



Appendix L

Aboriginal Archaeology and Cultural Heritage Assessment



**ARCHAEOLOGICAL RISK ASSESSMENT SERVICES:
DRAYTON MINE EXTENSION PROJECT**

**ABORIGINAL ARCHAEOLOGY & CULTURAL
HERITAGE ASSESSMENT REPORT**

OF

DRAYTON MINE EXTENSION

**A REPORT TO
ANGLO COAL (DRAYTON MANAGEMENT) PTY LTD**

BY

**GILES HAMM
CULTURAL HERITAGE CONSULTANT
ARCHAEOLOGICAL RISK ASSESSMENT SERVICES PTY LTD**

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EXECUTIVE SUMMARY

Archaeological Risk Assessment Services Pty Ltd (ARAS) was engaged by Anglo Coal (Drayton Management) Pty Ltd to undertake an assessment of the Aboriginal archaeology and cultural heritage values associated with the proposed Drayton Extension Project. The Project area is located in the Hunter Valley of NSW, 10 kilometers (km) South-east of Muswellbrook, NSW (see Figure 1).

The assessment located and recorded a total of 480 Aboriginal objects within the Project area. This Aboriginal cultural record is made up of 39 sites consisting of: 22 open stone artefact scatters of varying densities and 17 individual stone artefact isolated finds. A majority of this record (70%) is made up of exposed stone artefactual material eroding from areas of bare soil exposure with less than five artefacts in density.

The assessment of Aboriginal cultural values was by invitation through letters (see Appendix 4) and a community meeting. No one was identified within the existing Aboriginal groups as having cultural knowledge about the proposed Drayton Extension. Whilst local Aboriginal people generally expressed an interest in archaeological sites and their protection, there were no objections to the proposed extension on cultural assessment grounds.

The proposed extension is likely to impact on a total of 29 Aboriginal sites. Twenty of these sites are associated with the Delpah area (D1-D22) and nine are associated with the Ramrod Creek area (R1-R4).

Drayton intend to apply for Project Approval under Part 3A of the *Environmental Planning and Assessment Act 1979 (2001 amended)* to disturb the above sites. To assist Drayton in managing the identified Aboriginal heritage resources within the Extension area, this report provides a commitment to implement an Aboriginal Cultural Heritage Management Plan in consultation with the Wonnarua Aboriginal community groups.

INTRODUCTION

Anglo Coal (Drayton Management) Pty Ltd (Drayton) is seeking to extend Drayton Mine's current mine life and gain a number of additional flexibilities to maximise mining efficiencies. To achieve these outcomes, an application will be made to the NSW Department of Planning (DoP) under Part 3A of the *Environmental Planning and Assessment Act 1979* (NSW) (EP&A Act) to extend mining operations. An expanded footprint of the mine has necessitated the need for additional archaeological research to determine any likely impacts on Aboriginal archaeology and cultural heritage values.

ARAS was engaged by Drayton to carry out an Aboriginal archaeological and cultural heritage assessment. The assessment was required to determine likely Aboriginal heritage constraints and opportunities for the proposed Drayton extension. The project area associated with the extension covers land as shown in Figure 2.

The aims of the study were to:

- Review any relevant existing Aboriginal archaeology and cultural heritage information and relevant data-bases;
- Carry out an archaeological risk assessment to identify likely Aboriginal heritage issues on the ground and make an assessment of likely Aboriginal heritage potential;
- Ensure Aboriginal consultation is conducted in accordance with the DEC guidelines;
- Determine whether the proposed activity is likely to cause any impact to Aboriginal objects;
- Provide management and mitigation measures for the identified Aboriginal heritage objects; and
- Provide recommendations on the Aboriginal cultural heritage work required at the development.

ABORIGINAL CULTURAL HERITAGE ISSUES AND BACKGROUND RESEARCH

ARAS reviewed the NSW Department of Environment and Conservation (DEC) Aboriginal Heritage Information Management System (AHIMS) to determine if any known Aboriginal sites were registered for the land within the Project Area. The results of the register search (Appendix 2) show that there are registered sites located within one km of the study area (see Figure 3).

The Project Area is located within the boundary area of the Wonnarua Aboriginal language groups (see Tindale 1974, Horton 1994). Contemporary Aboriginal communities within the Muswellbrook area are represented by the following organisations:

- Upper Hunter Wonnarua Council Inc.;
- Wanaruah Local Aboriginal Land Council;
- Ungooroo Aboriginal Corporation;
- Lower Wonnarua Tribal Consultancy;
- Hunter Valley Aboriginal Corporation;
- Yarrawalk Aboriginal Corporation;
- Giwiirr Consultants;
- Upper Hunter Heritage Consultants;
- Hunter Valley Cultural Consultants; and
- Aboriginal Native Title Elder Consultants (formerly Combined Council Hunter Valley Aboriginal Corporation).

All the above Aboriginal groups are interested in development projects within the Muswellbrook Shire Council area and on any likely impacts on land that could contain Aboriginal sites and objects. The DEC Interim Consultation Guidelines (2005) for consultation require that the Aboriginal community should be provided the opportunity to be involved in any project that could impact on known Aboriginal sites or objects.

No traditional Aboriginal knowledge of the Project area was revealed during the consultation process. According to DEC advice, there are no known existing or proposed Aboriginal place declarations for the project area. Glen Morris of DEC (pers. Comms.) has also confirmed

the above assessment, based on his extensive local knowledge of Aboriginal culturally significant sites within the Muswellbrook region.

Definition of a 'site'

The DEC advise developers and consultants that the term 'site' is used to group Aboriginal objects or define a location where an Aboriginal object or cultural item occurs. The DEC provide general criteria to assist in the classification of site. Sites can be defined as:

- Exposures where archaeological evidence is revealed
- Topographic or land-form units where evidence of occupation has been recorded. This may be an entire landform unit (ridge, creek, valley) or part of a landform unit (saddle on ridge, creek bank);
- Areas that have physical boundaries defined by rocks (stone arrangement), or earthworks (mounds) or cleared land (ceremonial ground);
- Areas that are defined by Aboriginal community groups as culturally significant;
- Areas that are arbitrary or where a boundary has been assigned for the convenience of recording (in cases where the site would probably be much larger if based on the criteria above). Arbitrary criteria include the use of a fence-line, dirt track or gully as a boundary. In some cases the area may simply be designated as 50 x 50 m, or as a smaller sample plot, on the basis of convenience;
- Areas determined by artefact density. In some cases, a site boundary may be defined by the average number of flakes per square metre. This is a specialised type of arbitrary criterion and needs to be justified carefully; and
- A site or isolated find that needs to be specified for a particular study.

It is the consultant's responsibility to decide on an appropriate definition, suited to the particular project, the research goals and comparability with other regional studies. DEC requires site forms to be completed for isolated finds.

Environment, land-use history, previous archaeological assessment and relevant research issues

The Project area is located within the Central Lowlands topographic zone, described as part of the Liddell soil landscape. The landscape consists of undulating low hills with a few undulating hills ranging in elevation from 140–220 m. Slopes are 4–7% in length with local relief

being between 60–120 m (Kovac and Laurie 1991). The original vegetation was open woodland of narrow leaf iron barks with white box and spotted gum. Bull oak and swamp oak are also common in the Project area.

Prior to European occupation, the Drayton lease area was part of a drainage catchment area which lies at the headwaters of a number of creeks, including Ramrod (draining Northward into the Hunter River), Saltwater and Saddlers Creek (draining in a South-westerly direction to the Hunter River).

Adjoining drainage lines flow in an Easterly direction towards the Liddell Ash Dam. All these watercourses are regarded as ephemeral and all are receptors for upward leakage of saline groundwater. There is some occurrence of ‘ponding’ in these minor drainage channels. The quality of the local water before widespread clearing occurred would have been reasonable (Mitchell 2003).

Aboriginal Economic plant food species

In their work assessing the range of economic plant species for the Mt Arthur and Bayswater lease areas, MacDonald and Hill (1997) list a range of Aboriginal economic species and their relative abundance. The most abundant are *Dianella* spp. (flax lilies) *Eustruphus latifolius* (wombat berry), *Macrozamia* spp., *Xanthorrhoea* spp., *Ficus* spp., *Portulaca* spp., *Solanum* spp., *Lysiana* spp., *Panicum* spp., *Glycine tabacina* and *Geranium* spp. See Section 3.7.5 for further details on economic plant species in the Project area.

Drayton’s vegetation community

Original vegetation communities for the Project area have been reviewed and modelled by McElhinney (2002). Table 1 summarises this vegetation community structure.

Table 1: Distribution of vegetation communities

Landform feature	Vegetation community	Dominant species
Drainage line (upper)	Open woodland–riparian	Rough-bark apple (<i>Angophora floribunda</i>) and grey box (<i>Eucalyptus moluccana</i>)
Drainage line (lower)	Open woodland–riparian	As above and above to Swamp oak (<i>Casuarina glauca</i>)
Low lying flats	Open woodland	Narrow leaf iron bark (<i>E. crebra</i>) and scattered bullock and Kurrajong

Landform feature	Vegetation community	Dominant species
Mid slopes (moist)	Open woodland–forest	Grey box (<i>E. moluccana</i>) spotted gum (<i>Corymbia maculata</i>) grey gum (<i>E. punctata</i>) and forest oak (<i>Allocasuarina torosa</i>)
Mid slopes (dry)	Open woodland–forest	Narrow leaf ironbark, grey box, bull oak and black Cypress pine (<i>Callitris endlicheri</i>).
Rocky slopes and knolls	Open woodland-forest	Narrow leaf ironbark, grey box, black Cypress pine and Kurrajong (<i>Brachychiton populneus</i>)

Table 1 indicates that the original Project area contained substantial areas of open woodland-forest with varying degrees of ecological richness. Mammals such as Brush Tail Rock Wallabies and small rodents would have been present along the ridges and knolls.

Along drainage lines greater numbers of Common Brush Tail Possum, Wombats, Echidnas and Eastern Grey Kangaroos would have been available. Long leafed mat rush (*Lomandra longifolia*), native yams (*Dioscorea*), daisy yams (Murnong-*Microseris scapigera*) and probably lilli pilli (*Acmena*) (HLA Ecologist McElhinney pers comm. 2002) would also have been present along the alluvial flats.

It is debatable whether large numbers of Eastern Grey Kangaroos were present on the Project area. The area is considered primarily woodland and open grassland was not plentiful. Advice on hydrology suggests that prior to European settlement the Liddell Ash Dam area was probably undulating and not swampy.

Land-use history and impacts

The Project area has the following historical features.

- Between 1840–50s the study area was leasehold land and part of Edinglassie Estate of the White family. The land was utilised for sheep farming;
- After *Robertson's Land Act 1861*, conditional settlers move into the area;
- Between 1870–80 the area was taken up by conditional purchase settlers and sold back to the White family. The White family then used the land as a cattle fattening area. The land was claimed to be the best cattle country in the Hunter Valley;
- By the 1950s Edinglassie Estate was broken up and sold as small farm areas; and

- In the 1960s some land was resumed for Liddell Power Station and associated ash dam development.

The most significant feature of past land use is the level of total disturbance to the original 23km² of Drayton's lease. Figure 1 shows how the main area of landscape modification has affected large areas of Ramrod Creek's lower catchment, impacting on low lying alluvial flats and parts of Saddlers Creek upper catchment area in the South-west.

Clearing of woodland and forest for grazing probably commenced around the 1840s prior to mining development in the 1980s. Cattle grazing was the main economic land use for the Project area. The most intact landscape within the Project area is located in the South-eastern corner, containing an area of woodland-forest (see Figure 2).

Previous archaeological work

1.1.1 Kamminga (1978)

Previous archaeological work at Drayton was carried out by Johan Kamminga in 1978, based on a series of false premises. Little intense archaeological work had been done in the Hunter Valley; therefore Kamminga was free to develop his own assumptions about Aboriginal occupation models or settlement hypotheses in the Hunter Valley. Kamminga wrongly believed that:

- Prehistoric settlement was only concentrated along the Hunter River and its major tributaries;
- Stone for tool making could only have come from Hunter river gravel deposits (based on Professor's Dyal's work);
- 'Most known archaeological sites in the Upper Hunter Valley region are located along the lower reaches of the tributary streams, often below the 150 m contour' (Kamminga 3 1978); and
- Sites within the Drayton lease area would only be discovered in lowland areas and at the time of Kamminga's survey the Liddell Ash Dam would have flooded these.

In reviewing Kamminga's survey methods, one could also speculate on the level of observer bias and survey effort. Kamminga had two and half days to assess 2279 hectares of lease area. He would have had approximately 23 km² of land to assess in two and half days. That works out at approximately 1.5 km² per hour of field assessment. He says he did this assessment using a combination of foot traverse and vehicle survey. He also states that the land did not contain well-defined creeks or other forms of water. Looking at his survey map (see Figure 3), it appears that his survey only concentrated along sections of

Bayswater Creek to the North of the Liddell Ash Dam and included some margins of minor drainage lines flowing East into the Liddell Ash Dam.

It appears that Kamminga's work missed out significant areas of Crest, hillslope and footslope land units (see Figure 3). His confident survey result no doubt convinced other archaeologists that his coverage and detectability methods were sound. The issue of visibility was also a key factor that probably biased Kamminga's belief that Drayton lease was virtually unoccupied by Aboriginal people. It can be assumed that visibility was poor for much of the open pasture land that he walked across (probably less than 5%).

Substantial sections of the Saddlers, Bayswater, Whites, Fairford, and Saltwater Creek catchment areas were intensively occupied (Dyall 1981, Hughes and Koettig 1985, Koettig and Hiscock 1985, Koettig 1990, Dean-Jones and Mitchell 1993, Davidson, James and Fife 1993, Macdonald 1997, Mills 2000, and Kuskie 2000, 2003).

The most recent relevant archaeological assessment that applies to the Project area is the investigation of Russell and Hardy in 2002 and Hamm in 2003.

In their 2002 survey, HLA archaeologists, Russell and Hardy recorded 14 sites – all open artefact scatters within the A173 lease area. Sites appeared to be associated with a tributary of the Bayswater Creek system.

Further archaeological assessment undertaken by Hamm in 2003 confirmed these results, but located more archaeological material on several ridge crest and slope land units. Subsequently, archaeological salvage work undertaken by Hamm and Shawcross in 2003–04 recovered over 2000 artefacts within one site (DR 3) and confirmed site formation, location and artefact distribution patterns with four other Drayton sites: DR 5, 6, 8 and 9 (see Figure 3). The above assessment results demonstrate the following archaeological site distribution patterns:

- More intense and complex Aboriginal occupation is likely to be associated with higher order drainage system (i.e. 1st or 2nd Ramrod Creek). 'Ponding' may be a critical factor in assessing availability of water supply;
- There is a noticeable variation as to how people are using ridge systems within the Drayton lease. Not all ridges appear to have been used in the prehistoric past; and
- Local raw material supply to manufacture stone tools such as micro-blade material may be available in the form of porcellanite. This

could be one reason more archaeological material is found in certain areas within the Drayton lease.

Relevant research issues

1.1.2 Terrain and topography

When selecting occupation areas, foremost in the minds of hunter-gatherer peoples are the requirements of camp-site locations. Some ethno-historical researchers have commented that some Aboriginal cultural groups in Australia have a rule-based system for selecting camp-site locations (Fison and Howitt 1991).

Brayshaw (1986), writing on site selection factors from her ethno-historical work, only quotes the observations of J.W. Fawcett (1898) saying that in 'choosing the site [for their camps], proximity to fresh water was one essential, some food supply a second, whilst a vantage ground in case of attack from an enemy was a third' (1898: 152).

Considerable scepticism has to be applied to claims of large numbers of people at Aboriginal gatherings throughout certain landscapes. Early historic accounts are either skewed towards observer bias or a lack of understanding of the impacts of European settlement and the consequences of disease and conflict.

Many groups, including Hunter Valley Aboriginal people, would have modified their settlement patterns significantly after the early 1800s due to a negative reaction by white pastoralists who were rapidly taking over the best country in many districts. It is well known throughout the Bathurst area and Mudgee districts that groups such as the Wiradjuri and Gundungurra were combining their efforts to harass white settlers. There is some evidence that this may have been occurring with Kamilaroi and Wonnarua groups in the Hunter Valley.

Terrain and topography can limit choices for hunter-gatherer occupation. Within a survey area there may be a range of topographic and relief types. This landform or medium scale environmental context is likely to determine the patterns of soils and biological resources (Butzer 1994). It is important to understand the variations in these patterns and what they may mean. Variables such as slope classes (e.g. flat: $<2^{\circ}$, gentle: $2-5^{\circ}$, moderate: $6-15^{\circ}$ or steep: $15-40^{\circ}$) and relief types (e.g. plains, hills, tablelands, mountains) are all important in determining how a site fits within a spatial framework or pattern.

Hunter Valley researchers such as Dean-Jones and Mitchell (1993) argue that many of the sites recorded in the Hunter Valley have been distributed along drainage lines. They note that far fewer sites have been recorded on landforms remote from watercourses. This, they argue, is due in part to the way surface erosion processes are concentrated along drainage features and also to the historical focus of archaeological assessment. Less is known about how Aboriginal

occupation may have been structured in higher altitude locations especially areas that contain a range of relief types.

In her analysis of site location across the Hunter Valley, Koettig argues that:

'sites in the Central Lowlands often comprise discrete concentrations of artefacts distributed in a continuous, but apparently unpatterned way across creek flats. These concentrations varied in frequency, size, content and association, possibly representing different activities (manufacturing, maintenance and or tool production)' (Koettig 1994).

1.1.3 Site detection factors

One of the most important factors in locating sites or artefacts on the ground is whether they can be detected or discovered easily. A number of discovery factors will effect how easily sites or artefacts are located within a survey area. Schiffer, Sullivan and Klinger (1978) provide a useful summary of what the most important factors are likely to be in detecting sites or artefacts on the ground (see Table 2).

Table 2: Archaeological site detection factors

General factors	Definition	Specific examples
Abundance	The frequency or prevalence of site or artefact type in the study area	Sites and artefacts occur in highly variable quantities, from rare to abundant
Clustering	The degree to which archaeological materials are spatially aggregated	Various degrees of clustering may be found between dispersed and clustered
Obtrusiveness	The probability that particular archaeological material can be discovered by a specific technique	Artefact size, composition, surface morphology, heat retention, and other physical, chemical and biological
Visibility	The extent to which an observer can detect the presence of archaeological materials at or below a given place	Site area, artefact density, artefact size, surface area of exposure, frequency of exposure
Accessibility	The effort required to reach a particular place	Climate, biotic environment, terrain, roads, land holding patterns.

Source: Dancey 1981

In the Hunter Valley, a number of researchers have expressed concern over the effectiveness of surveying for sites which are constantly

obscured due to a lack of ground visibility. In their overview of methodological issues for the assessment of Hunter Valley archaeological resources, Dean-Jones and Mitchell (1993) summarise the most important site detection issues as factors affecting site visibility. These include:

- The original size and pattern of the deposit;
- The present vegetation cover;
- Post depositional processes causing artefact burial and/or erosion; and
- Artefact density and clustering, and presumably the increasing age of the site (Dean-Jones and Mitchell 1993, 46).

Other researchers such as Koettig (1990) suggest that in the Hunter Valley survey strategies and thus the success of site detection have varied considerably. Archaeological surveys carried out during the 1970s, 1980s and even in the early 1990s, often only inspected areas of *potential* leaving a higher proportion of development areas unsurveyed. Koettig defines these areas as of 'lesser' archaeological potential usually resulting in certain land units being ignored by surveyors (e.g. hillslopes, ridgecrests etc.) in favour of land units associated with creek lines and watercourses.

The result of this survey bias has led to a model of site prediction being one that focuses on the distribution of erosion along watercourses as a measure of site density. At Mount Arthur North, Koettig and Hughes (1985) attempted to quantify the amount of exposure along several creek lines relating this to the total amount of exposure present in the survey area (see Table 3 below).

Table 3: Visibility in the Mount Arthur North survey area

Creek name	Length of creek km	Length of exposure	Estimated percentage of exposure	No. of sites	Project site density per km of bank
Upper Whites	3.6	0.36	10	26	260
Lower Whites	10.4	2	20	21	109
B	7.4	1.2	17	9	56
C	5	0.95	18	22	116
E	4.4	0.6	14	5	37
Quarry to G+G	3	1	33	6	18
Quarry past G	2	0.3	15	-	-

Source: Hughes and Koettig 1985

The results of this exercise show that the section of Upper Whites Creek, Lower Whites Creek and one of its tributaries, Creek C, contained similar numbers of recorded sites (a site being any manifestation of past Aboriginal activity). The ratio of sites is 1:2:1 (Upper Whites Creek: Lower Whites Creek: Creek C).

When Koettig compares the number of sites along each creek to that of the amount of exposure as a percentage, Upper Whites Creek appears to have the highest projected number of sites within the catchment area.

Koettig concludes from this that some of the creeks were associated with less archaeological material because the amount of exposure was the same or higher than for Whites Creek and Creek C – yet there was much less archaeological evidence present. It is vital that this information is accurately recorded because it can be used to compare the distribution of sites against the distribution of erosion (i.e. visibility). Once this is done systematically, different catchment areas can be compared.

Hughes (1984) argues that major creek lines contain more sites than minor. Koettig (1990) suggests that this biased site distribution model could be based purely on the amount of erosion present on larger creek lines compared to smaller ones. She argues for a larger amount of comparable work, which includes test excavation methods, in order to reduce observer bias and increase information concerning landform and site location patterns.

1.1.4 Observer bias

Another issue to affect the outcomes of site detection is observer bias. Observer bias may mean the difference between expected and actual recovery in the results of a field survey (Dancey 1981). Elements of observer bias can be summarised in the following way:

- Site surveyors may have limited experience in detecting archaeological materials in areas of low visibility;
- As a majority of the archaeological record in the Hunter Valley and surrounding districts are made up of small scatters or single locations of stone artefacts usually no bigger than 50 mm, an understanding of ground conditions and artefact appearance is essential;
- Site surveyors may have limited understanding of site formation processes;
- Site surveyors may be under pressure to complete a survey within a certain timeframe, thus introducing an element of human error or what is called 'the blind archaeologist syndrome'; and

- Ground sampling or transects conducted by vehicle, instead of pedestrian field walking, increases observer bias.

1.1.5 Detection of older sites

Another aspect of site detection is whether older sites may be present within a buried landscape context. Most Aboriginal archaeological sites recorded in the Hunter Valley are shallow, heavily disturbed, lag deposits of artefacts lying within or on top of a 20–50 cm A/B soil horizon. Dean-Jones and Mitchell (1993) argue that in the Hunter Valley, surface soil mantles are relatively young in age – c3000 years BP – and are undergoing constant re-working.

There are few geomorphic situations where the former ground surfaces may have archaeological material on them and are likely to be preserved by a younger sedimentary cover. Dean-Jones and Mitchell (1993) provide a working model which characterises the depositional behaviour of these types of soil landscapes. The most likely places to look for older sites (i.e. >10,000 years) are where there is:

- Repeated or continuous occupation of stable sites where the occupation debris can accumulate faster than erosion losses. The best examples of these are enclosed rock shelters or large middens;
- Burial of an occupied surface by advancing dunes such as along the high banks of the Wollombi Brook and other source bordering dunes on the Hunter River;
- Burial of an occupied surface by alluvial sedimentation in overlapped stream terraces or accumulative floodplain sequences. These have not been recorded in the Hunter Valley and in fact virtually all terrace sequences in eastern New South Wales appear to be inset terraces, which are much less likely to preserve older sites;
- Burial by alluvial sediments in the distal portions of low angle alluvial fans such as at Swamp Creek; and
- Burial at stream junctions where each tributary has a different rate of sediment supply, for example Yorks Creek (Dean-Jones and Mitchell 1993).

1.1.6 Significance of access to water and resources

Another important issue for understanding site location factors in the Hunter Valley is the importance of water and access to biological and physical resources. A number of researchers have concluded that access to water is critical in the understanding of the frequency and scale of Aboriginal prehistoric occupation (Brayshaw and MacDonald

1992, Rich 1993, Koettig 1994). However, Dean-Jones (1992) and Dean-Jones and Mitchell (1993) question the standard assumption that water is the single most important site location factor for Hunter Valley Aboriginal occupation. They maintain that the distribution and quality of available water in the Hunter valley in prehistoric times may be difficult to determine.

Issues such as the volume of water flowing in the Hunter River are assessed to be highly variable. Flow in the Hunter River has even ceased on several occasions, whilst smaller tributaries like Whites Creek and Swamp Creek can cease to flow for up to 29 months (Dean-Jones and Mitchell 1993). The impact of this on Aboriginal people could have caused a seasonal pulse-reserve effect (Noy-Meir 1973).

Chains of ponds were known to have been reported as smaller streams and as Dean-Jones and Mitchell remark (1993, 60), some of these chains of ponds were quite deep. These ponds are likely to have been fed by shallow ground water flowing through basal gravels and may have been a reliable water resource. This water resource is likely to have been better quality than water located at lower groundwater depths. The other issue to consider for water quality is how saline some water sources were prior to European settlement. It is argued by Dean-Jones and Mitchell (1993) that some evidence exists in the Muswellbrook area that some streams flowing through local rock beds were highly saline in nature (e.g. Saltwater Creek).

Studies by Brayshaw (1986), Pearson (1981) and Vinnicombe (1980), indicate that Aboriginal use of a range of plant and animal resources in and around the Hunter Region was dependent on understanding seasonal availability. Much of this evidence comes from observation made of coastal Aboriginal populations or observations made near first settled districts (i.e. Bathurst, Mudgee, Newcastle, Parramatta etc.) rather than in remote mountainous terrain. Table 4 sets out the more common economic plant and animal foods recorded by early settlers and observers in the New South Wales coastal region.

Table 4: Common Aboriginal economic foods

Species Name	Source	Common name/use
<i>Blechnum</i>	Barrallier (1802)	Rhizome/fern roots roasted in ashes
<i>Dioscorea traversa</i>	Backhouse (1843)	Yam. Often found near brooks
<i>Doryanthus excelsa</i>	Three-D (1843)	Giant lily. Stems and roots roasted cooked and made into paste/Johnny cake.
<i>Zamia spiralis</i>	Threlkeld (1843) Backhouse (1843)	Cycads. Seeds soaked for several weeks in swamp. Pounded and roasted.

Species Name	Source	Common name/use
<i>Exocarpus cupressiformis</i>	Cunningham (1825)	Native/wild cherry
<i>Sterculia heterophyllus</i>	Cunningham (1843)	Kurrajong. Capsules roasted and made into paste.
<i>Themeda australis</i>	Cunningham (1823)	Grass seeds ground for paste like Johnny cakes.
<i>Xanthorrhoea resinosa arborea</i>	Threlkeld in Gunson (1974)	Grass tree. Nectar eaten from flower stems – stems used for spear shafts. Resin used in hafting.
<i>Acmena smithii</i>	Hunter (1793)	Lilli pilli. Edible fruit.
<i>Persoonia sp.</i>	Hunter (1793)	Geebung. Fruits or flowers. eaten
<i>Doryanthes excelsa</i>	Backhouse (1836)	Giant/gymea lily. Stems roasted and eaten.
<i>Lomandra longifolia</i>	Threlkeld in Gunson (1974)	Long leaf mat rush – edible stems and strips for making dilly bags and reed mats.
<i>Ostrea angasi</i> <i>Anadara trapezia</i> <i>Velesunio sp.</i> <i>Pyrazus ebeninus</i>	Threlkeld in Gunson (1974) Ebsworth (1826)	Lakes and shallow estuaries. Mud Oyster Sydney Cockle Freshwater Mussel Mud Whelks
<i>Anguillidae</i>	Collins (1798)	Freshwater Eels (Caught in narrow channels near lakes and rivers using basket nets)
<i>Macropus major</i> <i>Macropus robustus</i> <i>Wallabia bicolor</i>	Fawcett (1898)	Eastern Grey Kangaroo Eastern Wallaroo Swamp Wallaby (Caught by netting in forested areas. Burning patches of grass to attract new growth and game)
<i>Perameles nasuta</i>	Ebsworth (1826)	Long-Nosed Bandicoot
<i>Trichosurus vulpecular</i> <i>Pseudocheirus laniginosus</i>	Dawson (1830) Meredith (1846)	Possums – Ring Tail and Brush Tail. Caught by cutting hole into trunk of tree. Access by cutting toe holes in tree. Important food staple. Favoured in spring.
<i>Tachyglossus aculeatus</i>	Collins (1798)	Echidna. Cooked in ovens. Eggs highly prized.
<i>Varanus varius</i>	Backhouse (1843)	Lace Monitor or Goanna

Species Name	Source	Common name/use
<i>Egernia</i> sp. <i>Agamidae</i> sp. <i>Monelix spilotes</i>	Backhouse (1843) Graham (1863) Oxley (1820)	Lizards and snakes Skinks, dragons and pythons. Cooked roasted. Cooked in pit.
<i>Dromaius novaehollandiae</i>	Collins (1798) Hunter (1793)	Emu. Hunted using boomerang and clubs.
Grubs	Backhouse (1863) Meredith (1844)	Root grubs from gum trees. Seen as luxuries.
Waterfowl, various species	Mundy (1815)	Caught in nets in major wetlands. Hunted using large boomerangs.
<i>Chelonda longicollis</i>	Backhouse (1843)	Tortoise. Caught sunning on logs in rivers.
Fish, various species	Meredith (1844) Graham (1839).	Mullet, Catfish, Cod and Perch. Caught using nets, snares and spears. Some nets made from stringy bark.

These ethnographic sources allow the distinction to be made that some areas of the Hunter Valley were far more ecologically rich and reliable than others from a prehistoric settlement perspective. The most likely preferred lands for large scale occupation were probably land-systems with broad open catchments having substrates that could support large lagoons, freshwater swamps and rainforest habitats.

1.1.7 Regional studies

Black Hill-Woods Gully F3 Freeway Salvage Programme

This project is located within the Hexham land-system (Story et al 1963) approximately 17 km North-west of Newcastle and approximately 55 km south east of Singleton. The area consists of undulating low hills and rises. Hexham Swamp is located approximately 100 km South-east of the Project area, with the Hunter River located a few kilometres to the North. The land under investigation was to be developed as part of the NSW Road and Traffic Authority's (RTA) F3 Freeway extension between Minmi and the New England Highway.

Three archaeologists have contributed to this project (Effenberger 1995, Baker 1996, and Kuskie, P.J and Kamminga, J. 2000). The most significant excavation and salvage work has been undertaken by Kuskie and Kamminga (2000). The original survey work and sub-surface testings was focussed on two sites Black Hill 2 (38-4-376) and Woods Gully (38-4-410). Both sites were originally recorded as scatters of stone artefacts with extensive sub surface deposits. However, the main concern for researchers was how much sub-surface evidence was actually present at the two sites.

The principal problem in the salvage of both sites was how to detect the extent of sub-surface deposits and how such deposits could be effectively recovered. The work of Kuskie and Kamminga (2000) is significant in that it attempts to use a range of recovery techniques, assessing the validity of each one. It also uses finer scale analytical techniques such as:

- Onsite lithic work station where every lithic item is examined under a low magnification binocular microscope and identified and recorded in databases;
- Residue and use/wear analysis on a significant number of recovered items using a total retrieval process;
- Replicative microblade and microlith knapping experiments; and
- A combination of test excavation, broad area excavation by shovel and trowel and mechanical surface scrapes.

The main results of the study are summarised below.

- 612 test pits (0.25 x 0.25 m) were dug, initially measuring 38.25 m² excavated 3 m apart on rectangular grid across each site. This first phase approach was used to initially detect the basic patterns of sub-surface evidence;
- In phase two, larger areas were opened up using broad area excavation by shovel and trowel;
- At Black Hill, 63 m² were excavated on a ridge crest. At Woods Gully, 87 m² were excavated adjacent to a watercourse including a 39 m² of narrow trench leading away from the creek upslope. Hand excavation was carried out digging in 0.25 x 0.25 m unit squares in successive 5–10 cm spits. Each bucket of deposit was labelled and transported to a sieving station. The method of 'total sieve retrieval' was used (for the first time anywhere in the Hunter Valley). This method involved retention of all residue in the sieve which was artificially dried and items were later extracted under laboratory conditions;
- In phase three, surface scrapes were used to detect larger features such as hearth and heat treatment pits. Five surface scrapes were used to remove grass cover and upper soil layers at Black Hill 2 and two at Woods Gully. After each surface scrape had been undertaken, spoils were examined carefully and any material recovered. An additional area was identified for broad excavation (8 m²) using this technique;
- A total area of 196.25 m² was excavated by hand with surface scrapes making up a combined area of 34,422 m². 72.4 t of soil

were excavated. A total of 37,585 cultural items were identified and recorded. This was made up of 22,921 recognisable artefacts with 14,664 lithic fragments. Approximately 546.2 artefacts/m³ were recovered from Black Hill 2, and 209.5 artefacts/m³ for Woods Gully;

- Some 44 artefact categories were defined for Black Hill 2 and Woods Gully. Six stone working activities were identified, these being; bi-polar, micro-blade production, non specific stone working, backing retouch of microblades, loss or intentional discard of non-microlith tools and intentional loss or discard of microlithic tools. Production of microblades was the most common stone working activity;
- Replicative micro-blade and microlithic knapping experiments using silcrete and rhyolitic tuff (mudstone) showed that possibly less than 150 bond points were made on site at broad area C3/B and less half that number at broad area F5/A. A huge amount of micro-blade debitage was recovered showing a high percentage of 'waste'. A considerable time was spent preparing silcrete for heat treatment and subsequent flaking. Researchers concluded that given the amount of bondi point production, its role and purpose may have had some social significance;
- Artefact assemblages are predominantly small (89%) measuring less than 20 mm in length. Over 60% of all artefacts recorded measured less than 10 mm in length. This recording of high density numbers of small artefacts was probably the result of intense micro-blade production and the use of the total sieve retrieval method. Over 70% of the assemblages from Black Hill 2 and Woods Gully contain rhyolitic tuff with silcrete making up just over 20% of the raw materials used;
- There is substantial evidence to show that a high proportion of silcrete assemblages have been heat affected, with two heat-treatment pits being identified for the Black Hill 2 site;
- Spatial analysis of environmental variables shows that human activity was focused on the level crest and gently inclined north-facing upper slope at zone C3 (Black Hill 2). A single direct date of 2130+ years BP was retrieved from a fireplace from Woods Gully. It is assumed that no site was likely to be older than 4000 years BP;
- Kuskie and Kamminga argue that broad area excavation has allowed them to address all of their relevant research questions. They suggest that tuff and silcrete were the primary stone raw materials used for production of tools in the Central Lowlands of the Hunter Valley. Heat treatment of silcrete was widespread. A majority of artefacts recorded are the result of microblade

production with implements occurring widely but in low numbers. Bi-polar knapping occurs on sites but in low frequency; and

- A model of occupation was put forward for Black Hill 2 and Woods Gully. Human settlement probably represented one or more nuclear or extended family base camps, involving low numbers of people and several episodes of short-term occupation.

1.1.8 Variability of stone technology

The importance of understanding the variability in the assessment of stone artefact assemblages in the Lower and Upper Hunter Valley is critical and has involved a considerable amount of work over the last 15 years. Analysis of lithic materials can provide information about activities that occurred at a site.

The activities may involve inferences about raw materials used for stone tools, the specific stages of tool manufacture, use of tools and their discard. Hopefully, by analysing this data archaeologists may develop a real understanding of the range of activities present on any one particular site.

Hunter-gatherer occupation sites or campsites (i.e. rock shelter or open space) are likely to have a broad range of tool types due to the variety of activities undertaken at a site over a certain period of time. These types of sites are contrasted to the more specialised sites where food gathering or hunting requires a more restricted range of tool kit. Tools that are broken or exhausted are often found at these types of sites as well as resharpening flakes from a tool user carrying out tool maintenance (Kooyman 2000).

Lithic analysis can also lead to information about where a tool may have been manufactured and why it was discarded. The analysis of lithic debitage can also provide information on whether the tool was manufactured close to a quarry site or transported from a distance. Evidence such as the amount of decortification flakes, unmodified or broken flakes or flakes with specific types of platform can all lead to an understanding of the stages of tool manufacture.

Modelling of prehistoric hunter-gatherer behaviours using lithic analysis has led some researchers to speculate on the level of sedentism or mobility. The assumption that mobility of a group limits the type of the toolkit has been put forward by a number of researchers (Walker 1978, Bleed 1986, Bamforth 1986). Conversely, greater sedentism usually means groups will have a greater range of resources to choose from at one site and thus their toolkits will contain more variety (Odell 1994). The more mobile a group is, the more likely they are to standardise their core technology (Odell 1994).

Curation of tools is another important consideration in assessing lithic variability. Odell (1996) argues that curation will usually reduce the need for raw material supply. This leads on to the concept of gearing up or preparing tools in advance of use. This further raises the question of the functionality and versatility of tool types that may or may not tell us something about how prehistoric hunters maximised opportunity when using a range of landscape in the past.

As discussed previously, archaeological work in the Upper and Lower Hunter Valley has led to a number of important lithic studies being undertaken (Hiscock 1984, 1985, 1986; Haglund 1989; Baker and Gorman 1992; Koettig 1994).

These studies have led to hypotheses concerning stone tool technology (reduction sequences) and:

- Chronology (Hiscock 1986, Hiscock and Attenbrow 1988);
- Stone raw material use and procurement (Hughes 1984, Hiscock 1986, Baker 1992, Koettig 1994, Haglund and Rich 1995, Rowney 1992);
- Technological attributes (Hiscock 1984, Baker 1992, Koettig 1992, Koettig 1994, Kuskie and Kamminga 2000, Baker 2001 and Witter 1992, 2002);
- Variability of assemblages and the activities that produced them (Koettig 1992, 1994, Kuskie and Kamminga 2000, Baker 2001, Witter 2002); and
- Limitations of sample sizes (Hiscock 2001).

LEGISLATIVE REQUIREMENTS – DEC & DOP'S ROLE

It is necessary for the Drayton extension to identify matters which are relevant in assessing whether a project to which Part 3A of the *Environmental Planning and Assessment Act 1979* applies is likely to have an impact on Aboriginal cultural heritage. In order to comply with the above requirement, a proponent should consider the following when making an assessment:

- Justification for any likely impact(s), including any alternatives considered for the proposal;
- Any measures which will be implemented to avoid, mitigate or offset the likely impact(s); and
- Demonstration that the input by affected Aboriginal communities has been considered when determining and assessing impacts, developing options, and making final recommendations to ensure that Aboriginal cultural heritage outcomes can be met by the proposed development.

The *National Parks and Wildlife Act 1974* as amended in 2001, (NPW Act 1974) provides statutory protection for all Aboriginal objects and Aboriginal Places.

An 'Aboriginal object' is defined under the Act as 'any deposit, object, or material evidence (not being a handicraft for sale) relating to Aboriginal habitation of the area that comprises New South Wales being habitation before or concurrent with the occupation of that area by persons of non Aboriginal extraction, and includes Aboriginal remains' (as defined within the meaning of the NPW Act 1974: See *Guidelines for Aboriginal Heritage Impact Assessment* July 2003).

An 'Aboriginal place' is a place which has been declared so by the Minister administering the NPW Act 1974 because he or she believes that the place is or was of special significance to Aboriginal culture. It may or may not contain Aboriginal objects (see *Guidelines for Aboriginal Heritage Impact Assessment* July 2003). The NPW Act 1974 does not provide protection for spiritual areas or natural resource areas that have no physical evidence of Aboriginal occupation or use, unless they have been declared an Aboriginal place.

Under section 90 of the NPW Act 1974, a person must not destroy, deface, damage, or desecrate, or cause or permit the destruction, defacement, damage, or desecration of, an Aboriginal object or Aboriginal place, unless the Aboriginal object or Aboriginal place is dealt with in accordance with a heritage impact permit (previously

known as a Consent to Destroy) issued by the Director-General of the DEC.

DEC acknowledges that it is Aboriginal people who should determine the cultural significance of Aboriginal heritage, and the Drayton Mine has a strong commitment to working in partnership with Aboriginal people to manage Aboriginal cultural heritage.

DEC recognise that Aboriginal cultural heritage includes both traditional and contemporary associations of Aboriginal people with the environment as well as physical sites.

HERITAGE PLANNING AND LAND USE ISSUES

Land surrounding the Project area has previously been subject to a general heritage study conducted in 1990. The heritage study was commissioned by Singleton Shire Council and carried out by Margrit Koettig. Koettig's study made a number of recommendations concerning development control and archaeological potential:

1. 'No sites are needlessly destroyed. Often sites that are identified can be preserved and protected within a development;
2. Sites, which are to be destroyed, must be adequately investigated. The information derived from such sites is valuable for current research as well as future research;
3. Representative samples of sites are preserved. Individual sites as well as suites of sites need to be preserved as a long term strategy; and
4. To prevent further deterioration of sites through one or more management options.' (Koettig 1990: 57).

While this study was completed over 15 years ago, its central premise still holds true. Over 70% of all sites recorded within the Muswellbrook Shire have been destroyed or disturbed principally as a result of coal mining development. There still remains a pressure to preserve as many open sites as is practicable in land surrounding parts of the Singleton Shire. The Central Lowlands land system is particularly in need of sites to be set aside for long term conservation.

GUIDELINES FOR ABORIGINAL CONSULTATION

DEC Interim Consultation Guidelines

In January 2005, the DEC introduced new Aboriginal Community Consultation guidelines. This was in response to changes to legal definitions of what constituted adequate Aboriginal community consultation. In these guidelines DEC explains that:

- Aboriginal heritage has both cultural and scientific/archaeological significance and that both should be the subject of assessment to inform its decision making;
- Aboriginal people are the primary determinants of the significance of their heritage;
- Aboriginal community involvement needs to occur early in the assessment process to ensure that their values and concerns are taken fully into account, and so that their own decision-making structures are able to function; and
- Information arising out of consultation allows the consideration of Aboriginal community views about significance and impact, as well as the merits of management or mitigation measures to be considered in an informed way.

Hence, when administering its approval functions under the NPW Act 1974, DEC requires applicants to consult with the Aboriginal community about the Aboriginal cultural heritage values (cultural significance) of Aboriginal objects and places within the area being considered for development.

However, community consultation is not a sign-off or approval process. The NPW Act 1974 establishes the Director-General of DEC as the decision-maker. DEC recognises that its decisions will not always be consistent with the views of the Aboriginal community and that there may not always be agreement within the Aboriginal community. However, DEC will take into account all relevant information it receives as part of its decision-making process.

The community consultation process ensures that Aboriginal communities have the opportunity to improve assessment outcomes by:

- Influencing the design of the assessment of cultural and scientific significance;
- Providing relevant information regarding the cultural significance

values of the objects/places;

- Contributing to the development of cultural heritage management recommendations; and
- Providing comment on draft assessment reports prior to their submission.

(DEC Interim Guidelines 2005)

To comply with the above process, DEC now requires developers (i.e. Drayton) to:

‘actively seek to identify stakeholder groups or people wishing to be consulted about the project and invite them to register their interest.’

To this end, DEC requires the developer to provide written notification to:

(a) The bodies listed below:

- Local Aboriginal Land Council(s);
- Registrar of Aboriginal Owners;
- Native Title Services;
- local council(s);
- Department of Environment and Conservation; and

(b) Via an advertisement in the local print media.

The notification must include details of the proposal and invite registrations from interested groups or individuals, as stipulated in the Guidelines. A closing date for registration of interest must also be included which reflects consideration of the project’s size and complexity, and allows at least 10 working days to respond.

In accordance with the Interim Guidelines, Drayton recorded all registrations received in writing before the closing date. Accordingly the DEC requires the developer to include all parties that have registered their interest. Respondents that do not register by the due date may still participate in the consultation process (DEC Interim Community Consultation Requirements for Applicants Guidelines 2005).

Consultation with the Local Aboriginal Community

To comply with the above process, Drayton placed an advertisement in the Muswellbrook Chronicle on 6 May 2005 seeking expressions of interest from Aboriginal community groups who may have an interest in the Project Area. In addition, Aboriginal groups who had previously worked at Drayton were also notified and sent a copy of the advertisement.

The groups that originally responded were:

- Upper Hunter Wonnarua Council Inc.;
- Wanaruah Local Aboriginal Land Council;
- Ungooroo Aboriginal Corporation;
- Lower Wonnarua Tribal Consultancy;
- Hunter Valley Aboriginal Corporation;
- Yarrawalk Aboriginal Corporation;
- Giwiirr Consultants;
- Upper Hunter Heritage Consultants;
- Hunter Valley Cultural Consultants; and
- Aboriginal Native Title Elder Consultants (formerly Combined Council Hunter Valley Aboriginal Corporation).

Since the original advertisement Wanaruah Aboriginal Custodians Corporation and Wonnarua Nation Aboriginal Corporation have also registered their interest.

The initial consultation meeting was held on 1 July 2005. Subsequent to this meeting, applications were sought for nominations for work. Following DEC interim consultation guidelines (2005), the following groups were engaged for the initial field work:

- Upper Hunter Wonnarua Council Inc.;
- Wanaruah Local Aboriginal Land Council;
- Ungooroo Aboriginal Corporation; and
- Upper Hunter Heritage Consultants.

The limited amount of field work in the initial stage restricted the number of groups engaged for such works.

In accordance with the Interim Consultation Guidelines (2005), a total of six Aboriginal members were required to assist in the survey assessment. The Aboriginal groups and associated field workers engaged for the survey assessment, who accompanied the archaeologist on a site survey between 1st August 2005 and 10th August 2005 included:

- Upper Hunter Wonnarua Council Inc. (Ms Tracey Skene);
- Upper Hunter Heritage Consultants (Mr Darrel Mathews);
- Wanaruah Local Aboriginal Land Council (Mr Barry French, Ms Kylie Griffiths); and
- Ungooroo Aboriginal Corporation (Mr Alan Paget).

Due to other commitments, Wonnarua Nation Aboriginal Corporation and the Wanaruah Aboriginal Custodians Corporation were unable attend the survey assessment.

Ms Barbara Foot, Wanaruah Aboriginal Custodians Corporation, has since visited the sites identified in the initial survey assessment and will also offer written comment on the proposal and recommendations of the final reports.

Each community group has stated that they will provide a written comment concerning the proposal and the recommendations of the final reports.

SURVEY METHODOLOGY

ARAS Pty Ltd was provided with a basic site plan illustrating the proposed extension. ARAS subsequently highlighted a number of high-risk land form unit areas that may have contained potential sites of former Aboriginal occupation. These high potential landform units were targeted for complete foot traverse assessment.

The ARAS survey team consisted of ARAS archaeologists: Rob Tickle and Trudy White, who completed the field assessment over a seven day period in August 2005 with members of the Wonnarua Aboriginal community (1 August –10 August 2005). Seven people walked across the land surface spaced evenly apart.

The most likely sites to occur within the land proposed for development could include isolated finds, open campsites and scarred trees. Rarer sites may include grinding grooves, carved trees, bora grounds (stone arrangements) and burials.

ASSESSMENT COVERAGE AND RESULTS

The Project area was defined by two main development areas: Delpah and Ramrod (see Figure 4).

Delpah area is made up of a series of mid and upper slope land units surrounding a large triangular dam. This land has been subject to some modification (i.e. tree clearing, power lines and some landscaping activities).

The Ramrod area contains a number of disturbed landscapes including a rail loop, Telstra cable, a dam and a series of regeneration areas. Ramrod Creek is located through part of this area and a small depression which holds some water is noticeable across an access road.

The most significant constraint encountered throughout the survey assessment was lack of ground surface visibility. Some land units did contain vehicle tracks and small patches of erosion due to cattle grazing (see Appendix 3, Plate 1).

Average visibility across the Project Area would have been between 0–25%. Foot coverage across the Project Area was 100%. Red flags were used to mark potential cultural features (i.e. Aboriginal objects) for detailed recording

Field conditions were fine and all areas were accessible by four-wheel drive. The main method of survey assessment was foot transects. The survey team consisted of seven people walking slowly across the study area.

A total of 11 transects were set out. Areas which contained evidence of ground surface exposure were investigated thoroughly. The original vegetation community can be described as open forest/woodland with spotted gum and ironbarks dominant. Over 80% of the Project area has been cleared for agricultural purposes and mining.

Table 5 below details which areas were sampled and what physical evidence was located during the field assessment (see Figure 4).

Table 5: Survey assessment and transect coverage

Land form units	Transect no.	Area investigated (Coordinates MGA 94)	Transect Description
Ridge crest 25% Upper slope 75%	1 Delpah	Easting 304809 Northing 6415894	Moderate slope, 0-25% visibility, gully. Used for cleared dam. Ephemeral drainage. Nil cultural evidence.
Upper slope 50% Lower slope 50%	2 Delpah	Easting 304944 Northing 6416141	Gentle slope, 0-25% visibility, gully. Cleared. Ephemeral drainage. Nil cultural evidence.
Ridge crest 10% Drainage channel 30% Simple slope 30% Upper slope 30%	3 Delpah	Easting 304944 Northing 6415404	Slope: flat 10%; gentle 10%; moderate 40%; steep 40%. 25–50% visibility. Gully, bare soil patches. Cleared, natural. Vehicle tracks. Ephemeral drainage. Total artefacts 95, 4 isolated finds.
Upper slope 50% Simple slope 20% Ridge crest 20%	4 Delpah	Easting 305805 Northing 6416448	Slope: moderate 50%, gentle 50%, 0–25% visibility. Gully. Cleared, dam. Vehicle tracks, contour banks. Ephemeral drainage. 2 isolated finds.
Ridge crest 20% Upper slope 30% Simple slope 35% Drainage channel 15%	5 Delpah	Easting 305266 Northing 6415923	Slope: Gentle 75%, moderate 25%. Visibility: 0–25% grass, 25–50% timber. Gully, bare soil patches. Cleared, natural, farm dam. Vehicle tracks. Ephemeral drainage. Total artefacts 73, including 2 isolated finds.

Land form units	Transect no.	Area investigated (Coordinates MGA 94)	Transect Description
Ridge crest 40% Upper slope 60%	6 Delpah	Easting 304938 Northing 6415651	Moderate slope, 25-50% visibility, bare soil patches, gully. Cleared, natural, farm dam. Cattle tracks, vehicle tracks. Ephemeral drainage. Total artefacts 15 including 2 isolated finds.
Upper slope 90% Simple slope 10%	7 Delpah	Easting 303993 Northing 6415322	Slope: steep 30%; moderate 30%; gentle 40%, 0-25% visibility, gully. Cleared, farm dam. Cattle tracks, vehicle tracks. Ephemeral drainage. Total artefacts 2.
Simple slope 25% Flat 25% Drainage channel 50%	1 Ramrod	Easting 303421 Northing 6420539	Slope: Flat 90%, gentle 10%, 0-25% visibility, Ramrod Creek. Cleared, vehicle tracks, dam. P/creek. Total artefacts 274, 1 isolated find.
Simple slope 90% Drainage channel 10%	2 Ramrod	Easting 304901 Northing 6420572	Gentle slope, 0-25% visibility, Upper Ramrod Ck. Cleared. Vehicle tracks, mined. Ephemeral drainage. 14 artefacts, 5 isolated finds.
Simple slope 100%	3 Ramrod	Easting 304322 Northing 6420563	Gentle slope, 0-25% visibility. Vehicle tracks, sediment dams, power lines, water pipes. Ephemeral drainage, 7 isolated finds.

DISCUSSION OF RESULTS

A total of 480 Aboriginal objects were recorded as a result of the survey assessment. This cultural record is made up of 39 sites consisting of: 22 open stone artefact scatters of varying densities and 17 individual stone artefact isolated finds (see Figure 5 and listed in Table 6).

A majority of these sites contain less than 10 stone artefacts. However, five sites (D1, R3 and R4) contain over 50 artefacts and are either located within 100 m of a drainage line or within a gully area.

The larger open sites are located within the survey area. Delpah area contained the least evidence for Aboriginal occupation; however this is not surprising given the amount of disturbance, lack of flat land and good surface ground visibility.

The majority of cultural material was located within gully features on sloping ground, which has been disturbed by cattle grazing and sheet erosion. Some sites were recorded along ridges or just above creek flats away from watercourses. Visibility was on average between 0–25% across the Project area. Most artefacts lie as lagged re-worked deposits. The possibility for dating sites is limited.

The Site considered to be archaeologically significant is R3.

Site R3 is located in the Ramrod Creek area (Transect 1 Ramrod), on the edge of a wetland overlooking Ramrod Creek. This site is located on a simple slope on an erosional scald, measuring 220 x 200 m in area. It consists of 169 exposed artefacts. Although this site is located within an erosional area, it does contain undisturbed Potential Archaeological Deposits. Site boundaries are defined by artefacts exposed through erosional processes.

No sites identified in the survey contain exposed hearths or potential stone-lined features. However, some sites contain areas with potential archaeological deposits. While ground visibility was a factor in the effective detection of ridge based sites (these areas were heavily grassed), it was not considered a limiting site detection factor along drainage channels or gullies associated with sheet erosion.

Nearly all cultural material is located within gully features, which have been disturbed by cattle grazing and sheet erosion. Visibility was on average between 0–25% across the study area. Most artefacts lie as lagged re-worked deposits. The possibility for dating sites is limited.

The majority of the artefactual material recorded could be argued to have been made and discarded within the last 500–2000 years. A majority of sites are located on landform elements, which are considered upper slope or simple slopes or on the edges of ridge crests. Most sites recorded border drainage features, with the greatest concentration of occupation being observed where ridge-lines intersect Ramrod Creek.

Summary of the Artefact Analysis

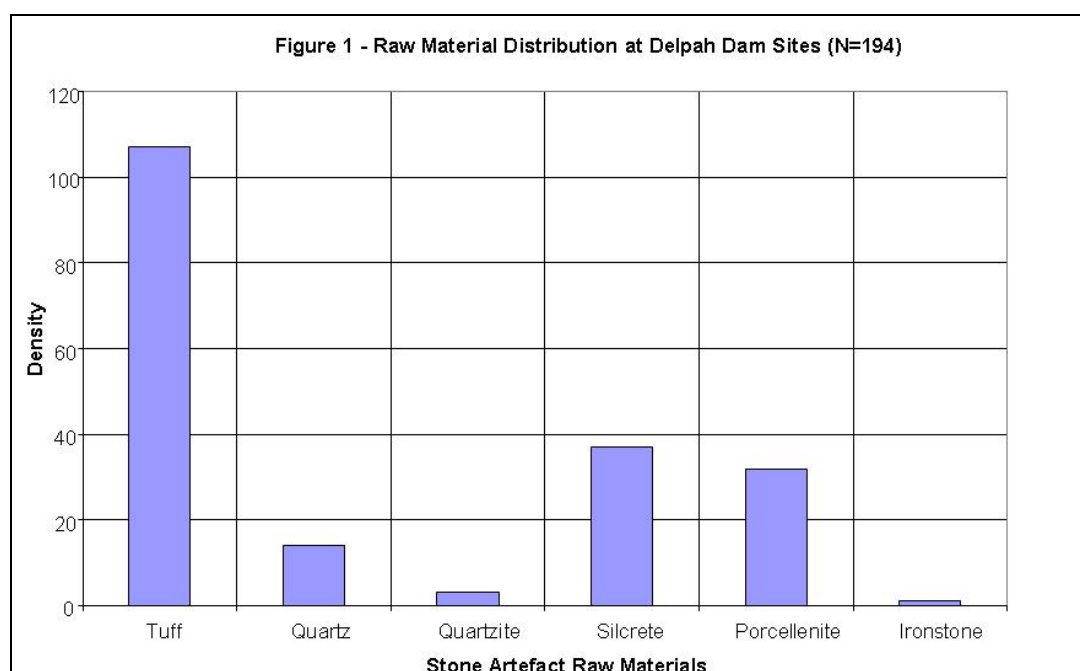
A majority of the surface artefact assemblages recorded are made from: yellow rhyolitic tuff and red rhyolitic tuff material (55%), followed

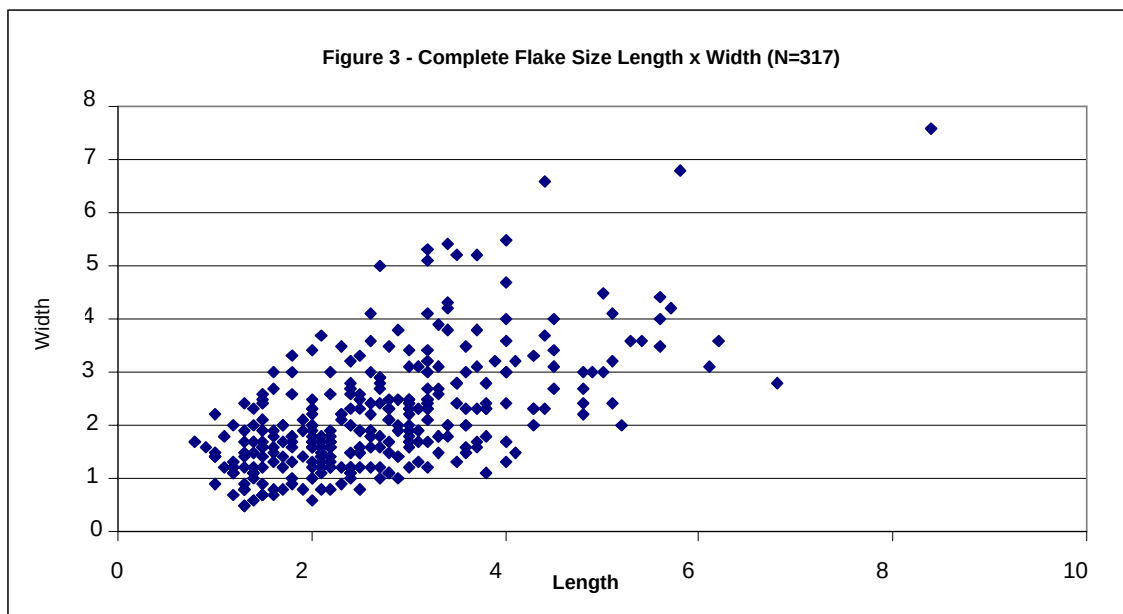
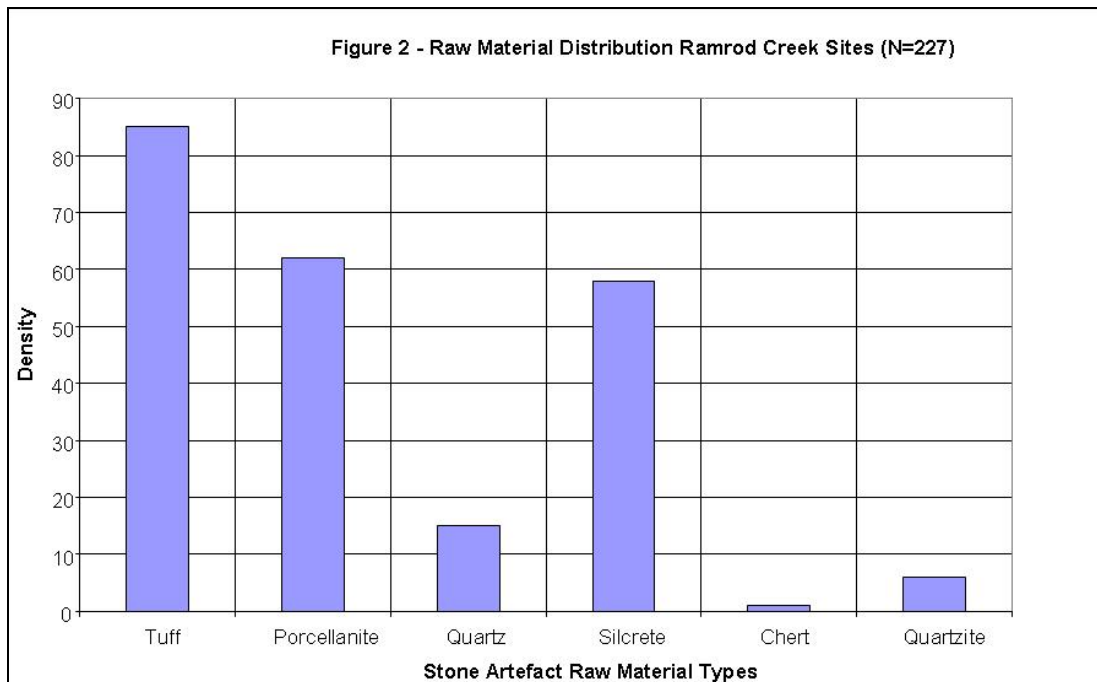
by red and yellow silcrete (25%), porcellanite(14%) and quartz (4.6%) (see Graph 1).

Artefact types are made up of: 38% of complete flakes, 31% broken flakes, followed by flaked pieces (26%) and cores (5%). Approximately 3% of the surface assemblage contains retouched and backed pieces. Cores are dominated by both single platform and multi- platform types and are evenly distributed between tuff and silcrete raw materials.

The mean average complete flake size (n=317) is 27 mm in length, 21 mm in width and 7.5 mm in thickness (see Graph 2). The mean average length and width for cores (n=39) are 39 mm, and 46 mm with the thickness being 35 mm. The distribution of cortex is present on approximately 12% of the entire assemblage with a majority being found on broken flakes (20%).

Platform type (i.e. broad or focal) is slightly higher for broad platforms (226) compared to focal (197). From a regional perspective, none of the assemblages are unique or rare in types of artefacts recorded or reduction processes observed. It could be argued that the overall assemblage was more utilitarian than specialised (i.e. micro-blade components were rarer).





SIGNIFICANCE ASSESSMENT CRITERIA

ARAS have based their Significance Assessment of the Project Area's cultural resources on the following criteria:

- DEC Guidelines;
- Australian Heritage Commission National Estate criteria;
- archaeological significance assessment;
- Aboriginal social significance; and
- Educational significance.

It is important to state that not all cultural heritage sites or places are equally significant or important and consequently worthy of long-term preservation. A detailed discussion of significance criterion and how it has changed over time has recently been undertaken by Byrne et al (2001).

Aboriginal Social Significance

Drayton has undertaken to consult directly with all Aboriginal community groups with an interest in the extension. As such, the relevant groups will be providing their own statement of Aboriginal significance to accompany this report (see Appendix 4).

Scientific Significance

Scientific significance is defined as: 'The scientific or research value of a place. This will depend upon the importance of the data involved, on its rarity, quality or representative ness and on the degree to which the place may contribute further substantive information' (Byrne et al 146:2002).

In the Hunter Valley, the following archaeological assessment criteria concerning Aboriginal history and past land-use, were used by the following headings:

- Information potential/research value;
- Regional research priorities;
- Representativeness;
- Rarity;
- Educational potential; and

- Cultural landscape values.

1.1.9 Information and research potential

This criterion is relevant to assessing an area's research potential in understanding of Australia's cultural history or human occupation of Australia. An area's cultural resource may have the potential to provide information that will contribute to understanding past human behaviour. Three factors are considered important in assessing a site, suite of sites or cultural object as having research potential:

- A place or site's intactness or integrity (this may include the state of preservation of a site or cultural remains). An intact site or place may reveal a greater amount of cultural evidence for past human behaviour. Sites in poor condition may be limited in what they can contribute to further research;
- Whether a site or cultural object may demonstrate connectedness to other sites within a landscape or within a regional context; and
- The chronological potential of a site or suite of sites to provide dates of human history for that particular evidence of occupation. Whether the site or place has potential for dateable deposits or strata.

Significance Assessment

From modeling and comparative assessment with other research conducted in the Hunter Valley, some sites recorded in the study area show medium to high research potential. The main issue to consider is the landscape context of the sites and how rarely this type of occupation has been assessed within the Wonnarua cultural landscape perspective. These sites are situated near the central part of the Wonnarua tribal boundary.

Although a majority of sites are small and recorded within disturbed contexts, they do show enough variability across an elevated terrain to be of interest to archaeologists wanting to model different types of occupation behaviour. Site R3 shows sub surface excavation potential.

The key aspect of their scientific value is to look at them in a broad landscape context and how they may form part of a specific local or regional occupation strategy.

The sites recorded within the Drayton Mine Lease area form part of a greater suite of sites which have been assessed by earlier studies (see Hamm 2003 & Hardie & Russell 2001 & 2002). Since most of the proposed development areas are within disturbed mining land, only a small portion of Drayton Lease area contains intact land unit elements.

The Delpah Dam area is the most significantly disturbed area, followed by Ramrod Creek (See Figure 2).

The sites do reflect a continuation of occupation first identified by Hardie & Russell and later Hamm and they need to be looked at in broader landscape context.

A majority of the sites are located on elevated crests or simple slopes within 50 metres of an ephemeral watercourse. Sites are defined by arbitrary erosional boundaries where artefacts have been exposed. Potential Sub-surface deposits are also included. Large sites which contain the greatest concentration of occupation material are found in the Ramrod Creek Transect 1 area (See Figure 5: R3).

In the Delpah Dam area, Transect 3 contains two sites of medium archaeological significance (D1 & D5). Transects 4 & 5 also contain potential for some sub surface archaeological deposits.

1.1.10 Regional Research Priorities

This research criterion is important for assessing significance when information will contribute on a regional level and assist other researchers in the understanding of past human behavior. It is usually understood in the context of regional research priorities. Some priorities may be focused on chronology, others on technological variability, while others may be looking at site function.

Significance Assessment

All sites recorded during the assessment are considered representative for the broader region of the Central Lowlands of the Hunter Valley. This has been assessed based on the following assumptions:

- No information was available on the number, type, and research potential of sites conserved in the Central Lowlands of the Hunter Valley;
- No consistent information on the number, type and research potential of sites conserved in the Central Lowlands. While there are sites conserved in the Mount Royal and Barrington Tops National Parks, little information is available as to their current conservation status; and
- No information was available as to the condition of sites (whether sites were destroyed or not) in the Central Lowlands land-system.

1.1.11 Representativeness

This archaeological assessment criterion is based on a conservation objective. This is relevant when assessing what a site or place may contribute if it was preserved for future generations. The concept has

to be assessed in a regional and local context. If very few of this type of site or suite of sites has been conserved, then it becomes a conservation priority. The aim for cultural resource managers is to conserve a representative sample of sites or places for future generations and research.

Significance Assessment

The main problem of this criterion is that much of the comparative data for site conservation, especially on a regional scale, has not been systematically gathered by many conservation agencies. Defining variability may be an aim for cultural resource managers, but if nothing is known about what has been destroyed or lost due to natural or human development processes then comparisons concerning representativeness are meaningless.

Without the above information, archaeologists are encouraged to assess representativeness based on their field experience and on their reading of the representative literature.

1.1.12 Rarity

This concept of significance criteria concerns the issue of how distinct a site or cultural object may be, compared to other similar sites or objects. 'Rare' implies that sites or objects of this nature have not been readily reported or assessed in a local or regional context before. The criterion of rarity may be assessed at a range of levels including local, regional, national, state or international.

Significance Assessment

Sites identified within this study are not considered rare or unique.

1.1.13 Educational potential

Sites or places that help educate the broader public about Wonnarua Aboriginal history are valuable resources. The level of information that is retrieved from sites or objects is usually of real assistance in enlightening the public about what happened at a particular place in the past. This educational potential comes from the work of the archaeologist in translating their finds or research results into everyday language that people can understand.

The educational outcomes may be newspaper articles, books, video presentations, lectures, radio broadcasts and information brochures. The information may be displayed as part of a local or regional museum. A mining company may use the research results to inform their employees about Aboriginal cultural history and occupation of a local area. The Aboriginal community may take the information and use it in local schools to teach and educate children about Wonnarua Aboriginal history and culture.

Significance Assessment

Sites identified within this study are considered to have low educational potential.

Cultural landscape value

This value combines the concept of aesthetic and social significance into a broader context of how living Wonnarua Aboriginal people perceived the local landscape and their sites or cultural objects within it. This Aboriginal concept may be connected to the understanding of religious and scenic values where places and natural features may contain inherent Wonnarua cultural landscape values.

Sites or cultural objects found within a landscape, which is 'untouched' or has natural scenic beauty, may be important when assessing cumulative impact or broader landscape disturbance. Aboriginal people will place a value on an entire landscape (with all its natural features) and how that may be affected by development impact.

Significance Assessment

Site R3 is considered to have some cultural landscape value.

The main landscape features considered important to Aboriginal people participating in the survey was the land containing Ramrod creek catchment (see Appendix 4).

CONCLUSION

Several Aboriginal sites recorded within the study area (i.e. Sites D1, D5, R3 and R4) (see Figure 5) are considered to be of medium or high archaeological significance due to their undisturbed nature, contents and location.

The remaining 20 artefact scatter sites and 17 isolated finds are considered to be of low archaeological significance, due to their physical condition and the low potential for in situ cultural material to be found in association with them.

In conclusion, Ramrod Creek drainage line is a significant archaeological feature and is likely to contain potential archaeological deposits with multiple Aboriginal sites and objects.

No sites of Aboriginal cultural significance have been identified within the Drayton mine lease extension area.

RECOMMENDATIONS

The following recommendations are made based on the existing and proposed legal requirements of:

- *Environmental Planning and Assessment Act 1979* (NSW) (amended); and
- *National Parks and Wildlife Act 1974* (NSW) (amended)

taking into account the archaeological and cultural heritage evidence found within Drayton Mine Lease areas A173, CCL 229 and ML 1531.

Conservation strategies

Subject to receiving Project Approval of the Project by the NSW Department of Planning, 29 sites (see Table 6 and Figure 6) are likely to be impacted by the extension and will require Part 3A planning approval.

Table 6 sets out the proposed recommendations for all sites and objects within the Drayton Mine Lease Extension area. These management recommendations may include:

- Conservation and preservation strategies from likely mine construction impacts (These strategies may include fencing and barricading of key areas and training of mining staff and their contractors.);
- Archaeological salvage and test excavations;
- Surface collection of Aboriginal objects; and
- Intensive in situ recording.

Table 6: Drayton Mine Extension Project's Aboriginal objects and sites

Site name	Site type	Artefact density	Eastings	Northings	Management status
DELPAH = D					
D1	Artefact scatter	55	305074	6416069	Impacted
D2	Isolated find	1	305176	6460550	Impacted
D3	Artefact scatter	3	305279	6416047	Impacted
D4	Artefact scatter	5	305230	6415960	Impacted
D5	Artefact scatter	31	305215	6415891	Impacted
D6	Isolated find	1	305583	6416460	Impacted
D7	Isolated find	1	304469	6416633	Impacted
D8	Artefact scatter	6	305350	6415942	Impacted
D9	Artefact scatter	4	305504	6415960	Impacted
D10	Artefact scatter	28	305660	6415981	Impacted
D11	Artefact scatter	26	305421	6416050	Impacted
D12	Isolated find	1	305283	6415888	Impacted
D13	Isolated find	1	305337	6415875	Impacted
D14	Artefact scatter	2	305781	6415786	Not Impacted by Mining
D15	Artefact scatter	5	306003	6415415	Not Impacted by Mining
D16	Artefact scatter	2	304942	6415925	Impacted
D17	Isolated find	1	304809	6415854	Impacted
D18	Isolated find	1	304847	6415798	Impacted
D19	Artefact scatter	4	304940	6415628	Impacted
D20	Artefact scatter	3	305054	6415475	Impacted
D21	Artefact scatter	4	304680	6415390	Impacted
D22	Artefact scatter	2	304491	6415684	Impacted
Ramrod = R					
R1	Artefact scatter	33	303622	6420533	Impacted
R2	Isolated find	1	303676	6420568	Impacted
R3	Artefact scatter	169	303739	6420466	Impacted
R4	Artefact scatter	71	303691	6420285	Impacted
R5	Isolated find	1	305541	6420814	Not Impacted by Mining
R6	Artefact scatter	3	305781	6420794	Not Impacted by Mining
R7	Isolated find	1	305043	6420543	Not Impacted by Mining
R8	Isolated find	1	305423	6420729	Not Impacted by Mining
R9	Isolated find	1	305387	6420827	Not Impacted by Mining
R10	Isolated find	1	305655	6420655	Not Impacted by Mining
R11	Artefact scatter	4	304886	6420480	Not Impacted by Mining
R12	Artefact scatter	2	304779	6420491	Not Impacted by Mining
R13	Isolated find	1	304076	6420394	Impacted
R14	Isolated find	1	304265	6420669	Impacted
R15	Isolated find	1	304350	6420584	Impacted
R16	Isolated find	1	304353	6420590	Impacted
R17	Isolated find	1	304333	6420486	Impacted

Management recommendations

For the proposed extension, it is recommended that Drayton undertakes the following management actions:

- Hold an Aboriginal community onsite meeting to discuss management recommendations for specific Aboriginal sites and objects likely to be effected by the Drayton Mine Extension development proposal;
- Prepare an Aboriginal Cultural Heritage Management Plan in order to assist management of likely Aboriginal cultural resources found within the mine lease area, as required under development consent;
- Seek expert geomorphological advice from Dr Peter Mitchell about the level of sub-surface potential for archaeological material within impact areas; and
- Provide the Aboriginal community with information about the proposed mine development plan and any likely operational impacts.

ACKNOWLEDGEMENTS

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BIBLIOGRAPHY

- Baker, N. 1992 NSW National Parks and Wildlife Service Hunter Valley Aboriginal Sites Assessment Project: Stone Artefact Assessment and Analysis-Recording Techniques and Methodology. Report to NPWS.
- Baker, N. and Gorman, A. 1992 Narama Salvage Project Lower Bayswater Creek Hunter Valley. Volume 4: Technological Studies. Report prepared for Envirosiences Pty Ltd and Narama Joint Venture.
- Baker, N. 1994 Moffats Swamp Dune: Final report on archaeological site salvage, testing and artefact analysis. Report to RZM Mining.
- Bamforth, D. 1986 Technological efficiency and tool curation. *American Antiquity* 51: 38-50.
- Barrallier, F. 1975 *Journal of the Expedition into the Interior of New South Wales 1802*, Marsh Walsh, Melbourne
- Barrington, G. 1810 *The history of New South Wales including Botany Bay, Port Jackson, Parramatta*. Sydney
- Bennett, G. 1834 *Wanderings in New South Wales*. London
- Binford, L. 2002 *In Pursuit of the Past Decoding the Archaeological Record*. University of California Press.
- Bleed, P. 1986 The optimal design of hunting weapons: Maintainability or reliability. *American Antiquity* 51: 547-562.
- Byrne, D., Brayshaw, H. and Ireland, I. 2001 *Social significance a discussion paper*. NSW National Parks and Wildlife Service Research Unit, Cultural Heritage Division.
- Brayshaw, H. 1986 *Aborigines of the Hunter Valley: a study of colonial records*. Scone and Upper Hunter Historical Society.
- Burton, C., Koettig, M. and Thorpe, W. *Regional Study of Heritage Significance, Central Lowlands, Hunter Valley Electricity Commission holdings Vol 1: Overview and Recommendations*. An unpublished report prepared for the Electricity Commission of NSW.
- Butzer, K. 1994 *Archaeology as human ecology* Cambridge University Press.
- Collins, D. 1975 *An account of an English Colony in New South Wales (2 vols)* A. H. Reed and A W Reed, Sydney.
- Dallas, M. and J. McDonald 1986 *Archaeological Reconnaissance of Singleton Shire Council Land Development known as Wattle Ponds. The Retreat*. Report to Singleton Shire Council.

- Dancey W.S. 1981 Archaeological Field Methods: An Introduction. Burgess Publishing.
- Davidson, I., James, R. and Fife, R. 1993 Archaeological Investigations, Proposed Bayswater No 3 Colliery, Authorisation Area 437. Prepared for Resource Planning Ltd. On behalf of Bayswater Colliery Company
- Davidson, I. and Lovell-Jones, C. 1993 Ethnographic Investigations, Proposed Bayswater No 3 Colliery, Authorisation Area 437. Prepared for Resource Planning Ltd. On behalf of Bayswater Colliery Company.
- Dawson, R. 1831 Present State of Australia, 2nd edition.
- Dean-Jones, P. 1992 Archaeological Investigations of Aboriginal Sites, Proposed North-Western Open *Cut Area*. Report to Lemington Coal Mines Ltd.
- Dean-Jones, P. and Mitchell, P. 1993 NSW National Parks and Wildlife Service Hunter Valley Aboriginal Sites Assessment Project: Environmental Modeling for Archaeological Site Potential in the Central Lowlands of the Hunter Valley. A report to NSW National Parks and Wildlife Service
- English, A. 2002 The Sea and the Rock Gives us a Feed. Mapping and Managing Gumbaingirr Wild Resource Use Places. NSW National Parks and Wildlife Service.
- EMR Resource Management (A division of EMR Mitchell McCotter) 1994. Bayswater No 2. Bulk Sample Program Archaeological Survey
- Fawcett, J. W. 1898 Notes on the customs and dialect of the Wonah-ruah tribe Science of Man ns 1, 7: 152-152, 8:180-81
- Foley, R. 1981 A model of regional archaeological structure. Proceedings of the Prehistoric Society. 47: 1-17.
- Grant, J. 1801 Journal at the Hunter River. Historical Records of Australia I 3:171-173.
- Gould, R. 1980 Living Archaeology Cambridge, Cambridge University Press.
- Gunson, N. 1974 Australian reminiscences and papers of L.E Threlkeld Australian Aboriginal Studies 40 AIAS, Canberra.
- Haglund, L. 1992 Archaeological investigations at Doctors creek, Warkworth, NSW: salvage excavation and surface collection in compliance with NPWS salvage requirements. A report prepared by Haglund and Associates for Warkworth Mining Ltd.

- Haglund, L. 1999 Warkworth Coal Mine: survey for Aboriginal heritage material. Haglund and Associates. Report to Warkworth Mining Pty Ltd.
- Hamm, G. 2002 An Archaeological Investigation of Sites recorded in the Drayton A173 and Rocky Knob Coal Mine Extension areas. A report to HLA-EnviroSciences.
- Henderson, J. 1851 Excursions and adventures in New South Wales London.
- Hiscock, P. 1989 Artefact recording in the field. In Sites and Bytes: Recording Aboriginal Places in Australia. Special Australian Heritage Publication Series Number 8. Ch 2: pp:20-39.
- Hiscock, P. and Koettig M. 1985 Archaeological Investigations at Plashett Dam, Mount Arthur North and Mount Arthur South in the Hunter Valley, NSW. Volumes 1-3.
- Hiscock, P. 1986 Technological change in the Hunter Valley and the interpretation of the late Holocene change in Australia. Archaeology in Oceania 21: 29-39.
- Hiscock, P. 2000 Sizing up prehistory. Sample size and the composition of artefact assemblages: Australian Aboriginal Studies 1: 48-62.
- Holdaway, s. 1993 Archaeological Assessment Standards and Methodological Design. A report to the NSW National Parks and Wildlife Service.
- Horton, D. (ed) 1994 The Encyclopedia of Aboriginal Australia. Australian Institute of Aboriginal and Torres Strait Islander Studies.
- Hughes, P. 1981 An archaeological survey of the Bayswater No 2 Colliery proposed lease extension area, Muswellbrook, the Hunter Valley. An unpublished report prepared for Natural Systems Research Pty Ltd, Hawthorne, Victoria.
- Hughes, P. 1984 An overview of the Archaeology of the Hunter Valley, its Environmental Setting and the Impact of Development. NSW National Parks and Wildlife Service Hunter Valley Region Archaeology Project Stage 1, Volume 1.
- Hughes, P. 1985 An archaeological investigation of Plashett Dam, Mount Arthur North and Mount Arthur South in the Hunter Valley, NSW. Unpublished report prepared for the Electricity Commission of NSW and Mount Arthur South Coal Pty Ltd.
- Hughes, P. and Shawcross, W. 2001 Archaeological Monitoring on the Sand dune at NPWS Site No 37-5-0166 Cheshunt Pit Hunter Valley Operations NSW Huonbrook Environment and Heritage Pty Ltd A report to Coal and Allied Operations Pty Ltd.

- Hunter, J. 1868 An historical journal of the Transactions at Port Jackson and Norfolk Island. Angus and Robertson.
- Hurst Thomas, D. 1991 Archaeology Down to earth. HBJ Publishing
- Koettig, M., and Hughes, P. 1985 An archaeological investigation of Plashett Dam, Mount Arthur North and Mount Arthur South in the Hunter Valley, NSW. Unpublished report prepared for the Electricity Commission of NSW and Mount Arthur South Coal Pty Ltd.
- Koettig, M. 1986 Test excavations at six locations along the proposed pipeline route between Glennies Creek Dam Hunter Valley region, NSW A report to the Public Works Department NSW.
- Koettig, M. 1990 Draft Report of the Aboriginal Sites within Singleton Shire: Heritage Study. A report to Singleton Shire Council.
- Kovac, M. and Lawrie, J. 1991 Soil Landscapes of the Singleton 1:250,000 Sheet. Soil Conservation Service of NSW.
- Kooyman, B. 2000 Understanding Stone tools and Archaeological Sites. University of Calgary Press, University of New Mexico Press.
- Kuskie, P. 1994 Archaeological assessment of land rezoning proposal Lot 101, DP 559519 Millers Forest.
- Kuskie, P. and Kamminga, J. 2000 Salvage of Aboriginal archaeological sites in relation to the F3 Freeway near Lenegans Drive, Black Hill New South Wales. Report to the Roads and Traffic Authority.
- McCardle, P. 2003 Singleton Councils' Remaining Land: Archaeological Assessment. Volume 1: Report.
- Morris, G. 2004 NSW NPWS Aboriginal Sites Register Search.
- NSW NPWS. 2003 (Draft-final) Guide-lines for Aboriginal Heritage Impact Assessment.
- NSW Dept Urban Affairs and Planning NSW Heritage Office. 1996 Regional Histories of New South Wales.
- Odell, G. 1994 Assessing hunter-gatherer mobility in the Illinois valley: Exploring ambiguous results. In The Organization of North American Prehistoric Chipped Stone Tool Technologies, Archaeology Series No7 ed Phillip J Carr Ann Arbour: International Monographs in Prehistory.
- Odell, G. 1996 Economizing behaviour and the concept of curation. In Stone Tools: Theoretical Insights into Human Prehistory ed George Odell.
- Orton, C. 2000 Sampling in Archaeology Cambridge Manuals in Archaeology.

- Paterson, W. 1801 Journal of the Hunter River expedition. Historical Records of Australia I 3: 174-180.
- Perry, V. 2002 Aboriginal Cultural Heritage for Singleton Housing Sub Division
- McElhinney, N. 2003. HLA Ecologist, Inhouse.
- Mitchell, P. Dr. 2003. Consultant Geomorphologist.
- Morris, G. 2004 NSW NPWS Aboriginal Sites Register Search.
- NSW NPWS. 2003 (Draft-final) Guide-lines for Aboriginal Heritage Impact Assessment.
- NSW Dept Urban Affairs and Planning NSW Heritage Office. 1996 Regional Histories of New South Wales.
- Ruig, J. 1993 An archaeological survey and assessment of the proposed optic fibre route at Belford, N.S.W. Report to Telecom Australia.
- Schiffer, M. 1987 Formation Processes of the Archaeological Record University of Utah Press, Salt Lake City.
- Story, R., Galloway, R.H., de Graaff H.M. and Tweedie, A. 1963 General Report on the lands of the Hunter Valley. Melbourne, CSIRO.
- Sullivan, s. and Bowdler, s. 1984 Site Surveys and Significance Assessment in Australian Archaeology. Proceedings from the Springwood conference.
- Torrence, R. 1986 Production and Exchange of Stone Tools: Prehistoric Obsidian in the Aegean. Cambridge University Press.
- Tindale, N. 1974 Aboriginal Tribes of Australia. University of California. Berkeley.
- Vickers, J. 1996 Glendonbrook. The land and its people.
- Vita-Finzi Claudio. 1978 Archaeological Sites in their settings Thames and Hudson.
- Walker, P.L. 1978 Butchering and stone tool function. American Antiquity 43: 710-715.
- Witter, D. 2002 Ashton Coal Mining Project. Environmental Impact Statement: Aboriginal Archaeology. A report to HLA Enviro-sciences.
- Witter, D. 1995 A classification of Australian Stone Artefact and Principles of Taxonomy. Draft Research Report.

FIGURES 1 - 6

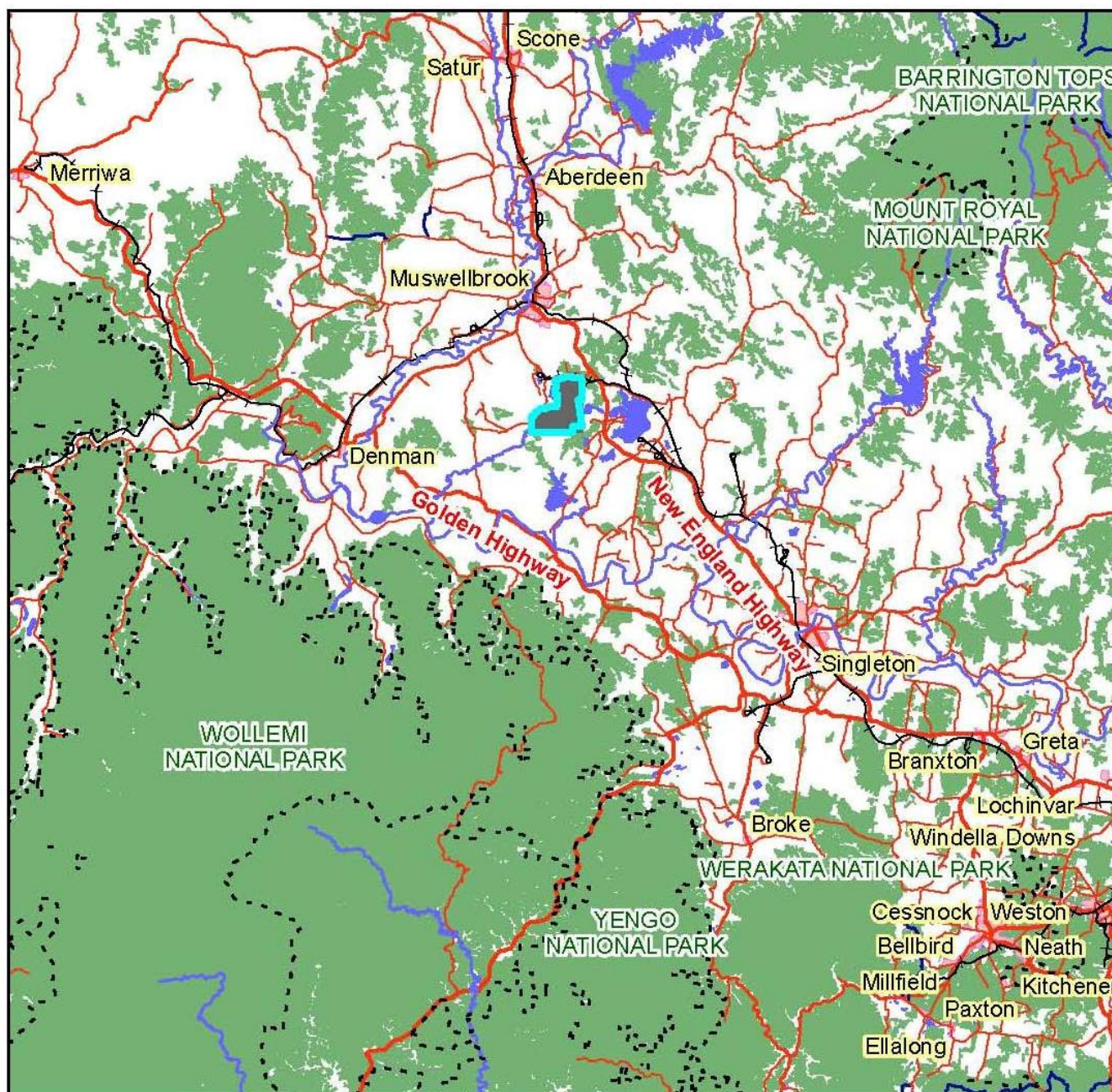
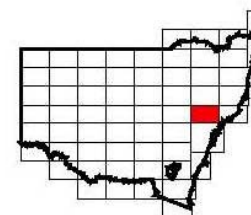


Figure 1:
General Location Map

- Drayton Open Cut Mine
- Rail
- Roads
- Watercourses
- Park Boundary
- Forest Area
- Water Bodies



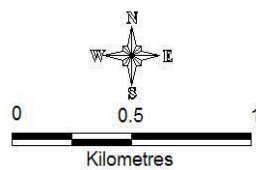
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Base Data: (C) Copyright Commonwealth of Australia (Geoscience Australia) 2000



Figure 2: Study Area with EA Boundary

--- EA Boundary



Scale 1: 30 000

Source: Anglo Coal Drayton Management, 2005

Archaeological Risk Assessment Services



Figure 3: Known Aboriginal Sites Located within or near the study area



Data Source

Sites: AHIMS, Department of Environment
 and Conservation
 Aerial Photo: Anglo Coal Drayton
 Management, 2005

Archaeological Risk Assessment Services

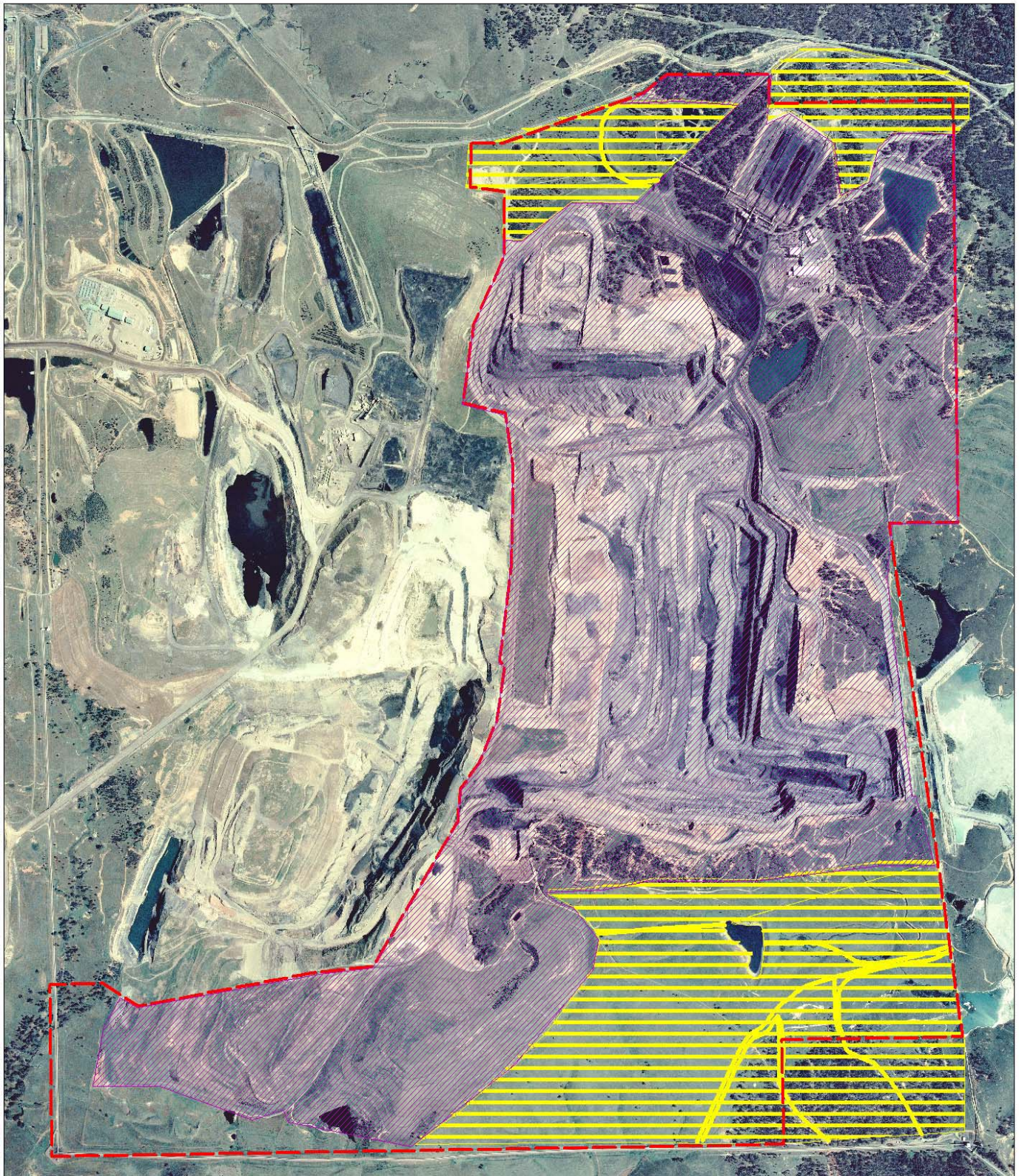
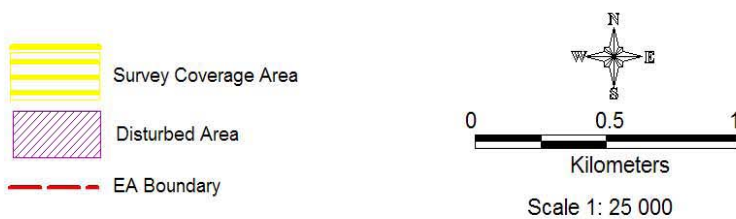


Figure 4: Survey coverage map showing areas surveyed in the study area



Data Source

Aerial Photo: Anglo Coal Drayton
Management, 2005

Archaeological Risk Assessment Services



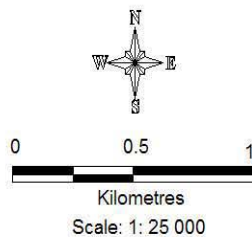
Figure 5: New Aboriginal sites and objects located as a result of the survey assessment

Open Sites Showing Density Counts

- ★ Isolated Find
- 2 - 5
- 6 - 25
- 26 - 50
- 51 - 100
- > 100
- EA Boundary

Site Codes

D = Delpah
R = Ramrod



Source: Anglo Coal Drayton
Management, 2005

Archaeological Risk Assessment Services

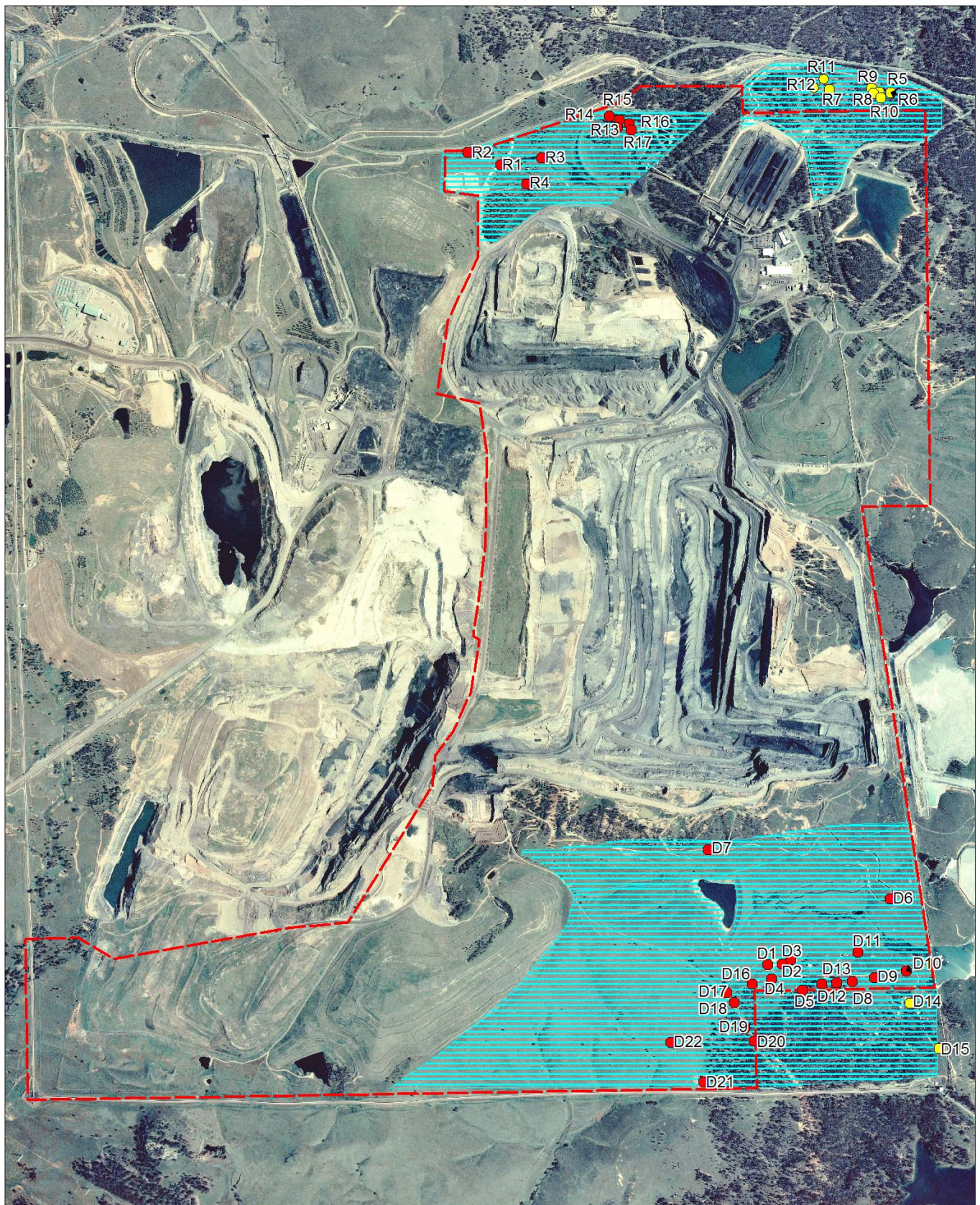
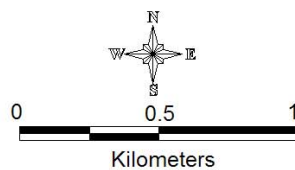


Figure 6 : Areas and sites identified regarding the Drayton Extension Development Proposal

-  Survey Coverage
-  Sites to be impacted by the Project
-  Sites not to be impacted by the Project
-  EA Boundary



Source: Anglo Coal Drayton Management, 2005

Archaeological Risk Assessment Services

APPENDICES

APPENDIX 1: ABORIGINAL CONSULTATION ADVERTISEMENT

able at the door. 2517.



DRAYTON



**ANGLO
COAL**

ANGLO COAL DRAYTON MINE

**CULTURAL HERITAGE
SURVEY AND
CONSULTATION**

Anglo Coal Drayton Mine is
seeking expressions of interest
for Aboriginal community
consultation for Anglo Coal
Drayton Mine.

To register your interest, please
contact Peter Forbes 6542 0256

by 20th May 2005.

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APPENDIX 2: DEC AHIMS REGISTER SEARCH RESULTS



List of Sites (Partial)

Grid Reference Type = AGD (Australian Geodetic Datum), Zone = 56, Easting From = 302000, Easting to = 306000, Northing From = 6415000, Northing to = 6421000, Feature Search Type = AHIMS Features

Site ID	Site Name	Datum	Zone	Easting	Northing	Access Restrictions			Site Features	Site Types (recorded prior to June 2001)	Further Info.	Report ID
						Gender	General	Location			Contact	
<u>37-2-0097</u>	<u>The Pimple: Drayton</u> <u>3:</u>	AGD	56	302687	6416884	None	☐	☐	Artefact	Open Camp Site		
		Status	Valid								Permit(s)	
<u>37-2-0167</u>	<u>Bayswater: Bayswater</u> <u>No.2 Colliery Site 7:</u>	AGD	56	302600	6420400	None	☐	☐	Artefact	Open Camp Site		
		Status	Valid								Permit(s)	
<u>37-2-0168</u>	<u>Bayswater: Bayswater</u> <u>No.2 Colliery Site 8:</u>	AGD	56	302300	6420700	None	☐	☐	Artefact	Open Camp Site		
		Status	Valid								Permit(s)	
<u>37-2-1825</u>	<u>RP28</u>	AGD	56	302000	6420500	None	☐	☐	Artefact	Open Camp Site		
		Status	Valid								Permit(s)	
<u>37-2-1850</u>	<u>RL4</u>	AGD	56	303200	6420300	None	☐	☐	Artefact	Open Camp Site		
		Status	Valid								Permit(s)	
<u>37-2-1851</u>	<u>EC1</u>	AGD	56	302400	6419800	None	☐	☐	Artefact	Open Camp Site		
		Status	Valid								Permit(s)	
<u>37-2-1968</u>	<u>DR.1</u>	AGD	56	303384	6416832	None	☐	☐	Artefact			
		Status	Destroyed								Permit(s) 1744	
<u>37-2-1969</u>	<u>DR.2</u>	AGD	56	305372	6417842	None	☐	☐	Artefact			
		Status	Destroyed								Permit(s) 1744	
<u>37-2-1970</u>	<u>DR3</u>	AGD	56	305052	6417923	None	☐	☐	Artefact			
		Status	Destroyed								Permit(s) 1744	
<u>37-2-1971</u>	<u>DR4</u>	AGD	56	305034	6417863	None	☐	☐	Artefact			
		Status	Destroyed								Permit(s) 1744	
<u>37-2-1972</u>	<u>DR5</u>	AGD	56	305215	6416973	None	☐	☐	Artefact			
		Status	Destroyed								Permit(s) 1744	

List of Sites (Partial)

Grid Reference Type = AGD (Australian Geodetic Datum), Zone = 56, Easting From = 302000, Easting to = 306000, Northing From = 6415000, Northing to = 6421000, Feature Search Type = AHIMS Features

Grid Reference Type = AGD (Australian Geodetic Datum), Northing to = 8421000, Feature Search Type = AHIMS Features														Report ID
Site ID	Site Name	Datum	Zone	Easting	Northing	Access Restrictions			Site Features	Site Types (recorded prior to June 2001)	Further Info.		Report ID	
						Gender	General	Location			Contact			
<u>37-2-1973 DR6</u>		AGD	56	305228	6417245	None	☐	☐	Artefact			Permit(s) 1744		
		Status	Destroyed											
<u>37-2-1974 DR7</u>		AGD	56	305130	6417252	None	☐	☐	Artefact			Permit(s) 1744		
		Status	Destroyed											
<u>37-2-1975 DR8</u>		AGD	56	305372	6417258	None	☐	☐	Artefact			Permit(s) 1744		
		Status	Destroyed											
<u>37-2-1976 DR9</u>		AGD	56	305512	6417252	None	☐	☐	Artefact			Permit(s) 1744		
		Status	Destroyed											
<u>37-2-1977 DR10</u>		AGD	56	304187	6416658	None	☐	☐	Artefact			Permit(s) 1744		
		Status	Destroyed											
<u>37-2-1978 DR11</u>		AGD	56	304117	6416624	None	☐	☐	Artefact			Permit(s) 1744		
		Status	Destroyed											
<u>37-2-1979 DR12</u>		AGD	56	304523	6416628	None	☐	☐	Artefact			Permit(s) 1744		
		Status	Destroyed											
<u>37-2-1980 DR13</u>		AGD	56	304688	6416677	None	☐	☐	Artefact			Permit(s) 1744		
		Status	Destroyed											
<u>37-2-1981 DR14</u>		AGD	56	303332	6416603	None	☐	☐	Artefact			Permit(s) 1744		
		Status	Destroyed											
<u>37-2-1989 DR1 Drayton Coal</u>		AGD	56	303384	6416832	None	☐	☐	Artefact			Permit(s)		
		Status	Valid											
<u>37-2-1990 DR2 Drayton Coal</u>		AGD	56	305372	6417842	None	☐	☐	Artefact			Permit(s)		
		Status	Valid											

List of Sites (Partial)

Grid Reference Type = AGD (Australian Geodetic Datum), Zone = 56, Easting From = 302000, Easting to = 306000, Northing From = 6415000,
Northing to = 6421000, Feature Search Type = AHIMS Features

Site ID	Site Name	Datum	Zone	Easting	Northing	Access Restrictions			Site Features	Site Types (recorded prior to June 2001)	Further Info.	Report ID
						Gender	General	Location			Contact	
37-2-1991	DR3 Drayton Coal	AGD	56	305052	6417923	None	☐	☐	Artefact		Permit(s)	
		Status	Valid									
37-2-1992	DR4 Drayton Coal	AGD	56	305034	6417863	None	☐	☐	Artefact		Permit(s)	
		Status	Valid									
37-2-1998	DR 5 - Drayton Coal(refer to 37-2-1972)	AGD	56	305215	6416973	None	☐	☐	Artefact		Permit(s)	
		Status	Deleted									
37-2-1994	DR 6 - Drayton Coal(refer to 37-2-1973)	AGD	56	305228	6417245	None	☐	☐	Artefact		Permit(s)	
		Status	Deleted									
37-2-1995	DR 7 - Drayton Coal(refer to 37-2-1974)	AGD	56	305130	6417252	None	☐	☐	Artefact		Permit(s)	
		Status	Deleted									
37-2-1996	DR 9 - Drayton Coal(refer to 37-2-1976)	AGD	56	305512	6417252	None	☐	☐	Shell		Permit(s)	
		Status	Deleted									
37-2-2006	Ramrod Creek	AGD	56	302681	6420472	None	☐	☐	Artefact		Permit(s)	
		Status	Valid									

APPENDIX 3: PLATES: 1-7



Plate 1: Delpah Dam Artefact Scatter Site D1 looking west.



Plate 2: Artefact Scatter Site D5. Red flags represent artefacts.



Plate 3: Silcrete Blade Core recorded from Artefact Scatter Site D10



Plate 4: Artefacts located from Site R1 Ramrod Creek area.



Plate 5: Artefact Scatter Site R3 Ramrod Creek Area looking north-west.



**Plate 6: Artefact Scatter Site R4 Ramrod Creek area looking north-east.
Red Flags =artefacts**



Plate 7: Artefacts recorded from Ramrod Creek Site R4.

APPENDIX 4: ABORIGINAL CONSULTATION ADVICE



Upper Hunter Wonnarua Council Inc

PO BOX 184 SINGLETON NSW 2330
PHONE: 02 6571 4888 FAX: 02 6571 4889

ABN: 24 070 620 198



Anglo Coal
Drayton Management Pty Ltd
PMB 9
MUSWELLBROOK NSW 2333

19th July 2006

ATT: Peter Whalan - Project Manager

REF: Giles Hamm - Archaeological Heritage Assessment

Dear Peter

The Upper Hunter Wonnarua Council have read the above Heritage Assessment.

Our Council has no objections to the proposed fieldwork. We would like to be involved in any future salvage of sites within this development.

- We would also like to state that we are concerned with the - PART 3A - aspects of the Heritage Law.

We also state that our people have and are Registered N.T.Claimants and have certain Rights in relations to Culture and Heritage.

Yours sincerely

Upper WC


V Perry

APPENDIX 5: GENERAL GLOSSARY OF TERMS

Aboriginal object	'Aboriginal object' is defined under the Act as 'any deposit, object, or material evidence (not being a handicraft for sale) relating to Aboriginal habitation of the area that comprises New South Wales being habitation before or concurrent with the occupation of that area by persons of non Aboriginal extraction, and includes Aboriginal remains (as defined within the meaning of the NPW Act 1974: See <i>Guidelines for Aboriginal Heritage Impact Assessment</i> July 2003).
Analytical recording	A process of site recording which obtains detailed archaeological data useful in archaeological analysis.
Analysis	Evaluation of archaeological data to determine the archaeological significance of sites recorded within an impact area.
Archaeological deposit	A layer of soil material containing archaeological remains.
Archaeological investigation	The process of assessing the archaeological potential of an impact area by a qualified archaeologist.
Archaeological comparability	The evaluation of whether archaeological sites are uniformly different or similar across an impact area.
Archaeological data	Archaeological information that is recorded as a result of an archaeological investigation.
Archaeological significance	The evaluation of the scientific significance of a site, artefact, object or potential archaeological deposit as being unique, representative, information laden, intact or disturbed, easily dateable, or having special qualities that will add new knowledge to our understanding of human history.
Artefact	Any object made by human agency(stone artefacts).
Artefact scatter	A collection of artefacts usually lying as a lag deposit on an eroding surface.

Assemblage	1. A group of stone artefacts found in close association with one another. 2. Any group of items designated for analysis-without any assumptions of chronological or spatial relatedness (Witter 1995).
Avoidance	A management strategy which protects Aboriginal sites within an impact area by development totally avoiding them.
Broken flake	A flake which is either a distal fragment or proximal fragment.
Campsite	A site which contains a variety of artefactual data not specific to one type of stone tool reduction sequence.
Complete flake	A flake which is whole and not broken.
Core	A lump or nodule of stone from which flakes have been removed.
Debitage	Unmodified flakes or fragments of stone material removed as a result of stone tool manufacture or modification.
Flake	A piece of stone detached from a core displaying a bulb of percussion and striking platform.
Flaked piece	A fragment of stone where negative flake scarring is visible but no obvious striking platforms are present.
Hearth	The site of a campfire represented by charcoal, burnt earth, ash and sometimes stones used as heat retainers.
Intensive recording	The process of recording in detail aspects of a site or object's cultural fabric and character using the latest scientific methods otherwise unavailable at the time of the archaeological survey.
Isolated find	A single artefact found in an isolated context.
Impact area	An area that requires archaeological investigation and management assessment.

Knapping floor	A location on a site which normally represents a stone artefact reduction episode.
Landform	Any one of the various features that make up the surface of the earth.*
Landscape	That part of the land's surface, more or less extensive being viewed or under study, that relates to all aspects of its physical appearance, including various vegetation associations and landforms.*
Land system	An area, or group of areas, commonly delineated on a map, throughout which there is a recurring pattern of topography, soils, and vegetation.*
Land unit	An area of common landform, and frequently with common geology, soils, and vegetation types, occurring repeatedly at similar points in the landscape over a defined region. It is a constituent part of a land system.*
Management plans	Conservation plans which identify short and long term management strategies for all known sites recorded within an impact area.
Methodology	The procedures used to undertake an archaeological investigation.
Minimum requirements	The minimum standard for which NPWS will accept the reporting of an archaeological investigation.
Mitigation	To address the problem of conflict between land use and site conservation.
Open site	An archaeological site situated within an open space (e.g. archaeological material located on a creek bank, in a forest, on a hill etc.).
Open area excavation	A method of excavation where large areas of an archaeological site are open at any one time. A horizontal representation of Aboriginal occupation of different archaeological features is considered to be more important than vertical stratigraphic relationships.

Research design	A research strategy for carrying out an intensive archaeological investigation and analysis.
Sampling	The process of selecting part of an area under archaeological investigation as a basis for generalizing about the whole.
Sample unit	An area of investigation which is uniform size or density and which can be quantified for analytical reasons.
Salvage	A method by which an archaeological site or group of sites may be fully investigated before they are totally destroyed by a development.
Site	A place where past human activity is identifiable.
Site recording	The systematic process of collecting archaeological data for an archaeological investigation.
Spatial significance	A site which may contain potential sub-surface deposits or in-situ material useful in the analysis of human use of land and site formation process.
Summary recording	A process of site recording where archaeological data is collected on a summary level only.
Survey coverage	A graphic and statistical representation of how much of an impact area was actually surveyed and therefore assessed.
Technological significance	Artefactual material which may contain types or items although not unique, may be included in a sample to demonstrate an aspect of stone artefact variability.
Test excavation	A process of exploratory excavation done on a small scale used to determine site extent, site condition and excavation potential.

APPENDIX 6: GLOSSARY BIBLIOGRAPHY

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|------------------------------------|---|
| Soil Conservation Service of N.S.W | 1986 Glossary of Terms used in Soil Conservation (pp 76–7). |
| Witter, D. | 1995 A classification of Australian Stone Artefacts and principles of taxonomy. Unpublished report. |