ _____ ←
Licensor contact person

→  ←
Licensee contact person

- 4.4 The Licensee acknowledges and accepts that while a single point is provided for each known site (as represented spatially by the Grid Reference zone, easting and northing) many sites will extend over an area of land and would need to be relocated in the field (as indicated in clause 6.5) and mapped in terms of site extent.
- 4.5. If Aboriginal Heritage Information to be provided as part of this Licence Agreement relates to a Restricted Site, the AHIMS Registrar or the DECC Contact Person may at their discretion, refuse to provide the Standard Site Information in relation to that Site. It will be the responsibility of the Licensee to contact the Further Information Contact Person in relation to further information about the Restricted Site.

5. CONDITIONS OF USE

- 5.1. The Licensee shall only copy, hold and use the Aboriginal Heritage Information in the manner specified in Annexure B.
- 5.2. The Licensee shall not further copy or hold the Aboriginal Heritage Information (including copies or translations into any medium or format) in whole or in part unless authorised by the Licensor in writing.
- 5.3. On expiration or termination of this Licence Agreement, the Licensee shall erase all copies of the Aboriginal Heritage Information in its possession including any derived data (unless otherwise authorised in Annexure B). The Licensor at its discretion may direct the Licensee to confirm in writing that the information as provided under the terms of this Licence Agreement has been destroyed.
- 5.4. The Aboriginal Heritage Information provided under this Licence Agreement shall only be used by the employees or contractors as identified in Annexure B, section 2. Any requests for this information by third parties should be referred to the Licensor's Contact Person.
- 5.5. Adequate security measures and systems must be installed and enforced by the Licensee to safeguard the Aboriginal Heritage Information provided by the Licensor from unauthorised amendment, access or use, including access or use by third parties.
- 5.6. Any hard copy maps/reports derived from the Aboriginal Heritage Information shall include an acknowledgment to the Licensor, the number of this Licence Agreement and the date on which the Aboriginal Heritage Information was provided.
- 5.7. The Aboriginal Heritage Information provided under this Licence Agreement must not be made publicly available or be published by the Licensee in any form or by any means; unless otherwise authorised in Annexure B prior to signing of this Licence Agreement, or after signing of this Licence Agreement where approval has been sought from the AHIMS Registrar and provided in writing to the Licensee.

Details initialled by:

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→ _____ ←
Licensor contact person

→  ←
Licensee contact person

6. LICENSEE LIABILITIES UNDER THIS AGREEMENT

- 6.1. The Licensee acknowledges that the Aboriginal Heritage Information provided may contain errors or omissions.
- 6.2. No representations are made by the Licensors as to the accuracy of the Aboriginal Heritage Information provided.
- 6.3. The Licensee hereby releases and indemnifies, and will keep indemnified, the Licensors, the Minister, the Department of Environment and Climate Change, the Crown in the right of New South Wales and their agents, servants and employees from and against all liability whatsoever in respect to or arising from or in connection with the Aboriginal Heritage Information or otherwise whether for breach of this Licence Agreement, negligence, injury, death, economic loss, loss of reputation or damages incidental or consequential to the provisions of this Licence Agreement AND IT IS FURTHER AGREED that the obligations of the Licensee under this subclause shall continue after the revocation discontinuance or other termination of this Licence Agreement in respect to any act deed matter or thing happening before such revocation discontinuance or other termination.
- 6.4 The Licensee acknowledges that the Aboriginal Heritage Information is current only at the date of release and should be regularly updated by the Licensee to ensure that newly recorded sites are incorporated into planning, maintenance and assessment activities undertaken by the Licensee. Provisions for the resupply of Aboriginal Heritage Information are listed in Annexure C.
- 6.5. If precise locations are required for Sites then it will be the responsibility of the Licensee to verify the location and extent of those Sites in the field at its own cost.
- 6.6. Where the Licensee identifies new Aboriginal sites as part of its operations the Licensee must notify the Director-General of DECC as required under Section 91 of the *National Parks and Wildlife Act 1974*.

7. ABORIGINAL COMMUNITY ENDORSEMENT SOUGHT FOR THE RELEASE OF THIS ABORIGINAL HERITAGE INFORMATION

- 7.1. The Licensors provide this information on the understanding that where required the Licensee has sought endorsement from the relevant Aboriginal community organisations for the Licensors to release this Aboriginal Heritage Information and the Licensee warrants that such endorsement has been sought.
- 7.2. The Licensee acknowledges that the Licensors have provided advice to the Licensee as to the Aboriginal communities (and representative organisations) that should be approached by the Licensee and endorsement sought for the release of Aboriginal Heritage Information.

Details initialled by:

8

→ _____ ←
Licensor contact person

→  ←
Licensee contact person

7.3. The Aboriginal community organisations to be contacted by the Licensee are listed in Annexure D.

7.4 The Licensee must provide written evidence to the Licensor that the Licensee has reasonably sought the endorsement of Aboriginal community organisations identified in Annexure D for the Licensor to release Aboriginal Heritage Information to the Licensee, before Aboriginal Heritage Information is provided by the Licensor to the Licensee.

8. DURATION AND RENEWAL OF THIS AGREEMENT

8.1. The Licence granted in this Licence Agreement will be for a period of 2 years and shall expire on [26/03/2011]. If the Licensee requires Aboriginal Heritage Information past this date a new Licence Agreement must be negotiated.

8.2 The Licensee will be responsible for advising the Licensor no later than 2 months before the expiry of this Licence Agreement that a new Licence Agreement will be sought.

8.3. Prior to the expiration of this Licence Agreement a new Licence Agreement may be negotiated at the discretion of the Licensor.

9. TERMINATION OF THIS AGREEMENT

9.1 The Licensor reserves the right to terminate this Licence Agreement at any time for any breaches of this Licence Agreement by giving 7 days notice in writing to the Licensee, but without prejudice to any action or remedy which the Licensor has for arrears of fees or breach of any covenant or damages or any other remedy as a result of any such event. The Licensee agrees that the Licensor is not liable for and releases the Licensor from liability or loss arising from, and costs, charges and expenses incurred in connection with, anything done by the Licensor under this clause.

9.2. Notwithstanding any thing in clause 9.1, the Licensor shall not terminate this Licence Agreement by notice unless the Licensee has failed to remedy the breach or default (if capable of remedy) within seven (7) days after written notice thereof has been given by the Licensor to the Licensee.

9.3. Upon the revocation, discontinuance or other termination of this Licence Agreement the Licensee shall not be entitled to any compensation whatsoever from the Licensor, the Department of Environment and Climate Change, the Minister or the Crown in the right of New South Wales ("the released persons") with respect to any loss, damage or other liability which the Licensee may at any time suffer or incur as a consequence of or in connection with any such revocation, discontinuance or other termination and the Licensee hereby releases the released persons from all claims and demands in that regard.

Details initialled by:

9

→ _____ ←
Licensor contact person

→  ←
Licensee contact person

10. NOTICES

Any notice or other communication to be given under this Licence Agreement shall be sufficiently served on the Licensee if signed by the Licensor or the Licensor's delegate for the time being and if forwarded by post or left addressed to the Licensee at the address set out in Annexure E or the principal office of the Licensee last known to the Licensor, and shall be sufficiently served on the Licensor if addressed to the Licensor and left at or sent by post addressed to the Licensor at the Licensor's address specified in this Licence Agreement at Annexure E or such other address that the Licensor may notify to the Licensee from time to time, and a notice sent by post shall be deemed to be given at the time when it ought to be delivered in due course of post.

11. ASSIGNMENT

The Licensee must not assign, transfer, or otherwise deal with or dispose of this Licence Agreement or any rights granted under it or by any act or deed procure any of the foregoing.

12. VARIATION OR WAIVER

None of the provisions of this Licence Agreement shall be taken either at law or in equity to have been varied waived discharged or released by the Licensor unless by his or her express consent in writing. No waiver by the Licensor of any breach of any condition contained or implied in this Licence Agreement shall operate as a waiver of another breach of the same or of any other condition in this Licence Agreement.

Details initialled by:

→ _____ ←
Licensor contact person

→  ←
Licensee contact person

13. GOVERNING LAW

This Licence Agreement shall be governed by, and construed in accordance with the law of New South Wales and the parties submit to the jurisdiction of the Courts of New South Wales.

IN WITNESS THEREOF the parties have executed this Licence Agreement the day and year hereinbefore written.

Signed by: Cheryl Brown
Head, Aboriginal Heritage Information Unit
Information Systems and Assessment Section
Policy and Knowledge Branch
Culture and Heritage Division
the authorised delegate of
Lisa Corbyn, the Director-General of the
NSW Department of Environment and Climate Change

→  ←

in the presence of

→  ←

Signed by: [Rick Bullers]
Project Manager, Senior Archaeologist

→  ←

on behalf of

[Mount Arthur Coal (ENSR, Australia)]

in the presence of

[WITNESS NAME AND CONTACT DETAILS]

→  ←

Lee-Anne Bishop
02 8484 8960

Details initialled by:

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→ _____ ←
Licensor contact person

→  ←
Licensee contact person

ANNEXURE A

Aboriginal Heritage Information to be provided

1. **Description of the extent of area for the release of Aboriginal heritage information:**

MUSWELLBROOK – 90332N

JERRY PLAINS – 90332S

17 x 16km area within the following AMG coordinates

Easting: 288000-305000

Northings: 6410000 – 6426000 (zone 56)

2. **Number of Aboriginal sites as part of this area:**

960

Including nil restricted Aboriginal sites

3. **Format in which information is to be provided:**

GIS shape files

4. **Where format differs from standard format:**

Details initialled by:

12

→ _____ ←
Licensor contact person

→  ←
Licensee contact person

ANNEXURE B

Use of Aboriginal Heritage Information

- 1. For what type of activities can this Aboriginal Heritage Information only be used (list):**

For Archaeological assessment of the Mount Arthur Coal (MAC) mining lease lands in order to prepare an EA for consolidation for the various MAC development proposals.

- 2. What people (or groups of people) can access this information:**

This information will be used only by authorised representatives (archaeologists and graphic artists) in order to prepare the archaeological assessments.

- 3. In what specific manner would this information be stored and protected:**

The information will be stored on an ESR electronic project file, protected by external firewalls.

- 4. How will this Aboriginal Heritage Information be erased upon completion of the current DLA.**

The electronic information will be secure-deleted from the project file upon completion of the archaeological assessment project. No hard copies of the data will be retained.

- 4. How will this Aboriginal Heritage Information be published, or otherwise reproduced in any map or visual format.**

The information will be presented in visual (map) form within the archaeological assessment report. Some data (eg Sites located within heritage management zones) will be presented as separate maps. Information regarding selected individual sites may be presented within the text of the report, locational information (ie GPS coordinates) will not be presented in the copy of the report that goes to public exhibition as part of the EA process.

Details initialled by:

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→ _____ ←
Licensor contact person

→  ←
Licensee contact person

- ANNEXURE C

Aboriginal Heritage Information updates and Schedule of Fees

This Aboriginal Heritage Information is provided for:

2 Years

Aboriginal Heritage Information resupplies are every:

12 months

Aboriginal Heritage Information Service	Date to be provided	Fee	Number of sites	Date actually provided	Release confirmed by:
Aboriginal Heritage Information supply	After Signed copies of Licence received in Head Office	\$100.00			DECC

Details initialled by:

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Licensor contact person

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Licensee contact person

ANNEXURE C (continued)

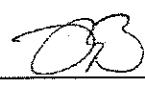
General schedule of fees for AHIMS services

No	AHIMS service	AHIMS service fee	Service provided to client
1	AHIMS database search	\$50.00	Printed AHIMS report plus cover letter
2	AHIMS/GIS search	\$75.00	Cover letter & digital data
3	Express search surcharge	\$50.00	Service provided in 2 working days
4	Processing surcharge	\$60.00 per hour	Specialist services that cannot be processed under normal service conditions
5	Archive visit	\$0	Access to AHIMS archive
6	Archive visit AHIMS search	\$50.00	AHIMS report only
7	Archive visit photocopy	\$0.40 each	Photocopies
8	AHIMS staff photocopy	\$1.00 each (minimum charge \$20.00) or associated with previous search service	Photocopies faxed to client, normally after an AHIMS database search
9	Data Licence Agreement (Now called Aboriginal Heritage Information Licence Agreement)	\$100.00	Use of or access to data for up to two years
10	Resupply of Aboriginal Heritage Information from DLA (Licence Agreement)	\$25.00	Resupply of Aboriginal Heritage Information based on current DLA (includes the new search)
9	Data Licence Agreement (Now called Aboriginal Heritage Information Licence Agreement)	\$175.00	Use of or access to data for up to two years
10	Resupply of Aboriginal Heritage Information from DLA (Licence Agreement)	\$50.00	Resupply of Aboriginal Heritage Information based on current DLA (includes the new search)

Details initialled by:

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Licensor contact person

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Licensee contact person

ANNEXURE D

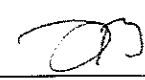
Aboriginal community endorsement for this Licence Agreement

The following Aboriginal community groups were identified by the DECC in relation to endorsement sought for the release of this information

Aboriginal community group	Endorsement sought		Endorsement given (Endorsement letter to be attached if yes)	
Wannarua				

Details initialled by:

→ _____ ←
Licensor contact person

→  ←
Licensee contact person

ANNEXURE E

Nominated contact persons for this Licence Agreement

The nominated contact person for the Licensee (SCC)

Name: [Rick Bullers]

Title: [Senior Archaeologist]

Phone: [02 84848999]

Fax: [02 84848989]

PO Address: [Level 5, Gordon, NSW, 2072, PO Box 726, NSW, 2073]

E-mail: [rick.bullers@aecom.com]

The nominated contact person for the Licensor (DECC) and for any notices.

Name: Cheryl Brown

Title: Head, Aboriginal Heritage Information Unit

Phone: (02) 95856470

Fax: (02) 95856094

PO Address: PO Box A290 Sydney South NSW 1232

Details initialled by:

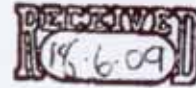
17

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Licensor contact person

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Licensee contact person

Hansen Bailey

ENVIRONMENTAL CONSULTANTS



15 June 2009

Wanaruah Local Aboriginal Land Council
PO Box 127
MUSWELLBROOK NSW 2333

Attention: Ms Suzie Worth

Dear Ms Suzie Worth

**Mt Arthur Coal Consolidation Project
Draft Aboriginal Archaeology and Cultural Heritage Impact Assessment Report**

Mt Arthur Coal is currently preparing an Environmental Assessment (EA) to support a new Project Approval under Part 3A of the *Environmental Planning and Assessment Act 1979* (EP&A Act) to gain a single, contemporary planning approval for its open cut operations and the mining of an additional area within its current Mining Leases (ML) (the Project).

In conjunction with members of the local Aboriginal community groups who expressed an interest in this Project, ENSR Australia conducted an Aboriginal Archaeology and Cultural Heritage Assessment for the Survey Area. As you are aware, the survey component of this work was undertaken over 12 days in March 2009 in accordance with the ENSR Australia methodology included in the letter from Hansen Bailey dated 3 February 2009.

Please find enclosed the draft Aboriginal Heritage Impact Assessment Report dated June 2009 prepared by ENSR Australia, which includes the findings from the fieldwork and the Cultural Heritage Assessment undertaken for this Project. This report will be included as an appendix to the Mt Arthur Coal Consolidation Project EA.

It would be greatly appreciated if you could please provide any comments to myself in relation to this report by **Friday, 3 July 2009**. All responses will be considered and where appropriate recommendations from the Aboriginal community will be incorporated into the final report.

Thank you again for expressing an interest and participating in this work. Should you have any queries in relation to this letter, please contact myself on 02 6575 2000.

Yours faithfully
HANSEN BAILEY

Melissa Walker
Environmental Scientist

Hansen Bailey Pty Ltd (ABN 17 003 587 910)

BRISBANE

Phone: (07) 3276 0600 Fax: (07) 3276 0901

Address: Level 10, 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



P.O. BOX 127
19 MAITLAND STREET,
MUSWELLBROOK 2333
ABN 33 251 730 169

PH: (02) 6543 1288

(02) 6543 1962

FAX: (02) 6542 5377

EMAIL: wanaruah@bigpond.net.au

23 July 2009.

Re: Mount Arthur Coal Consolidation Project Draft Aboriginal Archaeology and Cultural Heritage Assessment Report.

The area surrounding and including Mount Arthur has great cultural and social significance to Aboriginal peoples of this area. 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. It should also be noted that this area is within easy walking distance of several significant sites and ceremonial grounds. It is also situated in very close the proximity of the song line between the Hunter Valley and the Coast. This very important cultural and economic transit way was in use for thousands of years.

Aboriginal Cultural Heritage is not limited to the relics and art that have survived the impact of European settlement. It is a living culture and includes landforms, water holes vegetation zones, habitats, and peoples.

I note with disappointment that there is a desire to destroy an area set aside as a cultural offset. This is unacceptable. Wanaruah LALC has a responsibility to the 1600 plus Aboriginal people living within our boundaries to protect their culture on their behalf. We regretfully cannot stop the destruction of the many areas of significance that mining companies want to destroy. But we will not idly stand by and let you destroy a protected zone.

We do not accept nor agree with the management recommendations for the Mount Arthur Coal Consolidation Project and will not accept them without the guaranteed protection of ALL the Existing MAN Heritage protection Zones.

Thank you for this opportunity to comment.

Noel Downs
CEO



Barkuma Neighbourhood Centre Trading as...

ABN: 58 290 659 800

Gidawaa Walang

Cultural Heritage Consultancy

...To keep our Culture...

Fax
Cover

To: MELISSA WALKER

From: HANSEN BAILEY

Date: 30.6.09

No. of Pages: 2 INCLUDING HEADER.

RESPONSE TO MT ARTHUR COAL CONSOLIDATION
PROJECT - DRAFT ABORIGINAL ARCHAEOLOGY
AND CULTURAL HERITAGE IMPACT ASSESSMENT

THANKS

ANNIE'

76 Lang Street
Kurri Kurri
NSW 2327



Phone: 4937 1094
Fax: 4936 4449
Mob: 0411 196 991

Barkuma Neighbourhood Centre Trading as...

ABN: 58 290 659 800

Gidawaa Walang

*Cultural Heritage Consultancy**...To keep our Culture...*

.....

Monday 29th June 2009

Hansen Bailey
Environmental Consultants
6/127-129 John Street
SINGLETON NSW 2330

Attention: Melissa Walker

Dear Melissa

Re: Mt Arthur Coal Consolidation Project- Draft Aboriginal Archaeology and Cultural Heritage Impact Assessment Report

Gidawaa Walang Cultural Heritage Consultancy agrees with the Management Strategy (9.4) page 124 of the draft report.

9.4.3 Page 126 of the draft report – Sites within Mount Arthur Underground Survey Area- Gidawaa Walang Cultural Heritage Consultancy agrees with the management actions.

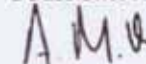
9.4.4 Page 127 of the draft report- Sites within South Pit Extension Area – Gidawaa Walang Cultural Heritage Consultancy agrees with the management actions.

9.4.5 Page 127 of the draft report – Sites within Bayswater No 3- Gidawaa Walang Cultural Heritage Consultancy agrees with the management actions.

9.5.1 Page 128 of the draft report- Scarred Trees GWCH agrees specific management requirements are to be addressed within the Mount Arthur Underground Aboriginal Cultural Heritage Management Plan.

9.5.2 Page 129 of the draft report – Axe Grinding Groove Sites GWCH agrees with the management actions for:- Site 37-2-0110(Mount Arthur)
Site 37-2-0111(Fairford)
Site 37-2-0731(LGH06)

Yours sincerely



Annie Hickey
Project Officer

.....

**76 Lang Street
Kurri Kurri
NSW 2327**



**Phone: 4937 1094
Fax: 4936 4449
Mob: 0411 196 991**

Return Fax: (02) 6575 2001

Attention: Melissa Walker

Re: Mt Arthur Coal – Saddlers Pit Grinding Grooves Potential Relocation

Aboriginal Stakeholder Group: CIDAWAA WALANG CULTURAL HERITAGE CONSULTANCY.

- ☐ We agree in principle that the Saddlers Pit grinding grooves should be relocated to a new Keeping Place at the expense of Mt Arthur Coal
- ☐ We would rather the grinding groove site be managed insitu and should not be moved to a new Keeping Place

We would like to make the following comments:

WE WOULD LIKE TO SEE MORE RESEARCH INTO WHAT CAN BE DONE, AND IF THEY ARE GOING TO BE MOVED, LOOK AT THE EFFECTS THIS WILL HAVE ON THE GRINDING GROOVES
IF THE GRINDING GROOVES ARE MANAGED INSITU, HOW WILL THE ONGOING MINING AROUND THE AREA AFFECT THEM? ALSO IF MANAGED INSITU THE MINIMAL ACCESS WE WOULD ALSO LIKE TO LOOK AT FORMING A WORKING GROUP THAT WILL INCLUDE STAKEHOLDERS TO HELP RESOLVE THE ABOVE ISSUES.

Signed:

A.M.B.

Date:

23.6.09.

Return Fax: (02) 6575 2001

Attention: Melissa Walker

Re: Mt Arthur Coal – Saddlers Pit Grinding Grooves Potential Relocation

Aboriginal Stakeholder Group: WONN1 CONTRACTING

- ☐ We agree in principle that the Saddlers Pit grinding grooves should be relocated to a new Keeping Place at the expense of Mt Arthur Coal
- ☒ We would rather the grinding groove site be managed insitu and should not be moved to a new Keeping Place

We would like to make the following comments:

Signed:

A. Fletcher

Date:

9-7-09

IM SORRY FOR BEING SO LATE A.C.F.

HANSEN BAILEY

Return Fax: (02) 6575 2001

Attention: Melissa Walker

Re: Mt Arthur Coal – Saddlers Pit Grinding Grooves Potential Relocation

Aboriginal Stakeholder Group: MINARR CULTURAL SERVICES

- ☐ We would be interested in working with Mt Arthur Coal to investigate the feasibility of relocating the Saddlers Pit grinding grooves to a new Keeping Place
- ☒ We would rather the grinding groove site be managed insitu and feel the site should not be investigated further

We would like to make the following comments:

MINARR CULTURAL SERVICES RECOMMEND
THAT THE SADDLERS PIT GRINDING GROOVES
ARE OF HIGH CULTURAL SIGNIFICANCE.
THEREFORE ARE TO REMAIN INSITU
WHICH ARE TO BE MONITORED WITH A
FENCE SITUATED AROUND THE GRINDING
GROOVES.

Signed:

Kathleen Stoddart

Date: 10 JULY 2009

Return Fax: (02) 6575 2001

Attention: Melissa Walker

Re: Mt Arthur Coal – Saddlers Pit Grinding Grooves Potential Relocation

Aboriginal Stakeholder Group:

Culturally Aware

- ☐ We agree in principle that the Saddlers Pit grinding grooves should be relocated to a new Keeping Place at the expense of Mt Arthur Coal
- ☒ We would rather the grinding groove site be managed insitu and should not be moved to a new Keeping Place

We would like to make the following comments:

If the grooves are not being impacted upon then should be left in original Cultural Landscape.

and if this is not an option and the Grooves are to be impacted or within close vicinity of them then sensitivity is a priority in removal-relocation of them with being done under a professional experienced team with Aboriginal Community input.

Signed:

T. Skene

Date:

29/6/09



Cacatua Culture Consultants

Entity of Cacatua General Services

ABN 63 774 580 518

2nd July 2009

Your Ref:

Melissa Walker
Environmental Scientist
Hansen Bailey Pty Ltd
PO Box 473
Singleton NSW 2330

RE: Mt Arthur Coal Consolidation Project Draft Aboriginal archaeology and Cultural Heritage Impact Assessment Report.

Melissa,

We have read and discussed the contents of the information that was supplied to us at the meeting on the 12th June 2009, with regards to: Mt Arthur Coal Consolidation Project Draft Aboriginal archaeology and Cultural Heritage Impact Assessment Report.

We found that this survey was thorough in covering all landform so we feel that all attempts to find remaining signs of Aboriginal Inhabitation was fulfilled. With the meeting and the information supplied we are aware of the locations and the items that were found.

The proposed impact on significant items is high due to the extension of Mt Arthur and we believe that this undertaking should remain under separate Section 90 consent to destroy and collection to 30cm below surface. As per point 2 of your draft Management Action (All will be subject to Section 90 Consents to Destroy and surface collected).

We feel that there should be more verbal meetings to discuss outcomes and reviews of drafts.

Yours truly

George Sampson
Manager

22 Ibis Parade, Woodberry NSW 2322
Ph: 02 4964 4685 • Fax: 02 4964 4635



Cacatua Culture Consultants

Entity of Cacatua General Services

ABN 83 774 580 518

2nd July 2009

Your Ref:

Melissa Walker
Environmental Scientist
Hansen Bailey Pty Ltd
PO Box 473
Singleton NSW 2330

RE: Mt Arthur Coal Consolidation Project Saddlers Pit Grinding Grooves.

Melissa,

We have had a representative visit the site, and have read and discussed the contents of the information that was supplied to us at the meeting on the 12th June 2009, with regards to Mt Arthur Coal Consolidation Project Saddlers Pit Grinding Grooves.

In our opinion every effort should be made in preserving what is left of this area. We do not agree with moving the grooves from this area as the location is just as significant as the grooves. This location we feel should be gazette, as the large number of grooves in such a small area gives the impression that the place was of high significance to the aboriginal's inhabitance.

While at the meeting we were informed that this area had a Section 90 and could have been destroyed, the Section 90 that we located for this area (37-2-0731, GPS -APD56) lapsed in 1997 and from what we were able to obtain the Section 90 only mentions artefacts, we did not find any mention of grinding grooves within the information. We were also given the impression that the grinding grooves would be the lowest point of the regeneration this would cause a swamp area with no run off if this is true it is not acceptable as it would create a different eco system to be created from the one that is there.

1 |

22 Ibis Parade, Woodberry NSW 2322

Ph: 02 4964 4685 • Fax: 02 4964 4635



We would prefer that no area go under a Part 3a, however we would like to see the Aboriginal Culture Heritage be involved with each step of the management and planning of the areas that are significant to the Aboriginal people from the onset not the decisions be made and a meeting called so that we can be told what is going to happen and be asked to sign off.

We would like to see the following:

- The regeneration of the land around the fence should be as close as possible to what it was before excavation.
- The water to run on and off the land like it did before
- This area is to have **NO** large build up of water so that it creates a swamp area.
- Weed control to be undertaken under Aboriginal management
- Aboriginal consultation while drafting of the new Aboriginal plan and
- No closing of access to this area if appropriate notification and time is given to the mines.

Please keep in mind that we log this reply as an independent that believes that the preservation of Aboriginal Culture Heritage should be of high priority.

Yours truly

George Sampson
Manager

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Environment

Appendix C

Sites and Artefact Database – Sites Found in Survey Areas

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Database Categories and Definition of Terms Used

Database Category	Definition
<i>Site Name</i>	Site name numbered sequentially from 1 to 94 and prefixed with MAC (Mt Arthur Coal)
<i>Site Type</i>	Identifies the type of Aboriginal site (e.g. artefact scatter, scarred tree, etc) as defined by NPWS (1997).
<i>Survey Area</i>	Identifies the survey area for this project, i.e. Edderton rd, Mount Arthur or offset survey areas.
<i>Inside or Outside Survey area</i>	Identifies whether the site is within the boundary of one of the three survey areas, or outside. If outside, it is cross-checked against sites identified in previous surveys.
<i>MGA Easting and Northing</i>	Grid references for site location and/or individual artefact locations, taken from DGPS at sub-metre accuracy. Grid coordinates are taken using MGA datum.
<i>Archaeological Terrain Unit</i>	A broader classification of a topographical feature that loosely followed Kuskie (1999).
<i>Landform Element</i>	Specific type of topographical feature, following definitions in McDonald et al (1984).
<i>Aspect</i>	Aspect refers to the general direction a site/slope is facing
<i>Slope</i>	Slope is defined by the following three criteria: 1 – level/very gentle 2 – Gentle 3 – Moderate/Steep
<i>Visibility Inside Exposure</i>	The percentage of ground surface visible within an exposure allowing for minor intrusions of vegetation cover. This affects the “detectability” of archaeological material.
<i>Visibility Outside Exposure</i>	The percentage of ground surface visible in the lands immediately surrounding an exposure. This affects the “detectability” of archaeological material.
<i>Erosion State</i>	1 – High state of erosion 2 – Moderate state of erosion 3 – Low state of erosion
<i>Erosion Form</i>	1 – Sheet erosion 2 – Rill erosion 3 – Gully erosion 4 – Stream bank erosion 5 – Aggrading 6 – Modified 7 – Densely vegetated 8 – Ant nest 9 – Animal track
<i>Disturbance</i>	1 – High 2 – Moderate 3 – Low

Database Category	Definition
<i>Number of Artefacts</i>	The number refers to the total number of artefacts recorded within a site. Count may also be an estimate where high numbers are encountered.
<i>Dominant Raw Material</i>	The most common raw material/s identified for stone artefacts (e.g. indurated mudstone, silcrete, etc). Where more than one raw material is identified as dominant, then numbers of each are roughly equal; the first raw material occurs slightly more frequently.
<i>Other Raw Materials</i>	Other raw materials occurring at the site in lower numbers than the dominant raw material/s.
<i>Dominant Artefact Type</i>	The most common type of stone artefact/s (e.g. flake, core, broken flake, etc). Where more than one artefact type is identified as dominant, then numbers of each are roughly equal; the first artefact type occurs slightly more frequently.
<i>Other Artefact Types</i>	Other artefact types occurring at the site in lower numbers than the dominant artefact type/s.
<i>Site Area</i>	This term refers to the gross ground surface area in which artefacts are visible (for each site)
<i>Area Defined By</i>	This refers to the factor that is defining the visible site area, e.g. the extent of visible artefacts, the extent of an exposure, etc.
<i>Aboriginal Significance</i>	Comments made by Aboriginal stakeholder groups regarding the value of the site to them.
<i>Comments from Aboriginal Groups</i>	Comments on cultural significance made by Aboriginal stakeholder groups regarding survey areas, sites, objects, etc.
<i>Artefact Comments</i>	More detailed information recorded regarding artefacts within site assemblages.

Modified from Umwelt (2008)

Table C1: Environmental Description of Archaeological Sites

Site Name	Site Type - New Sites Only	Survey Area	Inside or Outside Survey Area	MGA Easting	MGA Northing	Date Recorded	Recorder	Archaeological Terrain Unit	Landform Element	Aspect	Slope	Visibility Inside Exposure	Visibility Outside Exposure	Erosion State	Erosion Form
MAC1	Artefact scatter	Mt Arthur	Inside	298368.033 6418076.764		2/03/2009	NB	Simple Slope (Moderate-Steep)	Lower slope	NE 3		90%	<10%	3	6
MAC2	Artefact scatter	Mt Arthur	Outside	298363.181 6418212.782		2/03/2009	NB	Simple Slope (Moderate-Steep)	Lower slope	E 3		90%	<10%	3	6
MAC3	Artefact scatter	Mt Arthur	Inside	298298.784 6418217.679		2/03/2009	NB	Ridge Crest/Ridge Line	Spur/ridge crest	E 3		10-80%	0%	2	1
MAC4	Artefact scatter	Mt Arthur	Outside	298491.237 6418053.426		2/03/2009	NB	Simple Slope (Moderate-Steep)	Slope NE		3	60%	0%	2	1
MAC5	Artefact scatter	Mt Arthur	Inside	298604.087	6417857.805 2103	/2009	NB	Spur Crest	Spur?	NE	3	100%	0%	2	1
MAC6	Artefact scatter	Mt Arthur	Inside	298650.451 6417804.681		2/03/2009	NB	Drainage Depression (Moderate-Steep)	Interfluvial rise between two 1st order drainage lines	N 3		90%	0%	2	1
37-3-0111	Grinding grooves	Mt Arthur	Outside	298666.489 6417865.942		2/03/2009	NB	Drainage Depression (Moderate-Steep)	Second order creek	N 3		100%	<20%	1	
MAC7	Isolated find	Mt Arthur	Outside	298661.038 6417844.756		2/03/2009	NB	Drainage Depression (Moderate-Steep)	Creek bank	E 3		60%	0%	2	4
MAC8	Isolated find	Mt Arthur	Outside	298589.706 6417901.165		2/03/2009	NB	Simple Slope (Moderate-Steep)	Lower slope	NE 3		80%	0%	3	1
MAC9	Artefact scatter	Mt Arthur	Inside	298234.699 6418183.821		2/03/2009	NB	Ridge Crest/Ridge Line	Upper slope/ridge side	N 3		100%	0%	2	1

Site Name	Site Type - New Sites Only	Survey Area	Inside or Outside Survey Area	MGA Easting	MGA Northing	Date Recorded	Recorder	Archaeological Terrain Unit	Landform Element	Aspect	Slope	Visibility Inside Exposure	Visibility Outside Exposure	Erosion State	Erosion Form
MAC10	Artefact scatter	Mt Arthur	Outside	297902.737	6418354.529	203	NB	Spur Crest	Upper spur slope side	N 3		80%	0%	2	1
MAC11	Artefact scatter	Mt Arthur	Outside	297480.3	6418357.452	3/03/2009	NB	Ridge Crest/Ridge Line	Ridge crest	NE 3		80%	<10%	2	1
MAC12	Artefact scatter	Mt Arthur	Inside	297650.845	6418277.048	3/03/2009	NB	Simple Slope (Moderate-Steep)	Upper slope	N 3		80%	0%	1	1
MAC13	Artefact scatter	Mt Arthur	Inside	297290.685	6418315.644	3/03/2009	NB	Simple Slope (Moderate-Steep)	Slope S	W	3	90%	0%	2	1
MAC14	Isolated find	Mt Arthur	Inside	297485.546	6418301.862	3/03/2009	NB	Ridge Crest/Ridge Line	Ridge crest	SW 1		90%	0%	2	ridge
MAC15	Isolated find	Edderton Rd	Inside	292639.5	6421305.843	3/03/2009	NB	Simple Slope (Level to Very Gentle)	Slope N		1	80%	0%	3	track
Previous MAU	Isolated find	Edderton Rd	Outside	292663.9	6419816.532	3/03/2009	NB	Simple Slope (Level to Very Gentle)	Slope NE		2	90%	0%	1	3
B1	Artefact scatter	Offset area	Inside	301712.201	6422693.353	4/03/2009	NB	Drainage Depression (Level to Very Gentle)	Toe slope	W	1	95%	0%	2	4
B2	Artefact scatter	Offset area	Inside	301199.953	6423171.968	4/03/2009	NB	Drainage Depression (Level to Very Gentle)	mid slope/gully bank	NW 1		80%	0%	2	4
B3	Artefact scatter	Offset area	Inside	302341.695	6422306.548	4/03/2009	NB	Drainage Depression (Level to Very Gentle)	spur edge	SW	1	90%	0%	1	4, 8
MAC16	Isolated find and PAD	Offset area	Inside	302477.034	6423889.8	5/03/2009	NB	Drainage Depression (Level to Very Gentle)	Terrace -		100%	100%	0%	2	8
MAC17	Isolated find	Offset area	Inside	302870.141	6423383.803	5/03/2009	NB	Simple Slope (Gentle)	Lower slope	N 1		100%	0%	1	8

Site Name	Site Type - New Sites Only	Survey Area	Inside or Outside Survey Area	MGA Easting	MGA Northing	Date Recorded	Recorder	Archaeological Terrain Unit	Landform Element	Aspect	Slope	Visibility Inside Exposure	Visibility Outside Exposure	Erosion State	Erosion Form
MAC18	Artefact scatter	Offset area	Inside	302454.346	6423693.825	5/03/2009	NB	Drainage Depression (Gentle)	Creek flat	-	1	100%	0%	1	5, 8
MAC19	Artefact scatter	Offset area	Inside	302316.961	6423632.542	5/03/2009	NB	Simple Slope (Gentle)	Mid slope	NE	2 80%		10% 2		8
MAC20	Isolated find	Offset area	Inside	302139.595	6423484.158	5/03/2009	NB	Simple Slope (Gentle)	Mid slope	NE	2	100%	10%	2	8
MAC21	Scarred tree	Offset area	Inside	302161.048	6423734.167	5/03/2009	NB	Simple Slope (Gentle)	Mid slope	N	2	N/A N/	A N/	A	N/A
MAC22	Scarred tree	Offset area	Inside	302158.47	6423696.03	5/03/2009	NB	Simple Slope (Gentle)	Mid slope	N	2	N/A N/	A N/	A	N/A
MAC23	Artefact scatter	Offset area	Inside	302025.667	6423758.148	5/03/2009	NB	Drainage Depression (Gentle)	Gully N		2	100%	10%	1	4
MAC24	Isolated find	Offset area	Inside	301947.299	6423692.446	5/03/2009	NB	Drainage Depression (Gentle)	Mid slope	N	2	40%	0%	2	4
MAC25	Isolated find	Offset area	Inside	302055.18	6423461.338	5/03/2009	NB	Simple Slope (Gentle)	Mid slope	N	2	100%	10%	2	8
MAC26	Isolated find	Mt Arthur	Inside	298176.609	6417953.838	6/03/2009	NB	Drainage Depression (Level to Very Gentle)	Lower slope	S 2		20%	0%	3	1
MAC27	Isolated find and PAD	Mt Arthur	Inside	297790.589	6418187.643	6/03/2009	NB	Ridge Crest/Ridge Line	Ridge flat	W	2	100%	10%	3	6
MAC28	Isolated find	Mt Arthur	Inside	298089.953	6417934.795	6/03/2009	NB	Simple Slope (Moderate-Steep)	Minor spur between gullies	W	3 80%		10% 2		1
MAC29	Isolated find	Mt Arthur	Inside	298041.52	6417830.401	6/03/2009	NB	Drainage Depression (Level to Very Gentle)	Basal slope next to gully	SW 2		80%	0%	3	1

Site Name	Site Type - New Sites Only	Survey Area	Inside or Outside Survey Area	MGA Easting	MGA Northing	Date Recorded	Recorder	Archaeological Terrain Unit	Landform Element	Aspect	Slope	Visibility Inside Exposure	Visibility Outside Exposure	Erosion State	Erosion Form
MAC30	Isolated find	Mt Arthur	Inside	297954.146 6417914.067		6/03/2009	NB	Drainage Depression (Level to Very Gentle)	Toe slope	SW	2	100%	0%	3	9
MAC31	Isolated find	Offset area	Inside	302643.202 641762.374		6/03/2009	NB	Simple Slope (Gentle)	Slope/rock outcrop	W	2 90%		20% 3		1
MAC32	Isolated find	Offset area	Inside	302575.94 642138.707		6/03/2009	NB	Drainage Depression (Gentle)	Mid slope gully edge	NW 2		N/A	<10%	3	4
MAC33	Isolated find	Mt Arthur	Inside	297323.221 6417872.69		6/03/2009	NB	Simple Slope (Moderate-Steep)	Mid slope gully edge	SW	3 80%		10% 3		1
MAC34	Isolated find	Mt Arthur	Inside	297236.112 6417824.098		6/03/2009	NB	Simple Slope (Moderate-Steep)	Mid slope	N	3 90%		10% 3		9
MAC35	Isolated find	Mt Arthur	Inside	297275.818	6417747.77 9/03	/2009	NB	Spur Crest	Ridge crest	NW	1 90%		20% 3		6
MAC36	Isolated find	Mt Arthur	Inside	297824.482 6417736.336		9/03/2009	NB	Simple Slope (Moderate-Steep)	Upper slope	N 3		20%	0%	3	9
MAC37	Isolated find	Mt Arthur	Inside	297860.469 6417752.889		9/03/2009	NB	Simple Slope (Moderate-Steep)	Upper slope	N	3 50%		10% 3		1
MAC38	Artefact scatter	Mt Arthur	Inside	297582.269 6417896.054		9/03/2009	NB	Drainage Depression (Moderate-Steep)	Minor spur crest	NW 3		100%	30%	1	1
MAC39	Isolated find	Mt Arthur	Inside	297726.888 6417905.035		9/03/2009	NB	Simple Slope (Moderate-Steep)	Low spur on slope	NW 3		100%	10%	1	1
MAC40	Artefact scatter	Offset area	Inside	301045.089 6424830.726		9/03/2009	NB	Simple Slope (Gentle)	Midslope gully side	W 1		100%	0%	2	4
MAC41	Artefact scatter	Offset area	Inside	301098.916 6424372.183		9/03/2009	NB	Simple Slope (Gentle)	Upper slope	W 1		10-100%	0%	2	6
MAC42	Isolated find	Offset area	Inside	301217.749	6424197.231 9/03	/2009	NB	Spur Crest	Spur/ridge crest	NW 1		20%	0%	3	1

Site Name	Site Type - New Sites Only	Survey Area	Inside or Outside Survey Area	MGA Easting	MGA Northing	Date Recorded	Recorder	Archaeological Terrain Unit	Landform Element	Aspect	Slope	Visibility Inside Exposure	Visibility Outside Exposure	Erosion State	Erosion Form
MAC43	Isolated find	Offset area	Inside	301162.093 6424175.252		10/03/2009	NB	Simple Slope (Gentle)	Upper slope	W 1		100%	50%	1	1
MAC44	Isolated find	Offset area	Inside	301958.622 6423706.779		10/03/2009	NB	Drainage Depression (Gentle)	Mid slope	NW	1	100%	10%	3	1
MAC45	Artefact scatter	Offset area	?	301958.622 6423705.779		10/03/2009	NB	Ridge Crest/Ridge Line	Upper slope - ridge crest edge	NW 1		100%	10%	3	8
MAC46	Isolated find	Offset area	?	301958.622 6423701.779		10/03/2009	NB	Ridge Crest/Ridge Line	Ridge crest	N 1		100%	30%	3	8
MAC47	Isolated find	Offset area	?	301958.622 6423700.779		10/03/2009	NB	Ridge Crest/Ridge Line	Upper slope	NE 1		100%	20%	3	8
MAC48	Isolated find	Offset area	Inside	301421.175 6423822.099		10/03/2009	NB	Ridge Crest/Ridge Line	Ridge side slope	E 1		50%	0%	3	9
MAC49	Isolated find	Offset area	Inside	301072.774 6422131.24		11/03/2009	NB	Ridge Crest/Ridge Line	Upper slope	S 1		100%	20%	2	1, 8
MAC50	Isolated find	Offset area	Inside	300651.03 6422533.552		11/03/2009	NB	Simple Slope (Gentle)	Ridge flat	NW 1		100%	50%	3 1,	6
MAC51	Artefact scatter	Offset area	Inside	301661.876 6422808.55		11/03/2009	NB	Drainage Depression (Level to Very Gentle)	Creek terrace	NE 1		100%	20%	1	9
MAC52	Isolated find	Offset area	Inside	301641.051 6422894.171		11/03/2009	NB	Drainage Depression (Level to Very Gentle)	High creek bank	NE 1		100%	20%	3	4
MAC53	Artefact scatter	Offset area	Inside	301593.253 6422952.324		11/03/2009	NB	Drainage Depression (Level to Very Gentle)	Creek terrace/bank	- 1		50-100%	20%	3	9

Site Name	Site Type - New Sites Only	Survey Area	Inside or Outside Survey Area	MGA Easting	MGA Northing	Date Recorded	Recorder	Archaeological Terrain Unit	Landform Element	Aspect	Slope	Visibility Inside Exposure	Visibility Outside Exposure	Erosion State	Erosion Form
MAC54	Isolated find	Offset area	Inside	301202.994 6423319.553		11/03/2009	NB	Drainage Depression (Level to Very Gentle)	Creek bank/upper terrace	- 1		100%	20%	3	9
MAC55	Isolated find	Offset area	Inside	301145.978 6423344.004		11/03/2009	NB	Drainage Depression (Level to Very Gentle)	High creek bank	E 1		50-80%	10%	3	9
MAC56	Artefact scatter	Offset area	Inside	301269.58 6423430.473		11/03/2009	NB	Drainage Depression (Gentle)	High creek bank/basal slope/spur	S 1		100%	10%	2	1, 9
MAC57	Isolated find	Offset area	Inside	301524.288 6423268.747		11/03/2009	NB	Drainage Depression (Gentle)	Gully side	S	1	50%	0%	3	4
MAC58	Isolated find	Offset area	Inside	301567.67 6423184.746		11/03/2009	NB	Drainage Depression (Level to Very Gentle)	High creek bank	N/A	1 90%		10% 3		4
MAC59	Isolated find	Offset area	Inside	301715.576 6422997.121		11/03/2009	NB	Drainage Depression (Level to Very Gentle)	Spur	SW	1 50%		20% 3		1
MAC60	Artefact scatter	Offset area	Inside	301787.208 6422911.543		11/03/2009	NB	Drainage Depression (Level to Very Gentle)	High creek bank/basal slope	W 1		50-100%	10%	3	4, 9
MAC61	Artefact scatter	Offset area	Inside	301754.965 6422859.775		11/03/2009	NB	Drainage Depression (Level to Very Gentle)	Spur toe/creek bank	W 1		100%	10%	3	4, 8
MAC62	Artefact scatter	Offset area	Inside	301366.493 6422980.299		11/03/2009	NB	Drainage Depression (Level to Very Gentle)	Mid slope	NE	1 90%		10% 3		6
MAC63	Artefact scatter	Offset area	Inside	301860.937 6422518.421		12/03/2009	NB	Drainage Depression (Level to Very Gentle)	High creek bank	NE 1		<50%	0%	3	4
MAC64	Artefact scatter	Offset area	Inside	302024.109 6422459.85		12/03/2009	NB	Drainage Depression (Level to Very Gentle)	High creek bank/lower slope	N 1		50-80%	0%	3	1, 9

Site Name	Site Type - New Sites Only	Survey Area	Inside or Outside Survey Area	MGA Easting	MGA Northing	Date Recorded	Recorder	Archaeological Unit	Landform Element	Aspect	Slope	Visibility Inside Exposure	Visibility Outside Exposure	Erosion State	Erosion Form
MAC65	Isolated find	Offset area	Inside	302238.295 6422278.916		12/03/2009	NB	Drainage Depression (Level to Very Gentle)	Middle terrace edge	N 1		>90%	0%	3	4, 9
37-2-170	Offset	t area		302210.379 6422217.931		12/03/2009	NB	Drainage Depression (Level to Very Gentle)	High creek bank	E 1		>80%	0%	3	8, 9
MAC66	Isolated find	Offset area	Inside	302327.319 6422151.022		12/03/2009	NB	Drainage Depression (Level to Very Gentle)	High creek bank/lower slope	SW	1	20-50%	10%	3	1, 8, 9
MAC67	Isolated find	Offset area	Inside	302386.071 6422310.427		12/03/2009	NB	Drainage Depression (Level to Very Gentle)	Gully edge/slope	NW 1		100%	0%	3 1,	9
MAC68	Isolated find	Offset area	Inside	302280.43 6422340.88		12/03/2009	NB	Drainage Depression (Level to Very Gentle)	Lower slope	SW 1		100%	<20%	3	1
MAC69	Isolated find	Offset area	Inside	301584.167 6422755.796		12/03/2009	NB	Drainage Depression (Level to Very Gentle)	Lower slope	NE 1		75-100%	<10%	3	6
MAC70	Isolated find	Offset area	Inside	301551.12 6422810.667		12/03/2009	NB	Drainage Depression (Level to Very Gentle)	Lower slope	NE 1		80%	<10%	3	6
MAC71	Artefact scatter	Offset area	Inside	301166.719 6422987.643		12/03/2009	NB	Drainage Depression (Level to Very Gentle)	Slope/gully sides	N	2 >90%		<10% 2		1, 4
MAC72	Isolated find	Offset area	Inside	301396.154 6422405.547		12/03/2009	NB	Drainage Depression (Gentle)	Spur toe into gully	NE 2		50%	0%	3	1
MAC73	Isolated find	Offset area	Inside	301021.007 6422429.766		12/03/2009	NB	Simple Slope (Gentle)	Shallow 1st order gully side	W 1		100%	0%	1	1, 4
MAC74	Isolated find	Offset area	Inside	301036.356 6422489.09		12/03/2009	NB	Simple Slope (Gentle)	Mid slope	N	2	50%	0%	3	1
MAC75	Artefact scatter	Offset area	Inside	301256.202 6422676.876		12/03/2009	NB	Simple Slope (Gentle)	Shallow gully base	N 1		50%	0%	3	3

Site Name	Site Type - New Sites Only	Survey Area	Inside or Outside Survey Area	MGA Easting	MGA Northing	Date Recorded	Recorder	Archaeological Terrain Unit	Landform Element	Aspect	Slope	Visibility Inside Exposure	Visibility Outside Exposure	Erosion State	Erosion Form
MAC76	Artefact scatter	Offset area	Inside	300608.154 6424337.4		13/03/2009	NB	Drainage Depression (Level to Very Gentle)	Creek terrace edge	NW 1		50-100%	<10%	2, 8,	9
MAC77	Artefact scatter	Offset area	Inside	300523.267 6424255.065		13/03/2009	NB	Drainage Depression (Level to Very Gentle)	High creek bank	E 1		50%	<10%	3	8, 9
MAC78	Artefact scatter	Offset area	Inside	300479.769 6424183.838		13/03/2009	NB	Drainage Depression (Level to Very Gentle)	High creek bank/gully head	NE 1		80-100%	<10%	3	9
MAC79	Isolated find	Offset area	Inside	300052.581 6423939.491		13/03/2009	NB	Drainage Depression (Gentle)	Upper slope	W 2		15%	0%	3	1
MAC80	Isolated find	Offset area	Inside	300325.462 6424135.117		13/03/2009	NB	Drainage Depression (Gentle)	Slope W		1	90%	0%	3	9
MAC81	Isolated find	Offset area	Inside	300304.421 6424144.134		13/03/2009	NB	Drainage Depression (Gentle)	Slope/eroded watercourse	W 2		50%	<10%	2	3
MAC82	Artefact scatter	Offset area	Inside	300510.272 6424078.069		13/03/2009	NB	Simple Slope (Gentle)	High creek/gully bank flat	N 1		50%	0%	3	4
MAC83	Artefact scatter	Offset area	Inside	300687.989 6423970.453		13/03/2009	NB	Drainage Depression (Level to Very Gentle)	High creek bank	E 1		80%	<10%	3	9
MAC84	Artefact scatter	Offset area	Inside	301438.891 6423441.869		16/03/2009	NB	Simple Slope (Gentle)	Mid slope	S	2	80%	0%	2	6
MAC85	Artefact scatter	Offset area	Inside	301704.921 6423502.864		16/03/2009	RB	Ridge Crest/Ridge Line	Ridge crest	E 1		70%	0%	3	6, 9
MAC86	Artefact scatter	Offset area	Inside	302078.446 6423193.979		16/03/2009	RB	Ridge Crest/Ridge Line	Ridge crest	SE 1		20%	0%	3	9

Site Name	Site Type - New Sites Only	Survey Area	Inside or Outside Survey Area	MGA Easting	MGA Northing	Date Recorded	Recorder	Archaeological Terrain Unit	Landform Element	Aspect	Slope	Visibility Inside Exposure	Visibility Outside Exposure	Erosion State	Erosion Form
MAC87	Artefact scatter	Offset area	Inside	301877.539	6423401.748	16/03/2009	RB	Ridge Crest/Ridge Line	Ridge crest	NE 1		100%	<20%	3	1, 8
MAC88	Isolated find	Offset area	Inside	301993.688	6423321.136	16/03/2009	RB	Ridge Crest/Ridge Line	Ridge crest	N 1		10%	0%	3	1
MAC89	Isolated find	Offset area	Inside	302064.331	6423276.984	16/03/2009	RB	Ridge Crest/Ridge Line	Upper slope	NE 1		100%	10%	3	8
MAC90	Isolated find	Offset area	Inside	302457.283	6423449.176	16/03/2009	RB	Simple Slope (Gentle)	Midslope N		2	90%	0%	3	1
MAC91 PAD		Offset area	Inside	24	6423482.684	16/03/2009	RB	Drainage Depression (Gentle)	High terrace in confluence of 1st & 3rd order creeks	N 1		0%	0%	-	-
MAC92	Artefact scatter	Offset area	Inside	301630.53	6422571.53	17/03/2009	GO	Drainage Depression (Level to Very Gentle)	Lower slope	NE 1		100%	0%	3	6, 8
37-2-0185	Artefact scatter	Offset area	Inside	300736.502	6423744.244	17/03/2009	GO	Drainage Depression (Level to Very Gentle)	High creek bank	E 1		80%	0%	2	4, 9
MAC93	Artefact scatter	Offset area	Inside	300809.761	6423573.2	17/03/2009	GO	Drainage Depression (Level to Very Gentle)	Creek bank	E 1		90%	0%	2	4
MAC94	Artefact scatter	Offset area	Inside	300846.082	6423497.537	17/03/2009	GO	Drainage Depression (Level to Very Gentle)	High creek bank	NE 1		90%	0%	3	4, 8

Table C2: Cultural Description of Archaeological Sites

Site Name	Site Type - New Sites Only	Disturbance	Number of Artefacts	Predominant Material	Other Raw Materials	Predominant Artefact Type	Other Artefact Types	Site Area	Area Defined By	Aboriginal Significance	Comments from Aboriginal Groups	Artefact Comments
MAC1	Artefact scatter	1	4	mudstone	-	flakes	broken flake	9 x 1 m	exposure defined by length width of contour bank	No comments made in the field	No comments made	
MAC2	Artefact scatter	3	2	mudstone	-	core	-	10 x 1 m	Artefact distribution	No comments made in the field	No comments made	
MAC3	Artefact scatter	3	3	Silcrete	-	Flake	-	5 x 5 m	Artefact distribution	No comments made in the field	No comments made	
MAC4	Artefact scatter	1 6		Silcrete	Volcanic material	Flake	Bondi point, core	100 x 100 m	Extent of exposure	No comments made in the field	No comments made	
MAC5	Artefact scatter	3 2		Silcrete, mudstone	-	Retouched flake, broken flake	-	7 x 7 m	Artefact distribution	No comments made in the field	No comments made	
MAC6	Artefact scatter	3 2		Silcrete, mudstone	-	Flake	-	7 x 7 m	Artefact distribution	No comments made in the field	No comments made	
37-3-0111	Grinding grooves	3	0	n/a	n/a	Grinding grooves	-	1 x 1 m	Distance between grinding grooves	No comments made in the field	No comments made	
MAC7 Isol	ated find	3	1	mudstone	-	flake	-	Single artefact	-	No comments made in the field	None made	
MAC8 Isol	ated find	3	1	volcanic	-	flake	-	Single artefact	-	No comments made in the field	None made	
MAC9	Artefact scatter	3	3	silcrete	quartz	flake	-	40 x 10 m	Extent of exposure	No comments made in the field	None made	

Site Name	Site Type - New Sites Only	Disturbance	Number of Artefacts	Predominant Material	Other Raw Materials	Predominant Artefact Type	Other Artefact Types	Site Area	Area Defined By	Aboriginal Significance	Comments from Aboriginal Groups	Artefact Comments
MAC10	Artefact scatter	1 2		silcrete	mudstone/quartz	flake	retouched flake, broken flake, flaked piece, core	100 m	Artefact distribution	No comments made in the field	None made	Most artefacts within contour bank; core is a blade core
MAC11	Artefact scatter	1 5		silcrete	mudstone/quartz	flake	retouched flake, broken flake, flaked piece	100 m	Artefact distribution	No comments made in the field	None made	Most artefacts within contour bank
MAC12	Artefact scatter	2 2		quartz/mudstone	-	flake	-	10 x 10 m	Artefact distribution	No comments made in the field	None made	
MAC13	Artefact scatter	2 2		quartz/mudstone	-	shatter/flake	-	20 x 5 m	Extent of exposure	No comments made in the field	None made	
MAC14 Isol	ated find	1	1	silcrete	-	core	-	Single artefact	-	No comments made in the field	None made	
MAC15 Isol	ated find	1	1	hornfels	-	hatchet head	-	Single artefact	-	No comments made in the field	None made	
Previous MAU	Isolated find	3	1	silcrete	-	flake	-	Single artefact	-	No comments made in the field	None made	
B1	Artefact scatter	3 16		mudstone	silcrete, quartz, chert	flake	core, flaked piece, broken flake, retouched flake	60 x 20 m	Artefact distribution	No comments made in the field	None made	
B2	Artefact scatter	3 9		Mudstone	Chalcedony, volcanic material	Flake	Core, broken flake	60 x 20 m	Artefact distribution	No comments made in the field	None made	

Site Name	Site Type - New Sites Only	Disturbance	Number of Artefacts	Predominant Material	Other Raw Materials	Predominant Artefact Type	Other Artefact Types	Site Area	Area Defined By	Aboriginal Significance	Comments from Aboriginal Groups	Artefact Comments
B3	Artefact scatter	1 11		Mudstone/Silcrete	Quartz Flake		Retouched flake, broken flake	30 x 15 m	Extent of exposure/ant nest	No comments made in the field	None made	One mudstone retouched flake is a "mini tula slug"; some mudstone is very coarse and/or grey in colour;
MAC16	Isolated find and PAD	1 1		Mudstone	-	Flake	-	4 m diameter	Exposure	No comments made in the field	None made	
MAC17 Isol	ated find	2	1	Mudstone	-	Flake	-	Single artefact	No comments made in the field	None made	2	
MAC18	Artefact scatter	1 2		Mudstone	-	Broken flake	-	Single artefact	Exposure 5 x 8 m	No comments made in the field	None made	
MAC19	Artefact scatter	1 5		Silcrete	-	Flake	Flaked piece, raw material cobbles	>100 m2	Extent of silcrete cobbles	No comments made in the field	None made	
MAC20 Isol	ated find	1	1	Silcrete	-	Flake	-	Single artefact	Exposure 12 x 8 m	No comments made in the field	None made	
MAC21	Scarred tree	3	0	N/A	-	Scarred tree	-	Single object	-	No comments made in the field	None made	Scar face heavily weathered; senescent box gum
MAC22	Scarred tree	3	0	N/A	-	Scarred tree	-	Single object	-	No comments made in the field	None made	Positive ID, dead box gum

Site Name	Site Type - New Sites Only	Disturbance	Number of Artefacts	Predominant Material	Other Raw Materials	Predominant Artefact Type	Other Artefact Types	Site Area	Area Defined By	Aboriginal Significance	Comments from Aboriginal Groups	Artefact Comments
MAC23	Artefact scatter	3	2	Silcrete	-	Flaked piece	-	10 m2	Artefact distribution	No comments made in the field	None made	Questionable ID as artefacts
MAC24 Isol	ated find	3	1	Basalt	-	Hatchet head	-	Single artefact	-	No comments made in the field	None made	Hatched head shows ground edge and anvil pitting; made on river pebble with flaked butt; 130 x 95 x 25- 30 mm
MAC25 Isol	ated find	2	1	Mudstone	-	Flake	-	Single artefact	Exposure 5 x 5 m	No comments made in the field	None made	
MAC26 Isol	ated find	3	1	Volcanic material	- Retouch	ed flake/tool	-	Single artefact	-	No comments made in the field	None made	
MAC27	Isolated find and PAD	1 1		quartzite	-	Flake	-	Single artefact	-	No comments made in the field	None made	
MAC28	Isolated find	3	1	Mudstone	-	Flaked piece	-	Single artefact	Exposure 20 m diameter	No comments made in the field	None made	
MAC29 Isol	ated find	3	1	Silcrete	-	Core	-	Single artefact	Exposure 5 m diameter	No comments made in the field	None made	flake scars unidirectional
MAC30	Isolated find	3	1	Silcrete	-	Broken flake	-	Single artefact	Exposure 1 x 1 m	No comments made in the field	None made	
MAC31 Isol	ated find	3	1	Chert	-	Flake	-	Single artefact	Exposure 50 x 10 m	No comments made in the field	None made	Grey chert

Site Name	Site Type - New Sites Only	Disturbance	Number of Artefacts	Predominant Material	Other Raw Materials	Predominant Artefact Type	Other Artefact Types	Site Area	Area Defined By	Aboriginal Significance	Comments from Aboriginal Groups	Artefact Comments
MAC32 Isol	ated find	3	1	Silcrete	-	Core	-	Single artefact	-	No comments made in the field	None made	Large obtrusive artefact on poor visibility ground surface
MAC33	Isolated find	3	1	Silcrete	-	Broken flake	-	Single artefact	Exposure 35 x 5 m	No comments made in the field	None made	
MAC34	Isolated find	3	1	Silcrete	-	Flaked piece	-	Single artefact	Animal track 0.3 m wide	No comments made in the field	None made	
MAC35 Isol	ated find	1	1	Silcrete	-	Flake	-	Single artefact	Vehicle track	No comments made in the field	None made	
MAC36 Isol	ated find	3	1	Quartz	-	Flake	-	Single artefact	Animal tracks through rocks	No comments made in the field	None made	
MAC37 Isol	ated find	3	1	Silcrete -		Retouched flake	-	Single artefact	-	No comments made in the field	None made	Distal end and side retouched
MAC38	Artefact scatter	3 2		Quartz, mudstone	-	Retouched flake, flake	-	20 x 1 m	Exposure area 40 x 10 m	No comments made in the field	None made	
MAC39 Isol	ated find	3	1	Mudstone	-	Flake	-	Single artefact	-	No comments	None made	
MAC40	Artefact scatter	3 2		Mudstone, silcrete	-	Flake, broken flake	-	10 m x 1 m	Artefact distribution	No comments made in the field	None made	
MAC41	Artefact scatter	2 4		Mudstone, silcrete	- Flake		Core, broken flake	10 x 5 m	Artefact distribution	No comments made in the field	None made	
MAC42 Isol	ated find	3	1	Silcrete	-	Core	-	Exposure 10 x 3 m	-	No comments made in the field	None made	

Site Name	Site Type - New Sites Only	Disturbance	Number of Artefacts	Predominant Material	Other Raw Materials	Predominant Artefact Type	Other Artefact Types	Site Area	Area Defined By	Aboriginal Significance	Comments from Aboriginal Groups	Artefact Comments
MAC43 Isol	ated find	3	1	Quartz	-	Core	-	Single artefact	Extensive exposure	No comments made in the field	None made	
MAC44 Isol	ated find	3	1	Mudstone	-	Flake	-	Single artefact	Exposure 20 x 15 m	No comments made in the field	none made	
MAC45	Artefact scatter	2 4		Silcrete	-	Flake	-	10 x 10 m	Extent of exposure	No comments made in the field	None made	
MAC46 Isol	ated find	2	1	Mudstone	-	Flake	-	Single artefact	Ant nest exposure 6 x 6 m	No comments made in the field	None made	
MAC47 Isol	ated find	2	1	Silcrete	-	Flake	-	Single artefact	Ant nest exposure 6 x 5 m	No comments made in the field	None made	
MAC48 Isol	ated find	3	1	Porphyry	-	Flake	-	Single artefact	Cattle track exposure 100 m x 0.5-1 m	No comments made in the field	None made	
MAC49 Isol	ated find	1	1	Volcanic material	- Flake		-	Single artefact	Exposure 100 x 20 m	No comments made in the field	None made	
MAC50	Isolated find	1	1	Mudstone	-	Broken flake	-	Single artefact	Farm track exposure 100 x 4 m	No comments made in the field	None made	
MAC51	Artefact scatter	3 11		Mudstone	Silcrete	Flake	Retouched flake, core	13 x 3 m	Extent of exposure	No comments made in the field	None made	One mudstone flake is the broken butt of a backed blade
MAC52 Isol	ated find	3	1	Silcrete	-	Flake	-	Single artefact	Exposure 50 x 0.5 m	No comments made in the field	None made	
MAC53	Artefact scatter	3	2	Silcrete	-	shatter, broken flake	-	10 x 1 m	Artefact distribution	No comments made in the field	None made	

Site Name	Site Type - New Sites Only	Disturbance	Number of Artefacts	Predominant Material	Other Raw Materials	Predominant Artefact Type	Other Artefact Types	Site Area	Area Defined By	Aboriginal Significance	Comments from Aboriginal Groups	Artefact Comments
MAC54 Isol	ated find	3	1	Mudstone	-	Flake	-	Single artefact	Exposure 20 x 0.5 m	No comments made in the field	None made	
MAC55 Isol	ated find	3	1	Silcrete	-	Core	-	Single artefact	Exposure 40 x 0.5 m	No comments made in the field	None made	
MAC56	Artefact scatter	3 2		Silcrete, volcanic material	-	Retouched flake, flake	-	10 x 1 m	Cattle track exposure 20 x 3 m	No comments made in the field	None made	
MAC57 Isol	ated find	3	1	Quartz	-	Flake	-	Single artefact	Exposure 20 x 10 m	No comments made in the field	None made	
MAC58 Isol	ated find	3	1	Quartz	-	Core	-	Single artefact	-	No comments made in the field	None made	
MAC59 Isol	ated find	3	1	Mudstone -		Retouched flake	-	Single artefact	-	No comments made in the field	None made	
MAC60	Artefact scatter	3 13		mudstone	silcrete, volcanic material	flake	shatter	70 x 5 m	Extent of exposure	No comments made in the field	None made	
MAC61	Artefact scatter	3 7		Silcrete	mudsto ne, petrified wood	flake	core, broken flake	2 m diameter	Extent of exposure	No comments made in the field	None made	Core is a blade core; retouched flake is a heavy flaked tool

Site Name	Site Type - New Sites Only	Disturbance	Number of Artefacts	Predominant Material	Other Raw Materials	Predominant Artefact Type	Other Artefact Types	Site Area	Area Defined By	Aboriginal Significance	Comments from Aboriginal Groups	Artefact Comments
MAC62	Artefact scatter	1 72		silcrete	mudstone, quartz, petrified wood, volcanic material	flake	core, broken flake, retouched flake, core tool	150 x 30 m	Artefact distribution	No comments made in the field	None made	Knapping floor; several retouched flakes including end scraper tool. Core is unidirectional
MAC63	Artefact scatter	3 7		mudstone	silcrete, quartzite	flake	flaked piece, broken flake	Arte	fact distribution	No comments made in the field	None made	
MAC64	Artefact scatter	3 4		silcrete	quartz	flake	broken flake, flaked piece	Arte	fact distribution	No comments made in the field	None made	
MAC65 Isol	ated find	3	1	silcrete	-	flake	-	Single artefact	-	No comments made in the field	None made	
37-2-170		2	1	silcrete	-	broken flake	-	Single artefact	-	No comments made in the field	None made	
MAC66 Isol	ated find	2	1	mudstone	-	flake	-	Single artefact	-	No comments made in the field	None made	
MAC67 Isol	ated find	2	1	mudstone -		broken flake	-	Single artefact	-	No comments made in the field	None made	
MAC68 Isol	ated find	3	1	silcrete	-	flake	-	Single artefact	-	No comments made in the field	None made	
MAC69 Isol	ated find	2	1	quartz	-	flake	-	Single artefact	-	No comments made in the field	None made	
MAC70 Isol	ated find	2	1	grey chert	-	flake	-	Single artefact	-	No comments made in the field	None made	

Site Name	Site Type - New Sites Only	Disturbance	Number of Artefacts	Predominant Material	Other Raw Materials	Predominant Artefact Type	Other Artefact Types	Site Area	Area Defined By	Aboriginal Significance	Comments from Aboriginal Groups	Artefact Comments
MAC71	Artefact scatter	3 14		quartz	silcrete, mudstone, volcanic material	core flake		>100 x 100 m	Extent of exposure	No comments made in the field	None made	
MAC72 Isol	dated find	3	1	mudstone	-	retouched flake	-	Single artefact	-	No comments made in the field	None made	Occasional quartzite cobbles in the area
MAC73 Isol	dated find	3	1	mudstone	-	cobble core/chopping tool	-	Single artefact	-	No comments made in the field	None made	Cobble core with impact damage along side
MAC74 Isol	dated find	3	1	mudstone	-	retouched flake	-	Single artefact	Exposure 2 x 2 m	No comments made in the field	None made	Coarse mudstone
MAC75	Artefact scatter	3 3		silcrete	-	broken flake	-	Single artefact	Exposure 50 x 5 m	No comments made in the field	None made	
MAC76	Artefact scatter	2 3		quartz	-	flake	core			No comments made in the field	None made	This site indicates the archaeological potential of the middle terrace along Ramrod Creek; Core is bipolar
MAC77	Artefact scatter	2 6		mudstone, quartz, silcrete	- flake		retouched flake, broken flake	60 x 0.5 m	Extent of exposure	No comments made in the field	None made	Retouched flake is a geometric backed blade

Site Name	Site Type - New Sites Only	Disturbance	Number of Artefacts	Predominant Material	Other Raw Materials	Predominant Artefact Type	Other Artefact Types	Site Area	Area Defined By	Aboriginal Significance	Comments from Aboriginal Groups	Artefact Comments
MAC78	Artefact scatter	3 23		mudstone, silcrete	quartz, petrified wood, grey chert	flake	core, flaked piece, broken flake, retouched flake	150 x 40 m	Extent of exposure	No comments made in the field	None made	Retouched flake is a geometric blade; core is a blade core
MAC79 Isol	ated find	3	1	silcrete	-	broken flake	-	Single artefact	Exposure 20 x 15 m	No comments made in the field	None made	
MAC80 Isol	ated find	3	1	silcrete	-	broken flake	-	Single artefact	Exposure 30 x 0.5 m	No comments made in the field	None made	
MAC81 Isol	ated find	3	1	mudstone	-	flake	-	Single artefact	Exposure 20 x 4 m	No comments made in the field	None made	
MAC82	Artefact scatter	3 3		quartz, mudstone, silcrete	-	core	-	10 x 10 m	Artefact distribution either side of gully	No comments made in the field	None made	One core is almost bifacial; one core is a cobble tool/core
MAC83	Artefact scatter	3 11		mudstone, silcrete	grey chert	flake	backed flake	100 x 2 m	Extent of exposure	No comments made in the field	None made	
MAC84	Artefact scatter	1	3	mudstone	silcrete	flake	-	10 x 2 m	Artefact distribution	No comments made in the field	None made	
MAC85	Artefact scatter	2 3		silcrete	-	core, flake, broken flake	-	5 x 5 m	Artefact distribution	No comments made in the field	None made	
MAC86	Artefact scatter	3 2		mudstone, volcanic material	-	flake, broken flake	-	5 x 5 m	Artefact distribution	No comments made in the field	None made	

Site Name	Site Type - New Sites Only	Disturbance	Number of Artefacts	Predominant Material	Other Raw Materials	Predominant Artefact Type	Other Artefact Types	Site Area	Area Defined By	Aboriginal Significance	Comments from Aboriginal Groups	Artefact Comments
MAC87	Artefact scatter	3	3	mudstone	-	core	broken flake	2 x 2 m	Artefact distribution	No comments made in the field	None made	One broken flake shows retouch
MAC88 Isol	ated find	3	1	silcrete	-	flake	-	Single artefact	Exposure 10 x 10 m	No comments made in the field	None made	
MAC89 Isol	ated find	2	1	silcrete	-	flake	-	Single artefact	Exposure 5 x 3 m - ant nest complex	No comments made in the field	None made	Blade
MAC90 Isol	ated find	3	1	mudstone	-	core	-	Single artefact	-	No comments made in the field	None made	Possible heat shatter, probably not an artefact
MAC91	PAD	3	0	-	-	-	-	50 x 50 m	High terrace landform in confluence	No comments made in the field	Considered to be a PAD by one Aboriginal group	
MAC92	Artefact scatter	1 2		silcrete, mudstone	-	flake, retouched flake	-	2 x 2 m	Artefact distribution	No comments made in the field	None made	
37-2-0185	Artefact scatter	3 80		mudstone, silcrete	quartz, volcanic material	flakes	broken flakes, retouch flakes, flaked pieces, cores	50 x 10 m	Artefact distribution	No comments made in the field	None made	
MAC93	Artefact scatter	3 4		mudstone	silcrete, chert	flake	-	10 x 10 m	Artefact distribution	No comments made	None made	
MAC94	Artefact scatter	2	21	mudstone	-	flake	-	20 x 3 m	Artefact distribution	No comments made	None made	

Table C3: Artefact Database

Site Name	Site Type	Survey Area	MGA Easting	MGA Northing	Raw Material	Artefact Type	Length
MAC1	Artefact scatter	Mt Arthur	298368.033 6418	076.764	mudstone	flake	35 mm
			298367.674 6418	077.448	mudstone	flake	13 mm
			298362.442 6418	082.253	mudstone	flake	16 mm
			298354.114 6418	122.192	mudstone	flake	28 mm
MAC2	Artefact scatter	Mt Arthur	298363.181 6418	212.782	mudstone	core	72 mm
			298360.51 6418	213.666	mudstone	core	60 mm
MAC3	Artefact scatter	Mt Arthur	298298.784 6418	217.679	silcrete	flake	42 mm
			298298.756 6418	215.523	silcrete	flake	38 mm
			298304.977 6418	215.926	volcanic	flake	44 mm
			298491.237 6418	053.426	volcanic	core	110 mm
MAC4	Artefact scatter	Mt Arthur	298494.229	6418041.509	silcrete	Bondi point	28 mm
			298475.979	6418046.041	volcanic material	flake	45 mm
			298494.05 6418	014.715	silcrete	flake	14 mm
			298488.878 6418	019.822	silcrete	flake	16 mm
			298480.04 6418	044.059	silcrete	flake	27 mm
MAC5	Artefact scatter	Mt Arthur	298604.087	6417857.805	silcrete	retouched flake	70 mm
			298605.448	6417853.204	mudstone	broken flake	62 mm
MAC6	Artefact scatter	Mt Arthur	298650.451 6417	804.681	mudstone	flake	26 mm
			298649.524 6417	802.034	mudstone	flake	30 mm
37-3-0111	Grinding Grooves	Mt Arthur	298666.489	6417865.942	n/a	n/a	n/a
MAC 7	Isolated find	Mt Arthur	298661.038	6417844.756	mudstone	flake	50 mm

Site Name	Site Type	Survey Area	MGA Easting	MGA Northing	Raw Material	Artefact Type	Length
MAC8	Isolated find	Mt Arthur	298589.706	6417901.165	volcanic material	flake	78 mm
MAC9	Artefact scatter	Mt Arthur	298234.699 6418	183.821	silcrete	flake	30 mm
			298228.588 6418	180.773	silcrete	flake	49 mm
			298227.781 6418	180.927	quartz	flake	29 mm
			297902.737	6418354.529	silcrete	retouched flake	46 mm
MAC10	Artefact scatter	Mt Arthur	297937.286	6418357.328	mudstone	broken flake	12 mm
MAC11	Artefact scatter	Mt Arthur	297480.3	6418357.452	silcrete	flaked piece	13 mm
			297509.842 6418	351.59	silcrete	flake	27 mm
			297551.177 6418	348.297	quartz	flake	30 mm
			297567.383 6418	342.113	silcrete	core	36 mm
			297568.06 6418	343.642	silcrete	flake	28 mm
			297650.845 6418	277.048	quartz	flake	23 mm
MAC12	Artefact scatter	Mt Arthur	297654.703 6418	270.606	mudstone	flake	40 mm
MAC13	Artefact scatter	Mt Arthur	297290.685 6418	315.644	mudstone	shatter	40 mm
			297302.242 6418	302.134	quartz	flake	28 mm
MAC14	Isolated find	Mt Arthur	297485.546	6418301.862	silcrete	core	95 mm
MAC15	Isolated find	Edderton Rd	292639.585	6421305.843	hornfels	hatchet head	90 mm
Previous MAU	Isolated find	Edderton Rd	292663.947 6419	816.532	silcrete	flake	30 mm
B1	Artefact scatter	Offset area	301712.201 6422	693.353	mudstone	flake	34 mm
			301715.075 6422	688.751	silcrete	core	97 mm
			301717.943 6422	683.016	mudstone	flake	58 mm
			301721.795 6422	682.056	silcrete	flake	27 mm
			301725.647 6422	683.386	mudstone	flake	48 mm

Site Name	Site Type	Survey Area	MGA Easting	MGA Northing	Raw Material	Artefact Type	Length
B1 cont.	Artefact scatter	Offset area	301723.132 6422	680.64	mudstone	flake	14 mm
			301734.469	6422650.413	mudstone	flaked piece	44 mm
			301742.13 6422	649.282	quartz	flake	28 mm
			301756.062	6422657.778	silcrete	broken flake	28 mm
			301737.105	6422666.901	mudstone	broken flake	64 mm
			301712.231	6422704.975	silcrete	broken flake	39 mm
			301701.407 6422	722.653	mudstone	flake	138 mm
			301685.83	6422749.24	silcrete	broken flake	21 mm
			301679.595	6422748.285	core	retouched flake	52 mm
			301732.158 6422	679.988	quartz	flake	40 mm
B2	Artefact scatter	Offset area	301732.304	6422680.164	mudstone	broken flake	36 mm
			301199.953 6423	171.968	mudstone	core	90 mm
			301195.38 6423	205.877	chalcedony	core	34 mm
			301190.203 6423	208.672	mudstone	flake	59 mm
			301191.257 6423	210.207	mudstone	flake	24 mm
			301172.206 6423	236.681	mudstone	flake	44 mm
			301172.536 6423	238.055	mudstone	flake	14 mm
			301185.488 6423	252.948	silcrete	flake	32 mm
			301216.303	6423149.743	mudstone	broken flake	24 mm
			301216.986	6423149.509	volcanic material	retouched flake	44 mm
B3	Artefact scatter	Offset area	302341.695 6422	306.548	silcrete	flake	26 mm
			302345.27 6422	301.474	silcrete	flake	37 mm
			302344.737 6422	299.06	silcrete	flake	25 mm

Site Name	Site Type	Survey Area	MGA Easting	MGA Northing	Raw Material	Artefact Type	Length
B3 cont.	Artefact scatter Offsets	et area	302344.882	6422296.769	mudstone	retouched flake	26 mm
			302346.889 6422	294.648	silcrete	flake	26 mm
			302346.183 6422	296.579	silcrete	flake	26 mm
			302346.174	6422296.91	mudstone	retouched flake	90 mm
			302349.121 6422	308.073	mudstone	flake	75 mm
			302348.541 6422	308.481	mudstone	flake	26 mm
			302347.103 6422	309.007	quartz	flake	21 mm
			302350.293	6422310.887	mudstone	broken flake	90 mm
MAC16	Isolated find and PAD	Offset area	302477.034	6423889.8	mudstone	flake	24 mm
MAC17	Isolated find	Offset area	302870.141	6423383.803	mudstone	flake	32 mm
MAC18	Artefact scatter	Offset area	302454.346	6423693.825	mudstone	broken flake	14 mm
			302452.677	6423691.775	mudstone	broken flake	12 mm
MAC19	Artefact scatter	Offset area	302316.961	6423632.542	silcrete	flaked piece	30 mm
			302318.372 6423	632.663	silcrete	flake	110 mm
			302316.889 6423	618.278	quartz	flaked piece	-
			302267.531 6423	590.468	quartzite	flaked piece	-
					hornfels	flaked piece	-
MAC20	Isolated find	Offset area	302139.595	6423484.158	mudstone	flake	35 mm
MAC21	Scarred tree	Offset area	302161.048	6423734.167	-	-	-
MAC22	Scarred tree	Offset area	302158.47	6423696.03	-	-	-
MAC23	Artefact scatter	Offset area	302025.667	6423758.148	silcrete	flaked piece	28 mm
			302023.553	6423756.132	silcrete	flaked piece	30 mm
MAC24	Isolated find	Offset area	301947.299	6423692.446	basalt	hatchet head	130 mm

Site Name	Site Type	Survey Area	MGA Easting	MGA Northing	Raw Material	Artefact Type	Length
MAC25	Isolated find	Offset area	302055.18	6423461.338	mudstone	flake	46 mm
MAC26	Isolated find	Mt Arthur	298176.609	6417953.838	volcanic material	retouched flake/tool	95 mm
MAC27	Isolated find and PAD	Mt Arthur	297790.589	6418187.643	quartzite	flake	32 mm
MAC28	Isolated find	Mt Arthur	298089.953	6417934.795	mudstone	flaked piece	30 mm
MAC29	Isolated find	Mt Arthur	298041.52	6417830.401	silcrete	core	50 mm
MAC30	Isolated find	Mt Arthur	297954.146	6417914.067	silcrete	broken flake	27 mm
MAC31	Isolated find	Offset area	302643.202	6421762.374	chert	flake	42 mm
MAC32	Isolated find	Offset area	302575.94	6422138.707	silcrete	core	90 mm
MAC33	Isolated find	Mt Arthur	297323.221	6417872.69	silcrete	broken flake	25 mm
MAC34	Isolated find	Mt Arthur	297236.112	6417824.098	silcrete	flaked piece	38 mm
MAC35	Isolated find	Mt Arthur	297275.818 6417	747.77	silcrete	flake	47 mm
MAC36	Isolated find	Mt Arthur	297824.482	6417736.336	quartz	flake	42 mm
MAC37	Isolated find	Mt Arthur	297860.469	6417752.889	silcrete	retouched flake	65 mm
MAC38	Artefact scatter	Mt Arthur	297582.269	6417896.054	quartz	retouched flake	27 mm
			297588 6417	904.407	mudstone	flake	40 mm
MAC39	Isolated find	Mt Arthur	297726.888	6417905.035	mudstone	flake	46 mm
MAC40	Artefact scatter	Offset area	301045.089 6424	830.726	mudstone	flake	35 mm
			301043.44 6424	813.048	silcrete	flake	25 mm
MAC41	Artefact scatter	Offset area	301098.916 6424	372.183	silcrete	flake	60 mm
			301096.732	6424373.011	silcrete	broken flake	35 mm
			301094.674 6424	373.137	mudstone	core	28 mm
			301104.409 6424	370.01	mudstone	flake	20 mm

Site Name	Site Type	Survey Area	MGA Easting	MGA Northing	Raw Material	Artefact Type	Length
MAC42	Isolated find	Offset area	301217.749	6424197.231	silcrete	core	55 mm
MAC43	Isolated find	Offset area	301162.093	6424175.252	quartz	core	31 mm
MAC44	Isolated find	Offset area	301958.622	6423706.779	mudstone	flake	24 mm
MAC45	Artefact scatter	Offset area	301958.622 6423	705.779	silcrete	flake	27 mm
			301958.622 6423	704.779	silcrete	flake	40 mm
			301958.622 6423	703.779	silcrete	flake	39 mm
			301958.622 6423	702.779	silcrete	flake	30 mm
MAC46	Isolated find	Offset area	301958.622	6423701.779	mudstone	flake	38 mm
MAC47	Isolated find	Offset area	301958.622	6423700.779	silcrete	flake	26 mm
MAC48	Isolated find	Offset area	301421.175	6423822.099	porphyry	flake	38 mm
MAC49	Isolated find	Offset area	301072.774	6422131.24	volcanic material	flake	39 mm
MAC50	Isolated find	Offset area	300651.03	6422533.552	mudstone	broken flake	38 mm
MAC51	Artefact scatter	Offset area	301661.876 6422	808.55	silcrete	flake	65 mm
			301658.463 6422	809.748	mudstone	flake	22 mm
			301658.097 6422	808.073	mudstone	flake	20 mm
			301657.558 6422	807.399	mudstone	flake	31 mm
			301656.474 6422	807.243	mudstone	flake	40 mm
			301656.294 6422	806.205	mudstone	flake	25 mm
			301656.095 6422	805.851	mudstone	flake	35 mm
			301656.358 6422	806.922	mudstone	flake	28 mm
			301656.125 6422	806.809	mudstone	flake	28 mm
			301656.213 6422	807.27	mudstone	flake	30 mm
			301656.15 6422	808.101	mudstone	flake	14 mm

Site Name	Site Type	Survey Area	MGA Easting	MGA Northing	Raw Material	Artefact Type	Length
MAC52	Isolated find	Offset area	301641.051	6422894.171	silcrete	flake	19 mm
MAC53	Artefact scatter	Offset area	301593.253 6422	952.324	silcrete	shatter	32 mm
			301608.502	6422979.369	silcrete	broken flake	22 mm
MAC54	Isolated find	Offset area	301202.994	6423319.553	mudstone	flake	20 mm
MAC55	Isolated find	Offset area	301145.978	6423344.004	silcrete	core	85 mm
MAC56	Artefact scatter	Offset area	301269.58	6423430.473	silcrete	retouched flake	36 mm
			301273.738	6423430.197	volcanic material	flake	70 mm
MAC57	Isolated find	Offset area	301524.288	6423268.747	quartz	flake	38 mm
MAC58	Isolated find	Offset area	301567.67	6423184.746	quartz	core	37 mm
MAC59	Isolated find	Offset area	301715.576	6422997.121	mudstone	retouched flake	60 mm
MAC60	Artefact scatter	Offset area	301787.208 6422	911.543	quartz	flake	16 mm
			301786.69 6422	904.516	mudstone	flake	26 mm
			301787.461 6422	903.067	mudstone	flake	12 mm
			301766.543 6422	882.841	mudstone	flake	17 mm
			301769.261 6422	883.627	silcrete	flake	36 mm
			301768.434 6422	882.01	silcrete	shatter	30 mm
			301775.074 6422	887.758	silcrete	shatter	25 mm
			301779.882	6422887.741	volcanic material	flake	45 mm
			301782.595 6422	888.707	mudstone	flake	20 mm
			301783.402 6422	888.01	mudstone	flake	32 mm
			301785.034 6422	893.866	mudstone	flake	44 mm
			301779.958 6422	897.08	mudstone	flake	17 mm
			301789.242 6422	929.616	mudstone	flake	23 mm

Site Name	Site Type	Survey Area	MGA Easting	MGA Northing	Raw Material	Artefact Type	Length
MAC61	Artefact scatter	Offset area	301754.965 6422	859.775	silcrete	core	38 mm
			301747.584 6422	849.922	mudstone	core	80 mm
			301741.899	6422806.386	silcrete	retouched flake	75 mm
			301744.489 6422	805.464	mudstone	flake	39 mm
			301743.789	6422804.464	petrified wood	broken flake	18 mm
			301740.775	6422815.249	petrified wood	flake	39 mm
			301762.646 6422	820.714	silcrete	flake	38 mm
			301366.493 6422	980.299	silcrete	core	32 mm
MAC62	Artefact scatter	Offset area	301349.737 6422	993.714	mudstone	flake	27 mm
			301343.055 6422	992.202	silcrete	flake	27 mm
			301331.687	6422996.913	mudstone	retouched flake	30 mm
			301330.5 6422	998.401	quartz	flake	32 mm
			301330.643 6422	999.777	silcrete	flake	22 mm
			301329.463	6423001.892	quartz	retouched flake	33 mm
			301326.768	6423002.105	mudstone	retouched flake	42 mm
			301328.074 6423	005.033	mudstone	flake	29 mm
			301326.983 6423	004.823	mudstone	flake	33 mm
			301327.007 6423	005.589	mudstone	flake	11 mm
			301323.775 6423	007.827	silcrete	core	30 mm
			301321.266 6423	009.422	mudstone	flake	13 mm
			301320.97	6423008.496	mudstone	broken flake	27 mm
			301321.088 6423	009.032	mudstone	flake	29 mm
			301320.716 6423	009.941	mudstone	flake	20 mm

Site Name	Site Type	Survey Area	MGA Easting	MGA Northing	Raw Material	Artefact Type	Length
MAC62 cont.	Artefact scatter	Offset area	301307.99 6423	013.392	silcrete	flake	36 mm
			301303.246 6423	019.221	silcrete	flake	60 mm
			301299.667	6423019.336	quartz	broken flake	22 mm
			301322.698 6422	993.031	quartz	flake	17 mm
			301322.456 6422	993.019	quartz	flake	31 mm
			301321.552 6422	993.336	quartz	flake	30 mm
			301321.556 6422	993.503	quartz	flake	32 mm
			301321.247 6422	993.79	quartz	flake	34 mm
			301320.442 6422	995.099	quartz	flake	38 mm
			301319.225 6422	995.244	quartz	flake	22 mm
			301319.298 6422	998.118	mudstone	flake	17 mm
			301257.434 6423	060.081	mudstone	flake	17 mm
			301254.17 6423	051.735	mudstone	flake	57 mm
			301253.826 6423	051.965	silcrete	flake	10 mm
			301251.685	6423058.795	petrified wood	flake	49 mm
			301249.707	6423058.408	mudstone	broken flake	87 mm
			301236.326 6423	055.556	silcrete	flake	37 mm
			301234.187 6423	052.201	quartz	core	55 mm
			301213.575 6423	050.156	mudstone	flake	45 mm
			301213.077 6423	050.818	mudstone	flake	23 mm
			301212.927 6423	050.507	mudstone	flake	21 mm
			301213.607	6423050.499	mudstone	retouched flake	21 mm
			301214.371	6423050.967	mudstone	retouched flake	21 mm

Site Name	Site Type	Survey Area	MGA Easting	MGA Northing	Raw Material	Artefact Type	Length
MAC62 cont	Artefact scatter	Offset area	301214.874 6423	051.13	mudstone	flake	39 mm
			301207.096 6423	052.465	silcrete	flake	111 mm
			301205.001	6423051.456	mudstone	broken flake	15 mm
			301205.557 6423	059.461	mudstone	core	53 mm
			301211.482 6423	060.656	mudstone	core	77 mm
			301215.858	6423067.398	volcanic material	core tool	82 mm
			301215.567 6423	071.469	silcrete	shatter	25 mm
			301227.792 6423	069.148	mudstone	flake	47 mm
			301241.793 6423	076.514	mudstone	flake	40 mm
			301253.719	6423075.67	silcrete	retouched flake	55 mm
			301251.138 6423	077.871	silcrete	flake	72 mm
			301257.591 6422	991.403	silcrete	flake	23 mm
			301256.96	6422992.806	silcrete	broken flake	27 mm
			301255.608	6422993.507	silcrete	flaked piece	39 mm
			301256.282 6422	992.629	silcrete	flake	40 mm
			301256.016	6422993.453	silcrete	broken flake	10 mm
			301255.689 6422	993.376	silcrete	flake	10 mm
			301255.259 6422	992.954	silcrete	flake	35 mm
			301256.888 6422	991.768	silcrete	flake	36 mm
			301256.627 6422	990.431	silcrete	flake	16 mm
			301256.184	6422990.105	silcrete	broken flake	26 mm
			301257.163 6422	989.364	silcrete	flake	19 mm
			301256.97	6422989.274	silcrete	flaked piece	21 mm

Site Name	Site Type	Survey Area	MGA Easting	MGA Northing	Raw Material	Artefact Type	Length
MAC62 cont.	Artefact scatter	Offset area	301255.259 6422	990.153	silcrete	flake	21 mm
			301254.663 6422	990.44	silcrete	flake	23 mm
			301256.56 6422	989.115	silcrete	core	41 mm
			301254.421 6422	989.316	silcrete	flake	32 mm
			301254.726	6422991.725	silcrete	broken flake	28 mm
MAC63	Artefact scatter	Offset area	301254.877	6422991.771	silcrete	broken flake	27 mm
			301255.531 6422	992.378	silcrete	flake	36 mm
			301255.621	6422992.214	silcrete	broken flake	12 mm
			301217.106 6422	980.035	mudstone	core	72 mm
			301860.937 6422	518.421	mudstone	flake	95 mm
MAC64	Artefact scatter	Offset area	301872.342	6422532.663	mudstone	broken flake	19 mm
			301873.519	6422523.403	silcrete	flaked piece	32 mm
			301862.491	6422512.843	quartzite	flaked piece	41 mm
			301829.794 6422	521.595	mudstone	flake	42 mm
			301827.697 6422	520.176	mudstone	flake	52 mm
MAC65	Artefact scatter	Offset area	301826.112 6422	520.556	mudstone	flake	42 mm
			301865.449 6422	505.684	-	-	-
			302024.109 6422	459.85	silcrete	flake	65 mm
			302032.29	6422455.678	silcrete	broken flake	28 mm
			302033.661 6422	450.597	quartz	flake	25 mm
37-2-170	Artefact scatter	Offset area	302033.408	6422446.898	silcrete	flaked piece	31 mm
			302238.295	6422278.916	silcrete	flake	40 mm
			302210.379	6422217.931	silcrete	broken flake	14 mm

Site Name	Site Type	Survey Area	MGA Easting	MGA Northing	Raw Material	Artefact Type	Length
MAC66	Isolated find	Offset area	302327.319	6422151.022	mudstone	flake	28 mm
MAC67	Isolated find	Offset area	302386.071	6422310.427	mudstone	broken flake	27 mm
MAC68	Isolated find	Offset area	302280.43	6422340.88	silcrete	flake	24 mm
MAC69	Isolated find	Offset area	301584.167	6422755.796	quartz	flake	22 mm
MAC70	Isolated find	Offset area	301551.12	6422810.667	grey chert	flake	86 mm
MAC71	Artefact scatter	Offset area	301166.719 6422	987.643	quartz	core	55 mm
			301159.115	6422975.908	volcanic material	flake	105 mm
			301152.443 6422	969.83	quartz	core	58 mm
			301132.217 6422	952.702	quartz	core	47 mm
			301142.284 6422	941.639	silcrete	flake	58 mm
			301116.108 6422	914.644	quartz	core	48 mm
			301098.801 6422	887.157	quartz	core	55 mm
			301097.645 6422	888.687	quartz	flake	30 mm
			301098.069 6422	887.815	quartz	core	46 mm
			301098.699 6422	886.896	quartz	core	33 mm
MAC72	Isolated find	Offset area	301033.081 6422	827.308	quartz	flake	33 mm
			301033.327 6422	826.956	quartz	flake	30 mm
			301122.146 6422	894.097	mudstone	flake	28 mm
			301180.616 6422	959.191	silcrete	core	95 mm
			301396.154	6422405.547	mudstone	retouched flake	50 mm
MAC73	Isolated find	Offset area	301021.007	6422429.766	mudstone	cobble core/chopping tool	155 mm
MAC74	Isolated find	Offset area	301036.356	6422489.09	mudstone	retouched flake	90 mm
MAC75	Artefact scatter	Offset area	301256.202	6422676.876	silcrete	broken flake	30 mm

Site Name	Site Type	Survey Area	MGA Easting	MGA Northing	Raw Material	Artefact Type	Length
MAC75 cont.	Artefact scatter	Offset area	301257.035	6422678.046	silcrete	broken flake	25 mm
			301256.848	6422677.164	silcrete	broken flake	23 mm
MAC76	Artefact scatter	Offset area	300608.154 6424	337.4	quartz	flake	13 mm
			300608.306 6424	337.611	quartz	flake	27 mm
			300607.879 6424	337.806	quartz	core	25 mm
			300523.267 6424	255.065	mudstone	flake	19 mm
MAC77	Artefact scatter	Offset area	300519.156	6424258.21	mudstone	broken flake	18 mm
			300525.008 6424	284.049	quartz	flake	30 mm
			300519.128	6424253.271	quartz	retouched flake	13 mm
			300525.065 6424	235.557	silcrete	flake	43 mm
			300523.872 6424	244.126	silcrete	core	45 mm
			300479.769 6424	183.838	mudstone	core	52 mm
MAC78	Artefact scatter	Offset area	300481.365	6424181.593	petrified wood	flake	80 mm
			300481.621 6424	182.066	quartz	flake	14 mm
			300488.337 6424	185.03	silcrete	flake	100 mm
			300488.357	6424182.589	mudstone	broken flake	25 mm
			300488.834 6424	182.431	mudstone	flake	48 mm
			300476.41 6424	170.218	mudstone	flake	21 mm
			300491.986	6424176.56	mudstone	broken flake	45 mm
			300489.033 6424	174.487	silcrete	flake	74 mm
			300490.284	6424168.419	silcrete	retouched flake	40 mm
			300490.48 6424	168.769	mudstone	flake	36 mm
			300500.484	6424173.307	silcrete	broken flake	35 mm

Site Name	Site Type	Survey Area	MGA Easting	MGA Northing	Raw Material	Artefact Type	Length
MAC78 cont.	Artefact scatter	Offset area	300478.38	6424160.855	petrified wood	broken flake	35 mm
			300476.652	6424171.113	petrified wood	broken flake	36 mm
			300471.448	6424185.837	grey chert	broken flake	50 mm
			300472.145	6424187.399	quartz	flaked piece	21 mm
			300522.183 6424	170.297	silcrete	flake	30 mm
			300528.939 6424	186.114	silcrete	flake	31 mm
			300528.577 6424	184.037	silcrete	flake	17 mm
			300529.682 6424	184.029	silcrete	core	38 mm
			300521.634 6424	185.123	mudstone	flake	36 mm
			300483.298 6424	181.642	mudstone	flake	30 mm
MAC79 MAC80 MAC81	Isolated find	Offset area	300529.682 6424	182.832	quartz	flake	25 mm
			300052.581	6423939.491	silcrete	broken flake	43 mm
			300325.462	6424135.117	silcrete	broken flake	40 mm
	Isolated find	Offset area	300304.421	6424144.134	mudstone	flake	24 mm
MAC82	Artefact scatter	Offset area	300510.272 6424	078.069	quartz	core	40 mm
			300512.507 6424	077.511	mudstone	core	95 mm
			300516.774 6424	076.53	silcrete	core	80 mm
			300687.989 6423	970.453	mudstone	flake	35 mm
MAC83	Artefact scatter	Offset area	300686.192 6423	969.606	silcrete	flake	20 mm
			300682.41 6423	973.51	mudstone	flake	25 mm
			300682.896	6423975.427	grey chert	flake	48 mm
			300681.826	6423974.015	silcrete	broken flake	22 mm
			300645.262 6423	908.875	-	-	-

Site Name	Site Type	Survey Area	MGA Easting	MGA Northing	Raw Material	Artefact Type	Length
MAC83 cont.	Artefact scatter	Offset area	300653.796 6423	899.336	-	-	-
			300656.247 6423	892.704	-	-	-
			300663.289 6423	878.277	-	-	-
			300672.468 6423	880.706	-	-	-
			300684.787 6423	867.475	-	-	-
MAC84	Artefact scatter	Offset area	301438.891 6423	441.869	mudstone	flake	42 mm
			301434.212 6423	441.727	mudstone	flake	39 mm
			301439.334 6423	440.502	silcrete	flake	32 mm
MAC85	Artefact scatter	Offset area	301704.921 6423	502.864	silcrete	core	81 mm
			301714.857 6423	499.447	silcrete	flake	22 mm
			301708.338	6423498.694	silcrete	broken flake	21 mm
			302078.446 6423	193.979	mudstone	flake	24 mm
MAC86	Artefact scatter	Offset area	302077.892	6423195.298	volcanic material	broken flake	26 mm
MAC87	Artefact scatter	Offset area	301877.539 6423	401.748	mudstone	core	34 mm
			301877.539	6423402.176	mudstone	broken flake	23 mm
			301877.539 6423	403.512	mudstone	core	34 mm
MAC88	Isolated find	Offset area	301993.688	6423321.136	silcrete	flake	46 mm
MAC89	Isolated find	Offset area	302064.331	6423276.984	silcrete	flake	27 mm
MAC90	Isolated find	Offset area	302457.283	6423449.176	mudstone	core	106 mm
MAC91 PAD		Offset area	302667.424	6423482.684	-	-	-
MAC92	Artefact scatter	Offset area	301630.53 6422	571.53	silcrete	flake	38 mm
			301631.428	6422570.103	mudstone	retouched flake	42 mm
37-2-0185	Artefact scatter	Offset area	300736.502	6423744.244	-	-	-

Site Name	Site Type	Survey Area	MGA Easting	MGA Northing	Raw Material	Artefact Type	Length
MAC93	Artefact scatter	Offset area	300809.761 6423	573.2	mudstone	flake	40 mm
			300808.761 6423	572.2	silcrete	flake	68 mm
			300807.761 6423	571.2	mudstone	flake	29 mm
			300806.761 6423	570.2	chert	flake	20 mm
MAC94	Artefact scatter	Offset area	300846.082 6423	497.537	silcrete	flake	56 mm
			300862.648 6423	489.957	mudstone	flake	40 mm
			300887.101 6423	502.407	mudstone	flake	58 mm
			300893.647 6423	503.601	mudstone	flake	44 mm
			300896.842 6423	498.704	mudstone	flake	30 mm
			300904.482 6423	504.731	mudstone	flake	46 mm
			300906.706 6423	504.736	mudstone	flake	24 mm
			300906.028 6423	505.716	mudstone	flake	64 mm
			300906.333 6423	506.331	mudstone	flake	59 mm
			300906.429 6423	507.117	mudstone	flake	41 mm
			300905.861 6423	507.554	mudstone	flake	25 mm
			300908.972 6423	510.589	mudstone	flake	19 mm
			300915.5 6423	515.008	mudstone	flake	57 mm
			300918.102 6423	516.583	mudstone	flake	68 mm
			300920.134 6423	519.069	mudstone	flake	43 mm
			300921.984 6423	520.058	mudstone	flake	48 mm
			300922.64 6423	520.714	mudstone	flake	26 mm
			300922.804 6423	521.861	mudstone	flake	38 mm
			300923.46 6423	523.009	mudstone	flake	30 mm

AECOM

Site Name	Site Type	Survey Area	MGA Easting	MGA Northing	Raw Material	Artefact Type	Length
MAC94 cont.	Artefact scatter	Offset area	300923.296 6423	521.533	mudstone	flake	75 mm
			300923.624 6423	523.993	mudstone	flake	46 mm

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Appendix D

Significance Criteria Definitions and Assessment Results

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Table 50: Criteria Used in Evaluating Scientific Significance

Criterion	Low (Score of 1)	Moderate (Score of 2)	High (Score of 3)
Rarity	The location of the site within the landscape, its type, integrity, contents and/or potential for subsurface artefacts is common within the local and regional context.	The location of the site within the landscape, its type, integrity, contents and/or potential for subsurface artefacts is common within the regional context but not the local context.	The location of the site within the landscape, its type, integrity, contents and/or potential for subsurface artefacts is rare within the local and regional context.
Representativeness	This site, when viewed in relation to its type, contents, integrity and location in the landscape, is common within a local and regional context and sites of similar nature (or in better condition) are already set aside for conservation within the region.	This site, when viewed in relation to its type, contents, integrity and location in the landscape, is uncommon within a local context but common in a regional context and sites of similar nature (or in better condition) are already set aside for conservation within the region.	This site, when viewed in relation to its type, contents, integrity and location in the landscape, is uncommon within a local and regional context and sites of similar nature (or in better condition) are not already set aside for conservation within the locality or region.
Integrity	Stratigraphic integrity of the site has clearly been destroyed due to major disturbance/loss of topsoil. The level of disturbance is likely to have removed all spatial and chronological information.	The site appears to have been subject to moderate levels of disturbance, however there is a moderate possibility that useful spatial information can still be obtained from subsurface investigation of the site, even if it is unlikely that any useful chronological evidence survives.	The site appears to be relatively undisturbed and there is a high possibility that useful spatial information can still be obtained from subsurface investigation of the site, even if it is unlikely that any useful chronological evidence survives. (In cases where both spatial and chronological evidence is likely to survive the site will gain additional significance from high scores for rarity and representativeness.

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6067101_RPTFinalRev01_28Aug09

Environment

Criterion	Low (Score of 1)	Moderate (Score of 2)	High (Score of 3)
Connectedness	There is no evidence to suggest that the site is connected to other sites in the local area or the region through: a. their chronology (rarely known); b. their site type (e.g. connectedness could be argued between an axe quarry, a nearby set of axe grinding grooves and an adjacent site exhibiting evidence of axe reduction); c. by the use of an unusual raw material, knapping technique/reduction strategy; d. similar designs/motifs in the case of art sites and engravings; and/or e. information provided by Aboriginal oral history.	There is some evidence to suggest that the site is connected to other sites in the local area or the region through: a. their chronology (rarely known); b. their site type (e.g. connectedness could be argued between an axe quarry, a nearby set of axe grinding grooves and an adjacent site exhibiting evidence of axe reduction); c. by the use of an unusual raw material, knapping technique/reduction strategy; d. similar designs/motifs in the case of art sites and engravings; and/or e. information provided by Aboriginal oral history.	There is good evidence to suggest that the site is connected to other sites in the local area or the region through: a. their chronology (rarely known); b. their site type (e.g. connectedness could be argued between an axe quarry, a nearby set of axe grinding grooves and an adjacent site exhibiting evidence of axe reduction); c. by the use of an unusual raw material, knapping technique/reduction strategy; d. similar designs/motifs in the case of art sites and engravings; and/or e. information provided by Aboriginal oral history.

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Criterion	Low (Score of 1)	Moderate (Score of 2)	High (Score of 3)
Complexity	The site does not exhibit and is not predicted to contain either of the following in a subsurface context: a. a complex assemblage of stone artefacts in terms of artefact types and/or raw materials (including use of local and imported raw materials) and/or knapping techniques/reduction strategies; and/or b. features such as hearths or heat treatment pits, activity areas.	The site exhibits or can be predicted to contain either of the following in a subsurface context: a. a complex assemblage of stone artefacts in terms of artefact types and/or raw materials (including use of local and imported raw materials) and/or knapping techniques/reduction strategies; and/or b. features such as hearths or heat treatment pits, activity areas.	The site exhibits or can be predicted to contain both of the following in a subsurface context: a. a complex assemblage of stone artefacts in terms of artefact types and/or raw materials (including use of local and imported raw materials) and/or knapping techniques/reduction strategies; and/or b. features such as hearths or heat treatment pits, activity areas.
PAD	The site does not have or has only a low potential to contain subsurface archaeological material that has stratigraphic integrity or is of a nature that suggests its subsurface investigation would assist with answering questions of contemporary archaeological interest or that indicate it should be preserved for its future research potential.	The site has moderate potential to contain subsurface archaeological material that has stratigraphic integrity or is of a nature that suggests its subsurface investigation would assist with answering questions of contemporary archaeological interest or that indicate it should be preserved for its future research potential.	The site has high potential to contain subsurface archaeological material that has stratigraphic integrity or is of a nature that suggests its subsurface investigation would assist with answering questions of contemporary archaeological interest or that indicate it should be preserved for its future research potential.

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6067101_RPTFinalRev01_28Aug09

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Table 51: Scientific Significance Assessment of New Sites Identified in the Mt Arthur Coal Survey Areas

Site Name	Rarity		Representativeness		Archaeological Integrity		Connectedness		Complexity		Potential for Archaeological Deposit		Overall Archaeological Significance	
	Local	Regional	Local	Regional	Local	Regional	Local	Regional	Local	Regional	Local	Regional	Score	Significance
MAC1	1	1	1 1		1	1	1 1		1	1	1 1		12	Low
MAC2	1	1	1 1		1	1	1 1		1	1	1 1		12	Low
MAC3	1	1	1 1		1	1	1 1		1	1	1 1		12	Low
MAC4	1	1	1 1		1	1	1 1		1	1	1 1		12	Low
MAC5	1	1	1 1		1	1	1 1		1	1	1 1		12	Low
MAC6	1	1	1 1		1	1	1 1		1	1	1 1		12	Low
MAC7	1	1	1 1		1	1	1 1		1	1	1 1		12	Low
MAC8	1	1	1 1		1	1	1 1		1	1	1 1		12	Low
MAC9	1	1	1 1		1	1	1 1		1	1	1 1		12	Low
MAC10	1	1	1 1		1	1	1 1		1	1	1 1		12	Low
MAC11	1	1	1 1		1	1	1 1		1	1	1 1		12	Low
MAC12	1	1	1 1		1	1	1 1		1	1	1 1		12	Low
MAC13	1	1	1 1		1	1	1 1		1	1	1 1		12	Low
MAC14	1	1	1 1		1	1	1 1		1	1	1 1		12	Low
MAC15	3	2	1 1		1	1	1 1		1	1	1 1		15	High*
MAC16	1	1	1 1		2	2	1 1		1	1	3 2		17	Low-Moderate
MAC17	1	1	1 1		2	2	1 1		1	1	1 1		14	Low
MAC18	1	1	1 1		1	1	1 1		1	1	1 1		12	Low

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Site Name	Rarity		Representativeness		Archaeological Integrity		Connectedness		Complexity		Potential for Archaeological Deposit		Overall Archaeological Significance	
	Local	Regional	Local	Regional	Local	Regional	Local	Regional	Local	Regional	Local	Regional	Score	Significance
MAC19	2	2	2 2		1	1	1 1		1	1	2 1		17	Low-Moderate
MAC20	1	1	1 1		1	1	1 1		1	1	1 1		12	Low
MAC21	3 3		3	3	2 2		1	1	N/A	N/A	N/A	N/A	18	High*
MAC22	3 3		3	3	2 2		1	1	N/A	N/A	N/A	N/A	18	High*
MAC23	1	1	1 1		1	1	1 1		1	1	1 1		12	Low
MAC24	3	2	1 1		1	1	1 1		1	1	1 1		15	High*
MAC25	1	1	1 1		1	1	1 1		1	1	1 1		12	Low
MAC26	1	1	1 1		1	1	1 1		1	1	1 1		12	Low
MAC27	1	1	1 1		2	2	1 1		1	1	2 2		16	Low-Moderate
MAC28	1	1	1 1		1	1	1 1		1	1	1 1		12	Low
MAC29	1	1	1 1		1	1	1 1		1	1	1 1		12	Low
MAC30	1	1	1 1		1	1	1 1		1	1	1 1		12	Low
MAC31	2	1	1 1		1	1	1 1		1	1	2 1		14	Low
MAC32	1	1	1 1		2	1	1 1		1	1	2 1		14	Low
MAC33	1	1	1 1		1	1	1 1		1	1	1 1		12	Low
MAC34	1	1	1 1		1	1	1 1		1	1	1 1		12	Low
MAC35	1	1	1 1		1	1	1 1		1	1	1 1		12	Low
MAC36	1	1	1 1		1	1	1 1		1	1	1 1		12	Low
MAC37	1	1	1 1		1	1	1 1		1	1	1 1		12	Low

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Site Name	Rarity		Representativeness		Archaeological Integrity		Connectedness		Complexity		Potential for Archaeological Deposit		Overall Archaeological Significance	
	Local	Regional	Local	Regional	Local	Regional	Local	Regional	Local	Regional	Local	Regional	Score	Significance
MAC38	1	1	1 1		1	1	1 1		1	1	2 1		13	Low
MAC39	1	1	1 1		1	1	1 1		1	1	1 1		12	Low
MAC40	1	1	1 1		1	1	1 1		1	1	1 1		12	Low
MAC41	1	1	1 1		1	1	1 1		1	1	1 1		12	Low
MAC42	1	1	1 1		1	1	1 1		1	1	1 1		12	Low
MAC43	1	1	1 1		1	1	1 1		1	1	1 1		12	Low
MAC44	1	1	1 1		1	1	1 1		1	1	1 1		12	Low
MAC45	1	1	1 1		1	1	1 1		1	1	1 1		12	Low
MAC46	1	1	1 1		1	1	1 1		1	1	1 1		12	Low
MAC47	1	1	1 1		1	1	1 1		1	1	1 1		12	Low
MAC48	2	2	1 1		1	1	1 1		1	1	1 1		14	Low
MAC49	1	1	1 1		1	1	1 1		1	1	1 1		12	Low
MAC50	1	1	1 1		1	1	1 1		1	1	1 1		12	Low
MAC51	2	2	2 2		1	1	1 1		1	1	3 2		19	Moderate-High*
MAC52	1	1	1 1		1	1	1 1		1	1	2 2		14	Low
MAC53	1	1	1 1		1	1	1 1		1	1	2 2		14	Low
MAC54	1	1	1 1		2	2	1 1		1	1	3 2		17	Moderate-High*
MAC55	1	1	1 1		2	2	1 1		1	1	3 2		17	Moderate-High*
MAC56	1	1	1 1		1	1	1 1		1	1	2 2		14	Low

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Site Name	Rarity		Representativeness		Archaeological Integrity		Connectedness		Complexity		Potential for Archaeological Deposit		Overall Archaeological Significance	
	Local	Regional	Local	Regional	Local	Regional	Local	Regional	Local	Regional	Local	Regional	Score	Significance
MAC57	1	1	11		2	2	11		1	1	22		16	Low-Moderate
MAC58	1	1	11		2	2	11		1	1	22		16	Low-Moderate
MAC59	1	1	11		2	1	11		1	1	21		14	Low
MAC60	1	1	11		2	2	11		1	1	32		17	Moderate-High*
MAC61	1	1	11		2	2	11		2	1	32		18	Moderate-High*
MAC62	1	1	11		2	2	11		2	1	32		18	Moderate-High*
MAC63	1	1	11		2	2	11		1	1	32		17	Moderate-High*
MAC64	1	1	11		2	2	11		1	1	32		17	Moderate-High*
MAC65	1	1	11		1	1	11		1	1	11		12	Low
MAC66	1	1	11		1	1	11		1	1	21		13	Low
MAC67	1	1	11		1	1	11		1	1	21		13	Low
MAC68	1	1	11		1	1	11		1	1	21		13	Low
MAC69	1	1	11		1	1	11		1	1	11		12	Low
MAC70	2	1	11		1	1	11		1	1	11		13	Low
MAC71	1	1	11		2	2	11		2	1	32		18	Moderate-High*
MAC72	1	1	11		1	1	11		1	1	11		12	Low
MAC73	1	1	11		2	1	11		1	1	21		14	Low
MAC74	1	1	11		1	1	11		1	1	11		12	Low
MAC75	1	1	11		1	1	11		1	1	11		12	Low

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Site Name	Rarity		Representativeness		Archaeological Integrity		Connectedness		Complexity		Potential for Archaeological Deposit		Overall Archaeological Significance	
	Local	Regional	Local	Regional	Local	Regional	Local	Regional	Local	Regional	Local	Regional	Score	Significance
MAC76	1	1	1 1		2	1	1 1		1	1	3 2		16	Moderate-High*
MAC77	1	1	1 1		2	2	1 1		2	1	3 2		18	Moderate-High*
MAC78	1	1	1 1		2	2	1 1		2	1	3 2		18	Moderate-High*
MAC79	1	1	1 1		1	1	1 1		1	1	1 1		12	Low
MAC80	1	1	1 1		1	1	1 1		1	1	2 1		13	Low
MAC81	1	1	1 1		1	1	1 1		1	1	2 1		13	Low
MAC82	1	1	1 1		2	1	1 1		1	1	2 1		14	Low
MAC83	1	1	1 1		2	1	1 1		1	1	3 2		16	Moderate-High*
MAC84	1	1	1 1		1	1	1 1		1	1	2 1		13	Low
MAC85	1	1	1 1		1	1	1 1		1	1	1 1		12	Low
MAC86	1	1	1 1		1	1	1 1		1	1	1 1		12	Low
MAC87	1	1	1 1		1	1	1 1		1	1	1 1		12	Low
MAC88	1	1	1 1		1	1	1 1		1	1	1 1		12	Low
MAC89	1	1	1 1		1	1	1 1		1	1	1 1		12	Low
MAC90	1	1	1 1		1	1	1 1		1	1	1 1		12	Low
MAC91	N/A	/A	N/A	N/A	N/A	/A	N/A	N/A	N/A	N/A	2	2	4	Low
MAC92	1	1	1 1		1	1	1 1		1	1	2 2		14	Low
MAC93	1	1	1 1		2	2	1 1		1	1	2 2		16	Low-Moderate
MAC94	1	1	1 1		2	2	1 1		2	1	3 2		18	Moderate-High*

* The significance rating was manually altered because the site/s received a score of 3 (high significance) in one or more of the criteria. A rating based on the total value of points scored against the criteria would not have given an accurate representation of the site's significance. Refer to Section 6.3.2 for further information.

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Appendix E

Significance Assessment of Archaeological Terrain Units

(Kuskie 1999a)

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E.1 Significance of Aboriginal Heritage Located within the Mount Arthur North Study Area

In terms of the cultural significance attributed to the identified and potential Aboriginal evidence within the Mount Arthur North study area, a separate statement has been prepared by the Traditional Owners organisation, the Wonnarua Tribal Council (Appendix 11). It is noted that all of the Aboriginal heritage is of interest and contemporary value to the Wonnarua community. Aboriginal heritage evidence represents a tangible link with the traditional past and with the lifestyle and values of community ancestors.

In acknowledgment that the Aboriginal community themselves are in the best position to identify levels of cultural significance, the remainder of this assessment focuses on the potential scientific values of the Mount Arthur North Aboriginal heritage evidence. The statement of scientific significance is in no way intended to prioritise scientific values over cultural values or to lessen the importance of the views of the Aboriginal community. As the heritage evidence is not related to any events, phases or persons of historical significance in the study of archaeology, the potential for historical value is minimal and this criterion is not discussed further.

Typically, Aboriginal heritage evidence is assessed in terms of individual localities (sites). However, assessment is possible on a different scale, that of 'cultural landscapes'. A number of justifications exist for using this approach within the context of the present study:

- the objectives of the present investigation;
- the extensive nature of the impacts of the mining proposal (impacts are expected to occur to almost the entire study area, rendering the assessment of significance of individual sites or loci as being of limited value, particularly in relation to potential management strategies);
- the patterns of evidence identified within specific combinations of environmental attributes (archaeological terrain units) and in relation to other environmental factors (eg. distance to and type of watercourse);
- the prediction that each and every locality within a similar environmental context (archaeological terrain unit) has equal potential for comparable types of evidence to occur;
- the recognition that individual site loci recorded during the present and previous investigations are primarily a function of conditions of surface visibility and ground disturbance, not a reflection of the true distribution of the underlying cultural evidence (*potential resource*);
- the prediction that the vast majority of Aboriginal heritage evidence within the study area constitutes a *potential resource*, that cannot be identified during a surface survey because it is obscured by vegetation and soil; and
- the recognition that individual site loci recorded during the present and previous investigations may generally be of lower integrity than surrounding potential deposits, by virtue of them having been exposed by erosion and disturbance.

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Impact Assessment

S

6067101_RPTFinalRev01_28Aug09

A preliminary assessment of scientific significance of individual archaeological terrain units is presented below and summarised in Table 30. The assessment of scientific significance is problematical. The assessment is not definitive. Only limited evidence (primarily surface scatters subject to relatively more post-depositional disturbance than potential deposits) is available on which to base the assessment. Further investigation may contribute to refinement of the significance assessment.

1. *Level/very gentle ridge crest:* Low numbers of artefacts are present (103), representing a limited range of stone materials (7) and a common suite of artefact types (17 in total). Soil deposits are predicted to be generally shallow on this unit, limiting the extent of potential sub-surface cultural deposits. The integrity of deposits may not be high, but through control of post-depositional factors, worthwhile information may be derived from further studies. Only a few detailed archaeological investigations have been undertaken within this unit in the region. In a local context, several research questions can be addressed by evidence from this unit, which may not be possible from other localities. In the context of the mid-upper Hunter Central Lowlands region, the prevalence of this archaeological terrain unit is uncertain. However, the effects of European occupation have almost certainly reduced the extent to which this unit exists in a relatively undisturbed context. The scientific significance of the level/very gentle ridge crest unit is provisionally assessed as moderate within a local context and low-moderate within a regional context;
4. *Gentle ridge crest:* Relatively low numbers of artefacts are present (304), representing a moderate range of stone materials (9) and a common suite of artefact types (19 in total), but including several less common tool types. Soil deposits are predicted to be generally shallow on this unit, limiting the extent of potential sub-surface cultural deposits. The integrity of deposits may not be high, but through control of post-depositional factors, worthwhile information may be derived from further studies. Few detailed archaeological investigations have occurred within this unit in the region. In a local context, several research questions can be addressed by evidence from this unit, which may not be possible from other localities. In the context of the mid-upper Hunter Central Lowlands region, the prevalence of this archaeological terrain unit is uncertain. However, the effects of European occupation have almost certainly reduced the extent to which this unit exists in a relatively undisturbed context. The scientific significance of the gentle ridge crest unit is provisionally assessed as moderate-high within a local context and low-moderate within a regional context;
5. *Moderate/steep ridge crest:* Very low numbers of artefacts are present (7), representing a limited range of stone materials (4) and common artefact types (3 in total). Soil deposits are predicted to be generally very shallow on this unit, limiting the extent of potential subsurface cultural deposits. The integrity of deposits may not be high, but through control of post-depositional factors, worthwhile information may be derived from further studies. In a local context, several research questions can be addressed by evidence from this unit, which may not be possible from other localities. Very little archaeological investigation has been undertaken within this unit in the region. In the context of the mid-upper Hunter Central Lowlands region, the prevalence of this archaeological terrain unit is uncertain. However, the effects of European occupation have almost certainly reduced the extent to which this unit exists in a relatively undisturbed context. The scientific significance of the moderate/steep ridge crest unit is provisionally assessed as low within both local and regional contexts;

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- 6 *Level/very gentle spur crest:* Low numbers of artefacts are present (109), representing a limited range of stone materials (4) and a common variety and limited range of artefact types (8 in total). Soil deposits are predicted to be generally shallow on this unit, limiting the extent of potential sub-surface cultural deposits. The integrity of deposits may not be high, but through control of post-depositional factors, worthwhile information may be derived from further studies. Minimal detailed archaeological investigation has been undertaken of this unit within the region. In a local context, several research questions can be addressed by evidence from this unit, which may not be possible from other localities. In the context of the mid-upper Hunter Central Lowlands region, the prevalence of this archaeological terrain unit is uncertain. However, the effects of European occupation have almost certainly reduced the extent to which this unit exists in a relatively undisturbed context. The scientific significance of the level/very gentle spur crest unit is provisionally assessed as moderate within a local context and low-moderate within a regional context;
- 7 *Gentle spur crest:* Relatively high numbers of artefacts are present (648), representing a diverse range of stone materials (12) and a wide range of mostly common artefact types (28 in total). However, several less common tool types and one regionally rare type (ochre) are also present. Soil deposits are predicted to be generally shallow on this unit, limiting the extent of potential sub-surface cultural deposits. The integrity of deposits may not be high, but through control of post-depositional factors, worthwhile information may be derived from further studies. Minimal detailed archaeological investigation has been undertaken within this unit in the region. In a local context, several research questions can be addressed by evidence from this unit, which may not be possible from other localities. In the context of the mid-upper Hunter Central Lowlands region, the prevalence of this archaeological terrain unit is uncertain. However, the effects of European occupation have almost certainly reduced the extent to which this unit exists in a relatively undisturbed context. The scientific significance of the gentle spur crest unit is provisionally assessed as moderate-high within a local context and moderate within a regional context;
- 8 *Moderate/steep spur crest:* Low numbers of artefacts are present (131), representing a limited range of stone materials (5) and a common suite of artefact types (21 in total), with the exception of several less common tools. Soil deposits are predicted to be generally shallow on this unit, limiting the extent of potential sub-surface cultural deposits. The integrity of deposits may not be high, but through control of postdepositional factors, worthwhile information may be derived from further studies. In a local context, several research questions can be addressed by evidence from this unit, which may not be possible from other localities. Very little archaeological investigation has been undertaken within this unit in the region. In the context of the mid-upper Hunter Central Lowlands region, the prevalence of this archaeological terrain unit is uncertain. However, the effects of European occupation have almost certainly reduced the extent to which this unit exists in a relatively undisturbed context. The scientific significance of the moderate/steep spur crest unit is provisionally assessed as moderate within a local context and low-moderate within a regional context;

- 9 *Level/very gentle simple slope:* Moderate numbers of artefacts are present (406), representing a broad range of stone materials (12), including several less common varieties, and a common suite of artefact types (21 in total), with several uncommon types. Soil deposits are predicted to vary from shallow to moderately deep on this unit, suitable for sub-surface cultural deposits with potentially higher integrity. The integrity of deposits may be affected by post-depositional factors, but worthwhile information may still be derived from further studies if these factors can be identified and controlled for. In a local context, several research questions can be addressed by evidence from this unit, which may not be possible from other localities. Several archaeological investigations have been undertaken of this unit within the region, primarily basal slopes near watercourses. In the context of the mid-upper Hunter Central Lowlands region, the prevalence of this archaeological terrain unit may be relatively high. However, the effects of European occupation have almost certainly reduced the extent to which this unit exists in a less-disturbed context. The scientific significance of the level/very gentle simple slope unit is provisionally assessed as moderate within a local context and low within a regional context;
- 10 *Gentle simple slope:* Very high numbers of artefacts are present (2817), representing a diverse range of stone materials (13) and artefact types (31 in total), mostly of common varieties but also with a number of uncommon types. Soil deposits are predicted to be shallow to moderate on this unit, suitable for sub-surface cultural deposits to occur. The integrity of deposits may not be high, but through control of post-depositional factors, worthwhile information may be derived from further studies. In a local context, a number of research questions can be addressed by evidence from this unit, which may not be possible from other localities. Several archaeological investigations have been undertaken of this unit within the region, primarily close to watercourses. In the context of the mid-upper Hunter Central Lowlands region, the prevalence of this archaeological terrain unit may be relatively high. However, the effects of European occupation have almost certainly reduced the extent to which this unit exists in a relatively undisturbed context. The scientific significance of the gentle simple slope unit is provisionally assessed as moderate-high within a local context and low-moderate within a regional context;
- 11 *Moderate/steep simple slope:* Relatively high numbers of artefacts are present (805), representing a broad range of stone materials (12) and a common suite of artefact types (23 in total), but including a number of uncommon tool types. Soil deposits are predicted to be generally shallow on this unit, limiting the extent of potential sub-surface cultural deposits. The integrity of deposits may not be high, but through control of postdepositional factors, worthwhile information may be derived from further studies. In a local context, several research questions can be addressed by evidence from this unit, which may not be possible from other localities. Very little archaeological investigation has been undertaken within this unit in the region. In the context of the mid-upper Hunter Central Lowlands region, the prevalence of this archaeological terrain unit may be relatively high. However, the effects of European occupation have almost certainly reduced the extent to which this unit exists in a relatively undisturbed context. The scientific significance of the moderate/steep simple slope unit is provisionally assessed as moderate-high within a local context and moderate within a regional context;

- 12 *Level/very gentle bench*: This unit is relatively rare within the study area and only one sample was inspected. Relatively low numbers of artefacts were recorded (99), representing a limited range of stone materials (5) and a common suite of artefact types (13 in total), but with several uncommon tool types. Soil deposits are predicted to be shallow to moderate on this unit, suitable for sub-surface cultural deposits to occur. The integrity of deposits may not be high, but through control of post-depositional factors, worthwhile information may be derived from further studies. In a local context, several research questions can be addressed by evidence from this unit, which may not be possible from other localities. Few detailed archaeological investigations have been undertaken of this unit within the region. In the context of the mid-upper Hunter Central Lowlands region, the prevalence of this archaeological terrain unit is uncertain, but it may not be common. The effects of European occupation have almost certainly reduced the extent to which this unit exists in a relatively undisturbed context. The scientific significance of the level/very gentle bench unit is provisionally assessed as moderate-high within a local context and moderate within a regional context;
- 13 *Level/very gentle flat*: Relatively little effective survey coverage was obtained of this unit and very few artefacts were identified (4 in total). The artefacts are made of only one stone material and are common types. However, the depositional nature of this unit renders it possible that substantially more evidence exists within a sub-surface context, which may be of moderate to high integrity. In a local context, a number of research questions can be addressed by evidence from this unit, which may not be possible from other localities. Several archaeological investigations have been undertaken of this unit within the region, primarily near watercourses. In the context of the mid-upper Hunter Central Lowlands region, the prevalence of this archaeological terrain unit is uncertain, but it almost certainly exists elsewhere. However, the effects of European occupation have probably reduced the extent to which this unit exists in a relatively undisturbed context. The scientific significance of the level/very gentle flat unit is provisionally assessed as moderate within a local context and low-moderate within a regional context;
- 14 *Level/very gentle valley flat*: Extremely high numbers of artefacts are present (7,935), representing a broad range of stone materials (12) and a broad range of artefact types (32 in total). Artefacts are predominantly common varieties, but a diverse range of uncommon tool types is also present. Artefacts occur at a relatively high density. Soil deposits are predicted to be generally moderate to deep on this unit, enhancing the potential for sub-surface cultural deposits of relatively high integrity. In a local context, numerous research questions can be addressed by evidence from this unit, which may not be possible from other localities. However, a number of detailed archaeological studies have been undertaken within this unit in the region. In the context of the mid-upper Hunter Central Lowlands region, the prevalence of this archaeological terrain unit is uncertain (when limited to third or fourth order watercourses and excluding major river flats). However, the effects of European occupation have almost certainly reduced the extent to which this unit exists in a relatively undisturbed context. The scientific significance of the level/very gentle valley flat unit is provisionally assessed as high within a local context and moderate within a regional context;

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Impact Assessment

S

6067101_RPTFinalRev01_28Aug09

- 15 *Gentle valley flat*: This unit is less common within the study area than level/very gentle valley flats. Low numbers of artefacts are present (159), representing a broad range of stone materials (9) and a common suite of artefact types (16 in total), with the exception of several less common tool varieties. Soil deposits are predicted to be shallow to moderate on this unit, suitable for sub-surface cultural deposits to occur. The integrity of deposits may not be high, but through control of post-depositional factors, worthwhile information may be derived from further studies. In a local context, several research questions can be addressed by evidence from this unit, which may not be possible from other localities. Few detailed archaeological investigations appear to have been undertaken of this unit within the region. In the context of the mid-upper Hunter Central Lowlands region, the prevalence of this archaeological terrain unit is uncertain. However, the effects of European occupation have almost certainly reduced the extent to which this unit exists in a relatively undisturbed context. The scientific significance of the gentle valley flat unit is provisionally assessed as moderate within a local context and low-moderate within a regional context;
- 16 *Level/very gentle drainage depression*: Low numbers of artefacts are present (159), representing a range of stone materials (8) and a common, but limited range of artefact types (12 in total). The artefacts occur at a relatively high density. Soil deposits are predicted to be variable within this unit, but conditions suitable for sub-surface cultural deposits probably exist. The integrity of deposits may not be high, but through control of post-depositional factors, worthwhile information may be derived from further studies. In a local context, several research questions can be addressed by evidence from this unit, which may not be possible from other localities. A number of archaeological investigations have been undertaken of this unit within the region, although not necessarily of all orders of watercourse. In the context of the mid-upper Hunter Central Lowlands region, the prevalence of this archaeological terrain unit is uncertain, but several sub-types exist in relation to the order of the watercourse. The effects of European occupation (and subsequent erosion) have almost certainly reduced the extent to which this unit occurs in a relatively undisturbed context. The scientific significance of the level/very gentle drainage depression unit is provisionally assessed as moderate within a local context and low-moderate within a regional context;
- 17 *Gentle drainage depression*: Very high numbers of artefacts are present (1,863), representing a diverse range of stone materials (12) and a broad range of artefact types (29 in total), mostly common varieties but including a number of uncommon tool types. Soil deposits are predicted to be variable within this unit, but conditions suitable for subsurface cultural deposits probably exist. The integrity of deposits may not be high, but through control of post-depositional factors, worthwhile information may be derived from further studies. In a local context, a number of research questions can be addressed by evidence from this unit, which may not be possible from other localities. A number of archaeological investigations have been undertaken of this unit within the region, although not necessarily of all orders of watercourse. In the context of the mid-upper Hunter Central Lowlands region, the prevalence of this archaeological terrain unit is uncertain, but several sub-types exist in relation to the order of the watercourse. The effects of European occupation (and subsequent erosion) have almost certainly reduced the extent to which this unit occurs in a relatively undisturbed context. The scientific significance of the gentle drainage depression unit is provisionally assessed as high within a local context and moderate within a regional context;

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Impact Assessment

S

6067101_RPTFinalRev01_28Aug09

- 18 *Moderate/steep drainage depression:* Moderate numbers of artefacts are present (420), representing a range of stone materials (10) and a broad range of artefact types (23 in total), mostly common varieties but including several uncommon tool types. Soil deposits are predicted to be variable within this unit, but conditions suitable for sub-surface cultural deposits probably exist. The integrity of deposits may not be high, but through control of post-depositional factors, worthwhile information may be derived from further studies. In a local context, a number of research questions can be addressed by evidence from this unit, which may not be possible from other localities. A number of archaeological investigations have been undertaken of this unit within the region, although not necessarily of all orders of watercourse. In the context of the mid-upper Hunter Central Lowlands region, the prevalence of this archaeological terrain unit is uncertain, but several sub-types exist in relation to the order of the watercourse. The effects of European occupation (and subsequent erosion) have almost certainly reduced the extent to which this unit occurs in a relatively undisturbed context. The scientific significance of the moderate/steep drainage depression unit is provisionally assessed as moderate within a local context and low-moderate within a regional context.

Several specific cultural contexts have been identified within the study area, including silcrete sources in the north-western portion near Edderton road and also around Whites Creek, tuff sources in the Jerrys Plains Subgroup and Branxton Formation, and the grinding groove site (BC7). These specific contexts are provisionally assessed as being of high scientific significance within a local context. If conclusive evidence of stone procurement/quarrying can be obtained from further study, these contexts may be of significance within a regional context.

Viewed in its entirety, the Mount Arthur North study area represents a specific combination of environmental contexts. This combination may not be replicated in a similar manner, or on a similar scale, elsewhere within the mid-upper Hunter Central Lowlands region, partially as a result of recent human impacts, including the cumulative effect of extensive open-cut coal mining. Mining proposals are currently in place for several substantial areas within this region, and other localities may be the subject of future mining proposals. Hence, as a cultural landscape, the Mount Arthur North study area may retain a degree of significance within the region, on the basis of representativeness value.

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Impact Assessment

S

6067101_RPTFinalRev01_28Aug09

Environment

Appendix F

Director General's Requirements

1 DGRs - Department of Planning

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Environment

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Impact Assessment

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Environment

Director-General's Requirements

Section 75F of the *Environmental Planning and Assessment Act 1979*

Application Number	09_0062
Project	The Mount Arthur Coal Project, which includes: • expanding open cut mining operations at the mine, and increasing the extraction rate of these operations from 20 to 28 million tonnes of raw coal a year; • processing up to 36 million tonnes of raw coal on site (that is, the coal from both the open cut and underground mining operations); • augmenting, upgrading and using the existing surface infrastructure at the mine, including the construction of a new coal loader; • relocating a section of Edderton Road; • exporting up to 27 million tonnes of product coal a year from the complex by overland conveyor and rail; • rehabilitating the site; and • consolidating all the existing development consents for the open cut mining operations at the mine into a single, modern planning approval.
Location	Approximately 5 kilometres southwest of Muswellbrook
Proponent	Hunter Valley Energy Coal Pty Ltd
Date of Issue	21 April 2009
General Requirements	The Environmental Assessment of the project must include: • an executive summary; • a detailed description of: - existing and approved mining operations and industrial development in the vicinity of the Mount Arthur mining complex; - historical mining operations at the Mount Arthur mining complex; - existing and approved mining operations and infrastructure on the site, including a copy of all relevant statutory approvals; - existing and/or approved biodiversity and heritage offset areas; and - the existing environmental management regime; • a detailed description of the project, including the: - need for the project; - alternatives considered, including justification for the proposed mine plan; - likely staging of the project; - likely interactions between existing and approved mining operations and the project; and - plans of any proposed building works; • a risk assessment of the potential environmental impacts of the project, identifying the key issues for further assessment; • a detailed assessment of the key issues specified below, and any other significant issues identified in the risk assessment (see above), which includes: - a description of the existing environment, using sufficient baseline data; - an assessment of the potential impacts of all stages of the project on this environment, including any cumulative impacts, taking into consideration any relevant laws, policies, guidelines and plans; and - a description of the measures that would be implemented to avoid, minimise, and if necessary offset the potential impacts of the project, including detailed contingency plans for managing any significant risks to the environment; • a statement of commitments, outlining the proposed environmental management and monitoring measures;

	• a conclusion justifying the project, taking into consideration: the suitability of the site; the economic, social and environmental impacts of the project as a whole; and whether the project is consistent with the objects of the <i>Environmental Planning & Assessment Act 1979</i>; and • a signed statement from the author of the Environmental Assessment, certifying that the information contained within the document is neither false nor misleading.
Key Issues	• Air Quality – including a quantitative assessment of potential air quality impacts of the project; • Noise & Blasting – including a quantitative assessment of the potential : - construction, operational and off-site road and rail noise impacts; - blasting impacts of the project on people, livestock and property (paying particular attention to those properties with heritage significance); • Biodiversity – including: - accurate predictions of the proposed vegetation clearing; - a detailed assessment of the potential impacts of the project on any: - o terrestrial and aquatic threatened species, populations, ecological communities or their habitats; and - o existing or approved offset areas; - a revised offset strategy for the mining complex to ensure that the project will maintain or improve the biodiversity conservation value of the region; • Heritage – including a detailed assessment of the potential impacts of the project on the Macleans Hill and Mount Arthur Northwest Slopes Heritage Management Zones; • Soil & Water – including: - a site water balance for the project; - a detailed assessment of the potential impacts of the project, using quantitative modelling, on: - o the quantity and quality of both surface and ground water resources; - o water users, both in the vicinity of and downstream of the project; - o the riparian and ecological values of the watercourses both on site and downstream of the project; - o environmental flows; and - o flooding; - a detailed description of the proposed water management system on site; • Transport – including: - accurate predictions of the road and rail traffic of the project; and - a detailed assessment of the potential impacts of this traffic on the capacity, efficiency, and safety of the road and rail networks; and - a detailed description of the strategy for the proposed relocation of Edderton Road, including conceptual plans for the proposed road works; • Visual – including: - a detailed assessment of the potential visual impacts of the project on the amenity of the surrounding area, paying particular attention to the potential impacts of the project on the residential areas of South Muswellbrook and the views of the project from the surrounding road network; - a detailed description of the measures that would be implemented to minimise these impacts, including the proposed landscaping to screen the surface facilities and operations, and the proposed measures to minimise the potential lighting and signage impacts of the project; • Greenhouse Gas – including: - a quantitative assessment of the potential scope 1, 2 and 3 greenhouse gas emissions of the project;

	- a qualitative assessment of the potential impacts of these emissions on the environment; and - an assessment of all reasonable and feasible measures that could be implemented on site to minimise the greenhouse gas emissions of the project and ensure it is energy efficient; • Waste – including: - accurate estimates of the quantity and nature of the potential waste streams of the project, including tailings and coarse reject; and - a detailed description of the measures that would be implemented to minimise the production of waste on site, and ensure that any waste produced is appropriately handled and disposed of; • Rehabilitation – including a detailed description of the proposed rehabilitation strategy for the mining complex, having particular regard to: - the key objectives and principles in the Strategic Framework for Mine Closure (ANZMEC/MCA); - any relevant strategic land use planning or resource management plans or policies; - the potential for integrating this strategy with any other offset strategies in the region; • Social & Economic – including: - an assessment of the potential impacts of the project on the local and regional community, paying particular attention to the demand it may generate for the provision of additional infrastructure and services; - a detailed assessment of the costs and benefits of the project as a whole, and whether it would result in a net benefit for the NSW community.
References	The environmental assessment of the key issues listed above must take into account relevant guidelines, policies, and plans. While not exhaustive, the following attachment contains a list of some of the guidelines, policies, and plans that may be relevant to the environmental assessment of this project.
Consultation	During the preparation of the Environmental Assessment, you should consult with the relevant local, State or Commonwealth Government authorities, service providers, community groups or affected landowners. In particular you must consult with the: • Department of Environment and Climate Change; • Department of Primary Industries; • Department of Water and Energy; • Roads and Traffic Authority; and • Muswellbrook Council. The consultation process, and the issues raised during this process, must be described in the Environmental Assessment.
Deemed refusal period	120 days

Policies, Guidelines & Plans

Aspect	Policy /Methodology
Risk Assessment	AS/NZS 4360:2004 Risk Management (Standards Australia) HB 203: 203:2006 Environmental Risk Management – Principles & Process (Standards Australia)
Air Quality	Protection of the Environment Operations (Clean Air) Regulation 2002 Approved Methods for the Modelling and Assessment of Air Pollutants in NSW (EPA) Approved Methods for the Sampling and Analysis of Air Pollutants in NSW (EPA)
Noise & Blasting	NSW Industrial Noise Policy (EPA, 1999) Environmental Criteria for Road Traffic Noise (EPA, 1999) Interim Guideline for the Assessment of Noise From Rail Infrastructure Projects (DECC) Draft NSW Construction Noise Guideline (DECC, 2008) ANZECC Guideline to Minimise Annoyance Due to Blasting Overpressure & Ground Vibration (ANZECC)
Biodiversity	Draft Guidelines for Threatened Species Assessment under Part 3A of the <i>Environmental Planning and Assessment Act 1979</i> (DEC) NSW Groundwater Dependent Ecosystem Policy (DLWC) Policy & Guidelines - Aquatic Habitat Management and Fish Conservation (NSW Fisheries) Policy & Guidelines - Fish Friendly Waterway Crossings (NSW Fisheries) State Environmental Planning Policy No. 44 – Koala Habitat Protection Guidelines for Developments Adjoining DEC Land (DEC)
Heritage	Draft Guidelines for Aboriginal Cultural Heritage Impact Assessment and Community Consultation (DEC, 2005) The Burra Charter (The Australia ICOMOS charter for places of cultural significance) NSW Heritage Manual (NSW Heritage Office & DUAP)
Soil and Water	
Soil	Rural Land Capability Mapping (DLWC) Agricultural Land Classification (DPI) Australian and New Zealand Guidelines for the Assessment and Management of Contaminated Sites (ANZECC & NHMRC) National Environment Protection (Assessment of Site Contamination) Measure 1999 (NEPC, 1999) State Environmental Planning Policy No. 55 – Remediation of Land Managing Land Contamination – Planning Guidelines SEPP 55 – Remediation of Land (DOP)
	National Water Quality Management Strategy: Australian Guidelines for Fresh and Marine Water Quality (ANZECC/ARMCANZ) National Water Quality Management Strategy: Australian Guidelines for Water Quality Monitoring and Reporting (ANZECC/ARMCANZ) National Water Quality Management Strategy: Guidelines for Sewerage Systems – Effluent Management (ARMCANZ/ANZECC) National Water Quality Management Strategy: Guidelines for Sewerage Systems – Use of Reclaimed Water (ARMCANZ/ANZECC) Using the ANZECC Guideline and Water Quality Objectives in NSW (DEC) State Water Management Outcomes Plan Hunter Regulated River Water Source Water Sharing Plan (DIPNR, 2004)
Surface Water	

	Draft Hunter Unregulated and Alluvial Water Sources Water Sharing Plan 2008
	NSW Government Water Quality and River Flow Objectives (DECC)
	Approved Methods for the Sampling and Analysis of Water Pollutants in NSW (DEC)
	Managing Urban Stormwater: Soils & Construction (Landcom)
	Managing Urban Stormwater: Treatment Techniques (DECC)
	Managing Urban Stormwater: Source Control (DECC)
	Floodplain Management Manual (DNR)
	Floodplain Risk Management Guideline (DECC)
	A Rehabilitation Manual for Australian Streams (LWRRDC and CRCCH)
	Technical Guidelines: Bunding & Spill Management (DECC)
	Environmental Guidelines: Use of Effluent by Irrigation (DECC)
Groundwater	National Water Quality Management Strategy Guidelines for Groundwater Protection in Australia (ARMCANZ/ANZECC)
	NSW State Groundwater Policy Framework Document (DLWC)
	NSW State Groundwater Quality Protection Policy (DLWC)
	Draft NSW State Groundwater Quantity Management Policy (DLWC)
	Murray-Darling Basin Groundwater Quality. Sampling Guidelines. Technical Report No 3 (MDBC)
	Murray-Darling Basin Commission. Groundwater Flow Modelling Guideline (Aquaterra Consulting Pty Ltd)
	Guidelines for the Assessment & Management of Groundwater Contamination (DECC, 2007)
Transport	
	Guide to Traffic Generating Development (RTA)
	Road Design Guide (RTA)
Greenhouse Gas	
	National Greenhouse Accounts (NGA) Factors (AGO)
	Guidelines for Energy Savings Action Plans (DEUS)
Waste	
	Environmental Guidelines: Solid Waste Landfills (EPA)
	Waste Classification Guidelines (DECC)
Rehabilitation	
	Mine Rehabilitation – Leading Practice Sustainable Development Program for the Mining Industry (Commonwealth of Australia)
	Mine Closure and Completion – Leading Practice Sustainable Development Program for the Mining Industry (Commonwealth of Australia)
	Strategic Framework for Mine Closure (ANZMEC/MCA)
	Synoptic plan: Integrated Landscapes for Coal Mine Rehabilitation in the Hunter Valley of NSW (DMR, 1999)
Hazards	
	State Environmental Planning Policy No. 33 – Hazardous and Offensive Development
	Applying SEPP 33 – Hazardous and Offensive Development Application Guidelines (DUAP)
	Hazardous Industry Planning Advisory Paper No. 6 – Guidelines for Hazard Analysis
Social & Economic	
	Draft Economic Evaluation in Environmental Impact Assessment (DOP)
	Techniques for Effective Social Impact Assessment: A Practical Guide (Office of Social Policy, NSW Government Social Policy Directorate)