Environmental & Heritage Management P/L

HERITAGE ASSESSMENT:

PROPOSED EXTENSION TO ML 68: THE INVINCIBLE OPEN CUT COAL MINE, CULLEN BULLEN, NSW.

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REPORT PREPARED BY
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FOR
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Executive Summary

The former ML 68 (Invincible) open cut coal mine ceased operations in 2001. Coalpac Pty Ltd now proposes to extend the open cut coal mine to recover c. 110,000 – 300,000 t of steaming coal. Approximately 10 ha of the Ben Bullen State Forest will be impacted as a result of the coal extraction proposal, and it is this land that forms the study area for the current archaeological assessment. Survey of this area recorded no Indigenous sites within the proposed impact footprint and haulage road. There are consequently no constraints to the proposed development on the grounds of cultural heritage with no further archaeological investigation is considered necessary.

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1. INTRODUCTION

This report was commissioned by Craven, Elliston & Hayes Pty Ltd (Lithgow). It details the results of an Indigenous heritage assessment of proposed extension of the Invincible open cut mine, situated east of the Castlereagh Highway c. 2 km south of Cullen Bullen, NSW (Figures 1, 2 and 3). The colliery is currently on a care and maintenance program, having ceased operations in 2001.

1.1 Project Scope

The consultant was briefed to undertake survey to assess the presence and condition of Aboriginal Objects, potential impacts and potential avoidance & mitigation models[1] arising from an approval sought to establish a c. 10 ha extension to the existing open cut coal mine within Mining Lease 68 (ML 68) at Invincible Colliery (Figures 2 and 3).

This investigation included the following aspects:

- A search of the NSW DEC Aboriginal Heritage Information Management System (AHIMS) for any previously recorded sites, a search of NSW State Heritage Register and Inventory; the Register of the National Estate; Environment Australia's Environmental Protection Biodiversity Conservation Acts Protected Matters Report and the Lithgow Council LEP;

- A review of relevant literature including previous consulting reports, academic theses, articles and published works on the history and ethnography of the Blackmans Flat / Cullen Bullen region;

- Consultation with the Bathurst Local Aboriginal Land Council (BLALC);

- Pedestrian field survey to identify and record all cultural heritage sites and relics within the c.10 ha area Invincible study area; and

- Completion of documentary evidence (e.g. DEC Site Cards) for any sites/relics located during the survey for the notification of the relevant authorities.

[1] As per letter to the Proponent from Darryl Clift Head Regional Operations Unit Bathurst DEC.

1.2 Proposed Works

Coalpac Pty Limited currently owns the Invincible Colliery. They are seeking to obtain approval to extend the open cut coal mine within ML 68, Invincible Colliery, to service a contract with Delta for the supply of coal to the Mt Piper Power Station. The Delta contract requires Coalpac to provide 110,000 - 350,000 tpa of steaming coal which will be transported by an internal haul road to the crushing and screening area within ML 80 (also within the Invincible property) for processing. The coal will then be transported via the Castlereagh Highway to Mt Piper Power Station and other domestic markets.

The proposed open cut coal mine extension will disturb 10 ha of the site within Ben Bullen State Forest. The open cut will be progressively rehabilitated and the final landform would be reseeded with locally occurring native species. Provenance seed would be obtained by a person(s) qualified to collect native seed prior to revegetation activities to ensure genetic biodiversity is maintained. The extraction and replacement of overburden as part of the outlined rehabilitation activities would expose coal from the Irondale, Lidsdale and Lithgow Coal Seams which would be available for removal, storage and ultimately despatch from the Project Site.

1.3 Project Constraints and Limitations

Survey was limited to the red area outlined and entitled 'Proposed limit of coal extraction' and the existing haul road on Figure 3**.** This comprises approximately 9.5 ha of relatively undisturbed land and 0.5 ha of highly disturbed land adjacent to the former open cut. This area was delineated by the client's representative (Graham Muir) on site maps provided to OzArk EHM and in the field.

1.4 Report Authorship

This investigation was undertaken and written by Jodie Benton and Phillip Cameron (OzArk Environmental & Heritage Management P/L). Richard Peters, representative of the Bathurst Local Aboriginal Land Council accompanied the OzArk representatives in the field.

Figure 1: Locality map (Source: International Environmental Consultants).

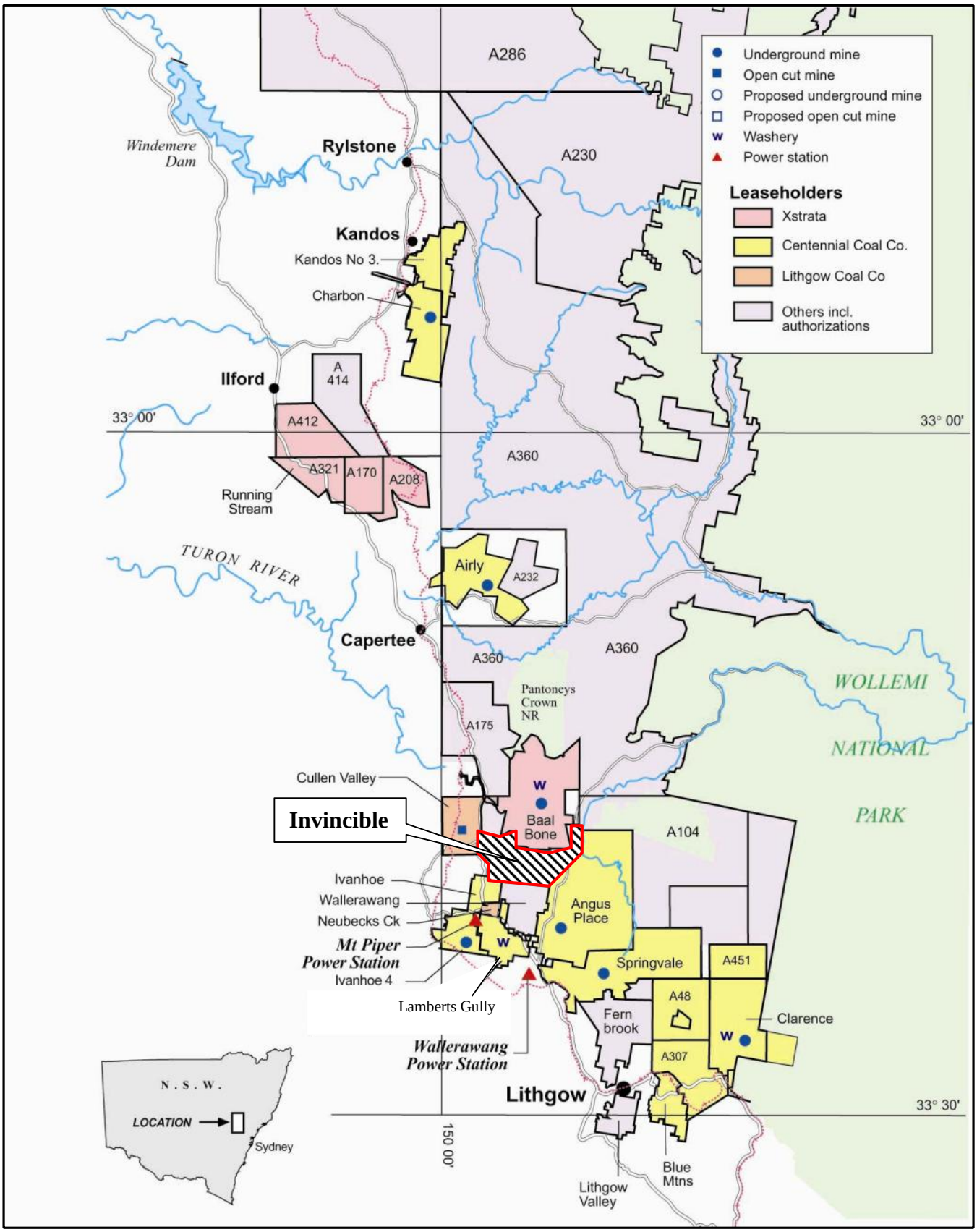


Figure 2: Project site detailing the proposed extension area. The red line delineates the extent of ML 68 within Invincible Colliery; the blue hatched area represents the former open cut while the black hatched portion shows the proposed extent of the works.

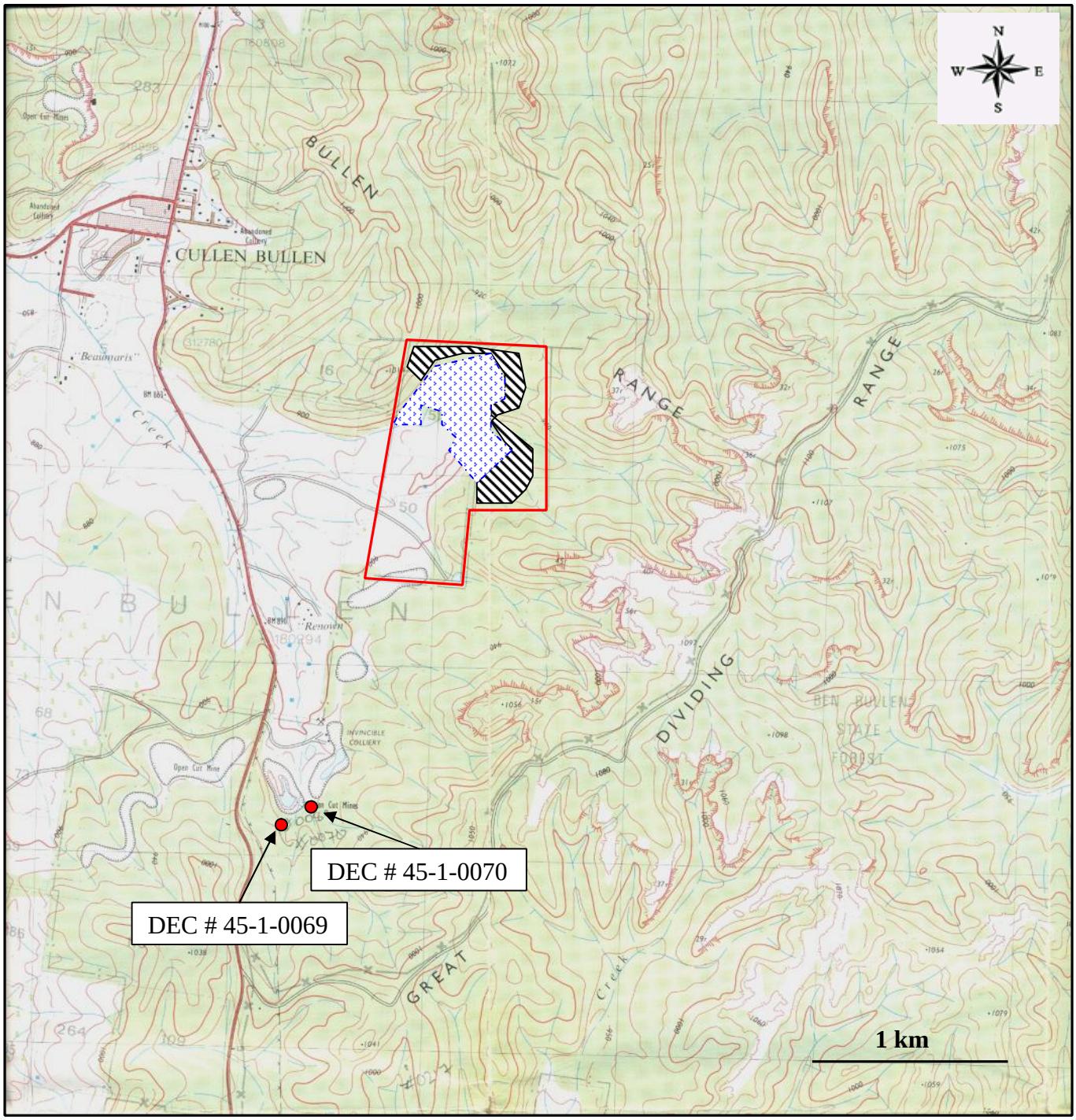
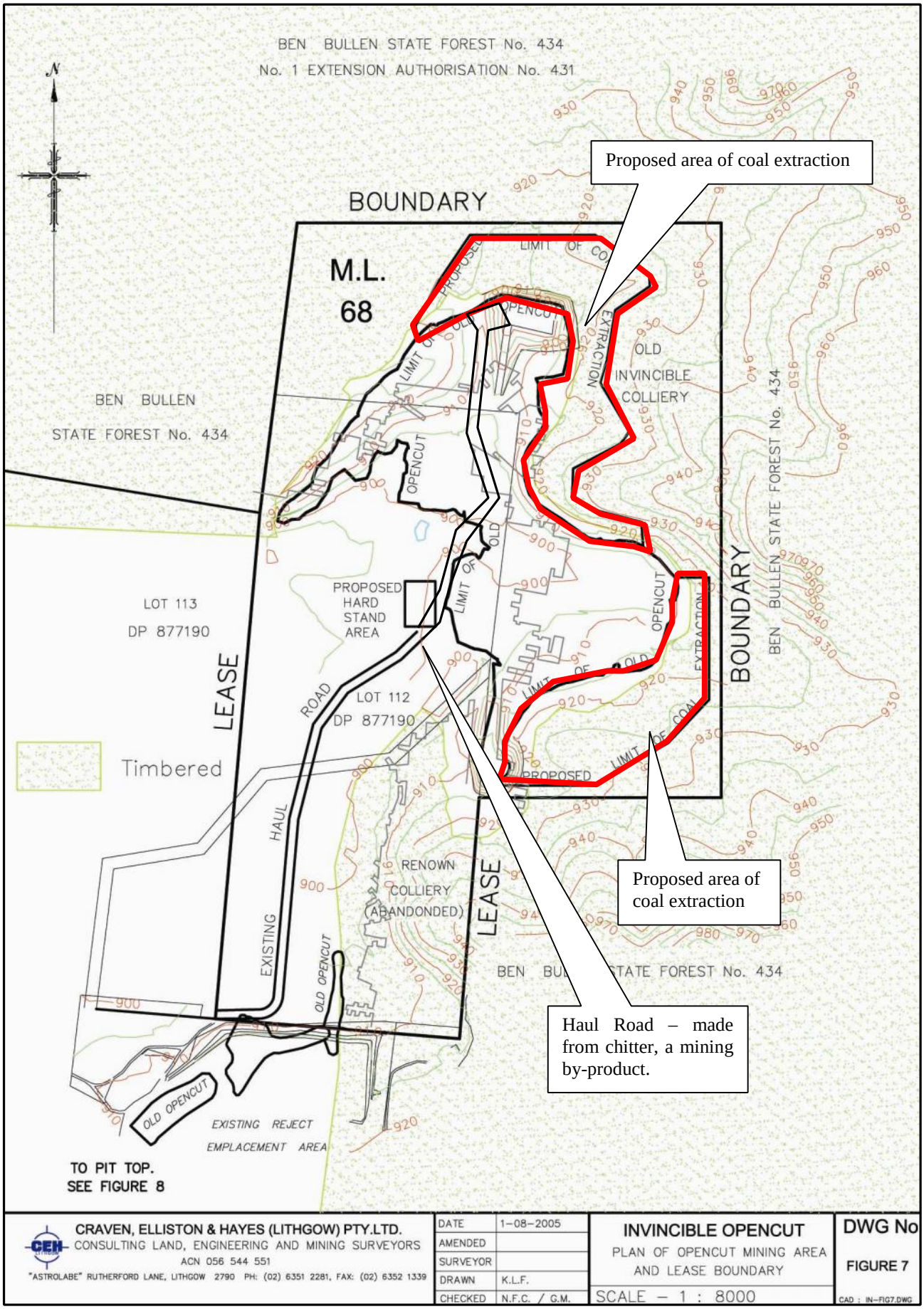


Figure 3: Plan of open cut mining area and lease boundary (Source: CE&H Pty Ltd Lithgow).



2. ABORIGINAL COMMUNITY INVOLVEMENT

The study area falls within the boundaries of the Bathurst Local Aboriginal Land Council (BLALC). One primary Native Title interest group in the area is the Wiradjuri (Ben Bullen) who in 1997 lodged claim NC97/9 over the study area. This claim has been discontinued and finalised[2] and an agreement with Coalpac was reached in 1998 (Appendix 5). Other groups or individuals within the region that may have an interest in the current study area could access information on this project through the BLALC.

Richard Peters (BLALC) took part in the field survey for the proposed Invincible open cut extension project on the 9th of February 2006. Mr. Peters had previously undertaken survey of the subject area during June 2005 and had undertaken investigations with an archaeologist in August 1997 for the original open cut and haul road. Discussions were held with the BLALC on-site regarding the findings of the field survey and the topics covered included a lack of recorded sites. The BLALC representatives concurred with OzArk EHM that the likelihood of finding a site on the moderately steep slopes within the study area was low.

Correspondence from the BLALC regarding the current and previous survey results can be found in Attachment 2. A record of all consultation with the BLALC was kept during the course of the project and is presented in Attachment 3.

3. THE STUDY AREA

The study area for the current heritage assessment is situated within the County of Roxburgh and Parish of Cullen Bullen. The study area lies wholly within the Lithgow City Council local government area (LGA) area, and is governed by the Local Environmental Plan (LEP) of 1994 on land zoned 1(f) forestry In this zone mining activities are permissible with consent (in this case, the Minister for Planning).

3.1 Topography, Hydrology and Climate

According to the DEC website (2005), the study area lies within the South Eastern Highlands Bioregion which covers the dissected ranges and plateau of the Great Dividing Range.

The subject land is situated on a south facing hill-slope decreasing in elevation from 925 m to 910 m meeting the former coal extraction area (Plate 1). The portion of the study area within the eastern extension can be described as moderately to steep sloped, with areas in the northern portion being gently sloped with discrete areas of moderate slope (Plates 2- 6).

Two small, ephemeral drainage lines traverse through the study area in a northeasterly and south easterly direction and drain into the former open cut (Plates 3 & 6).

[2] Native Title Tribunal website Feb 2006.

The Cullen Bullen area has a mild climate with a wet, late summer (average temperature is 16.5^{o} C with a maximum of 35.1^{o}) and cold, dry winters (average temperature 5.1^{o} C with a minimum of -9.4^{o}). Summers are the pronounced wet seasons, particularly from January to March, often accompanied by high intensity storms. Only intermittent rains are received during winter (Australian Bureau of Meteorology 2005).

3.2 Geology

The South Eastern Highlands Bioregion comprises part of the Lachlan fold belt that runs through the eastern states as a complex series of metamorphosed Ordovician to Devonian sandstones, shales and volcanic rocks intruded by numerous granite bodies and deformed by four episodes of folding, faulting and uplift. The general structural trend in this bioregion is north-south and the topography strongly reflects this.

More specifically, the study area is situated near the edge of the Permo-Triassic Sydney Basin, in an area known as the Western Coalfields. This is comprised of an extensive plateau of erosion resistant Triassic sandstone dissected by steep-sided valleys. There is a remnant surface layer of weathered sandstone and shales of the Narrabeen Group overlying a complex stratigraphic sequence including the Lidsdale and Lithgow Seams, which are both sub-groups of the Illawarra Coal Measures (Appleton 2004: 12).

No outcropping stone suitable for knapping was noted within the study area, nor were any sandstone overhangs, benches or exposures thought suitable for grooves or engravings.

3.3 Vegetation and Fauna

One vegetation unit has been identified within the study area with its description consistent with (Lembit 2002 and OzArk 2005a).

Hill Woodland, dominated by Broad-leaved Peppermint (*Eucalyptus dives*), Brittle Gum (*E. mannifera* ssp. *mannifera*), Red Stringybark (*E. macrorhynca*) and Western Scribbly Gum (*E. rossii*), is found on the mid-upper hill slopes. This community is less disturbed than Valley Woodland as it occurs on infertile soils unsuitable for agriculture. Tree height averages 15 m and other trees such as Snow Gum (*E. pauciflora*), Narrow-leaved Stringybark (*E. sparsifolia*) and Apple Box (*E. bridgesiana*) may occur within the community. There is a shrub layer of low to medium density and a ground layer vegetation of medium to high density.

Common shrub species include *Cassinia quinquefaria,* Native Cherry (*Exocarpos cupressiformis*), *Brachyloma daphnoides,* Mountain Holly (*Podolobium ilicifolium*), *Lissanthe strigosa, Acacia buxifolia, Daviesia leptophylla* and *Dillwynia phylicoides*.

Ground layer species include Kangaroo Grass (*Themeda australis*), Snow Grass (*Poa sieberiana* ssp. *sieberiana*), Plume Grass (*Dichelachne micrantha*), Forest Hedgehog Grass (*Echinopogon ovatus*), *Goodenia hederacea*, *Cheilanthes sieberi*, *Veronica plebeia*, and *Geranium solanderi*.

This community is relatively weed free due to a lower level of past disturbance and less fertile soils. Weed species present include St John's Wort (*Hypericum perforatum*) and Sweet Briar (*Rosa rubiginosa*).

Prior to European occupation the general area would have provided a rich resource base for animals including gliders, possums, macropods and bandicoots and a large variety of reptiles and amphibians. The wetlands and permanent creeks within close proximity (which do not occur within the study area) would have undergone inundation and seasonal movements of fauna would have supported a greater diversity and number of species, predominantly birds but including other species such as: swamp wallabies, grey kangaroos, rock wallabies, swamp rats, frogs and tortoise, as well as predator species such as the red bellied black snake and carpet python. A myriad of different migratory bird species would have also utilised these swamp areas and the flowering eucalypts present on site would have attracted nectar and insect feeding birds, including parrots and honey eaters and also a large number of species of bats. The BLALC and OzArk EHM believe that the current study area would have been more suited for hunting expeditions than camping locations.

3.4 Existing Levels of Disturbance

Figure 3 gives a fairly accurate macroscopic overview of site disturbance patterns. Treed hills are relatively undisturbed despite being subject to selective logging, vehicle access tracks, limited mineral exploration, mine subsidence and grazing from domestic stock. The footprint of the former open cut and other areas within the lease used for mining infrastructure has suffered extensive disturbance.

3.5 Effective Survey Coverage

Ground surface visibility across the majority of the study area was low (Table 1) hence, effective survey coverage was also low (c. 0.015 %).

The hill slopes were covered predominately by grasses and deep leaf litter. Vehicle access tracks, scapes in the earth and areas of erosion offered restricted to high ground surface visibility in limited areas (Plate 4). All mature trees of an age to possess cultural scarring were inspected.

Table 1: Estimated effective survey coverage of the proposed Invincible Extension Project during the OzArk EHM 2006 survey.

Land form	Dimensions	Exposure %	Visibility within exposures	Estimated effective coverage	Sites
Mid – upper hill slopes (north east and east of the former open cut)	c. 6 ha	1 % Tracks, erosion, old areas of disturbance	15 %	0.009 ha	0
Low slopes (north of the former open cut and haul road)	c. 4 ha	1% Tracks, erosion, old areas of disturbance	15 %	0.006 ha	0

Totals	***10 ha***			***0.015 ha***	**0**

4. ETHNOHISTORIC SOURCES OF PAST ABORIGINAL CULTURE

According to Tindale (1974), the current study area falls within the eastern limits of the lands occupied by the Wiradjuri tribe. However, due to the location of this area at the western base of the mountains it has often been referred to as zone of interaction between the Wiradjuri, the Dharug to the east and the Gundungurra to the south (Bowdler 1984).

Few archival sources are available which give any great detail regarding local Aboriginal culture at the time of contact or even soon after. The Lithgow area seems to have undergone little study by professional or amateur ethnologists and anthropologists despite its close proximity to Sydney.

A resident of nearby Lidsdale, Fay Hasler, has written notes based on oral histories of people in the area (reproduced in part in Kelton 2002: 12-13), which are held by the Lithgow and District Family Historical Society. The salient points derived from these notes are as follows:

- A large Aboriginal settlement is described as being located at Pipers Flat, with the burial ground being located at Lidsdale;
- The Pipers Flat Aborigines would regularly travel to Richmond to fight the local Aboriginals and bring back women to combat in-breeding;
- The tribes occupying the valleys in the area were wiped out by disease including measles and small pox;
- Stories of massacres of Aborigines by soldiers at Capertee and settlers at Marrangaroo were often spoken about by the elders, together with the poisoning of flour which killed women, children and men.

Interviews with Fay Hasler during March and May 1999 (Gay 1999) indicate that the burial ground at Lidsdale was located on the river flats either side of the current Coxs River alignment. It is noted that the colliery railway line was constructed through this area in the 1920's, and further disturbance would have affected this area during the Coxs River realignment in the 1950's (Gay 1999: 15).

Gay (1999: 16) also notes an historical reference to the burial of an Aboriginal Elder in the Wallerawang area. King Myall (Mylles) had worked for James Walker who had been granted land in the Wallerawang and Lidsdale districts during the 1820's. The burial site of King Myall was drawn and published in the Sydney Illustrated News in October 1880, showing a burial mound and carved trees. This may be part of the burial ground referred to by Fay Hasler (Gay 1999: 16).

5. ARCHAEOLOGICAL CONTEXT

5.1 Regional Context

Current understanding of the types of sites present or likely to be present, within the Coxs River valley and surrounding hill country remains sketchy. Data from excavated sites combined with information derived from surveys, points to a variable use of the valley, with some sites indicating ephemeral, casual or limited use, while other sites show more intensive or repeated use.

Sites within a c. 10 km radius of the study area will be considered in the following section (5.2 Local Context), while those from the general Coxs River valley and surrounds will be briefly reviewed here.

In 1992 a survey for the Springvale Colliery and conveyor (Rich and Gorman) recorded 35 sites situated in the Coxs River Valley. Site 2, located on the southern bank of Pipers Flat Creek, consisted of over 100 artefacts within a 200 x 40 m area. Two quartz knapping floors with artefact densities of over 25/m^2 were identified at Site 2 as were a smaller number of indurated mudstone artefacts. Site 9, located c. 700 m west of Duncan street, on elevated terrain above and on the west side of the Coxs River, was comprised of 26 artefacts, primarily quartz, with a maximum artefact density of 6/m^2. As a result of this study, Rich argues that the larger sites within her study area lie closest to the Coxs River and Pipers Flat Creek (Rich & Gorman 1992: 73).

Also in 1992, Haglund & Brayshaw undertook survey for the proposed Western Main colliery which was for the Lamberts Gully open cut mine (Haglund & Brayshaw 1992a). Six (6) Aboriginal sites were recorded as a result of this survey, predominantly located at the southern end of Lamberts Creek. Later that year test excavations were carried out at two PADs, one having been recorded during their Lamberts Gully survey (POS A), and the second being a PAD recorded by Rich and Gorman in 1992 (POS2). The latter site came to be known as Lamberts Creek 6 (#45-6-2355) and while POSA came to be known as Lamberts Creek 7 (#45-6-2354). Test excavation of these locations revealed them to be open sites although of a "one-off" nature, likely to date within the last 3,000 yrs due to the presence of a backed blade and bipolar knapping technology (Brayshaw 1993: 8).

Brayshaw (1993) undertook further survey for the Western Main colliery, although this extension was to the north of the previous study, being close to the Castlereagh Hwy. Three sites were recorded in this survey, all open camp sites, as the study area was situated within the Neubecks creek valley rather than in the more hilly country to the south. Brayshaw notes that the open sites identified were relatively small and sparse and were situated in positions elevated above swampy areas and creeks.

Lyell Dam, situated in the Coxs River catchment approximately 15 kms south of the current study area, was formed by damming the Coxs River. Three open sites located on the slopes of spurs overlooking the Coxs River floodplain were investigated here

in 1994, prior to raising the water level in the lake. All three sites were situated c. 400 m from the river margin (Gay 1999: 14).

At open site Lyell Dam 3 (LD3) a quartz block fractured knapping floor was found. Although the assemblage was dominated by quartz, other raw materials such as indurated mudstone (silicified tuff) and stone of volcanic origin was also present. In terms of surface manifestations of this site, the highest artefact density recorded was $3/m^2$, with most sample areas showing lower densities (Barton & McDonald 1995: 25). The excavated assemblage, however, was far larger, with estimated thousands of artefacts present at this location. Barton & McDonald (1995: 35) interpreted this site as being repeatedly occupied by people carrying out the same range of tasks.

Conclusions of the Lyell Dam site investigation project can be summarised as follows (from Barton & McDonald 1995: 67 as summarised in Gay 1999: 15):

- Cobbles of igneous, metamorphic and sedimentary rocks were procured locally, primarily from the bed of the Coxs River;
- Quartz was locally available and the ease with which it was procured eliminated the need to flake using the bipolar technique;
- Quartz was used to create medium sized flakes and some smaller retouched tools;
- Volcanic stone was used to create large or heavy tools; and
- All three sites were interpreted as representing repeated short-term occupation areas that focussed on acquiring resources such as specific plants or animals endemic to the swampy margins of the Coxs River.

As may be expected, research into the known archaeological sites in the region surrounding the current study area has shown that the majority of sites are located on landforms close to water sources. Most sites were small, containing low densities of artefacts, with only one large site present, being LD 3 situated in the Lyell Dam area. Quartz dominates the artefact assemblages that are characterised by the Core and Flake tradition (Gay 1999: 15).

Subsequent survey in the area by Rich (1988) and Silcox (1988) provided further evidence for the site occupation pattern noted previously by Rich, indicating that open sites are most frequent on elevated ground close to permanent water, such as the Coxs River. Again quartz was seen as the dominant raw material, in contrast to sites on the Newnes Plateau, which appear to have mudstone and chert dominated assemblages. The limited presence of cortex on some of the quartz artefacts led Rich to argue that artefacts may have been carried to these locations after primary/initial flaking elsewhere. The general quality of the quartz was reported as high, with few fracture plains.

In 1998 Mills undertook survey of the proposed Ivanhoe Stage 4 project c. 5 km south of the current study area. The survey identified six (6) open sites, two (2) isolated artefacts and eight (8) other areas of potential archaeological deposit. Mills concluded that the presence of high quality milky white quartz flakes and debitage at all sites recorded in the survey area may indicate that it was a procurement place for the raw material however, no source was located.

In 1999 and 2000, Kelton undertook surveys in the Wallerawang and Marrangaroo areas respectively. Of the seventeen sites recorded at Marrangaroo, the majority were rock shelter sites, as most of the study area was within the sandstone escarpment. Kelton notes that the location and nature of sites recorded conforms to the previously developed site prediction and distribution models outlined above (Kelton 2000: 101).

In 1999 a survey undertaken by Gay, indicated the possibility of an Aboriginal burial area being located close to the road alignment between Duncan Street and the coal conveyor. Oral history from a local informant provided primary data for the location of the burial ground and test excavations of this general area were undertaken in 1993 (McIntyre as reported in Gay 1999: 17). During this work two areas were tested, and although no skeletal remains were uncovered, a minor open site was identified on the west side of the railway line (AHIMS # 45-1-237), where stone tools were said to have been manufactured or repaired.

McIntyre concluded that the reported burial ground may have been destroyed during the Coxs River deviation works in the 1950's, although there is still the possibility that skeletal material may occur east of the railway and river. She further notes that the presence of artefacts within the level ground adjacent to the river indicates the potential this landscape unit has for the occurrence of Aboriginal sites (McIntyre as reported in Gay 1999: 16-17).

In 1999 and 2000, two surveys by Gay were undertaken in the face of the proposed Castlereagh Highway deviation at Lidsdale. One open site and two PADs were identified and test excavation of the latter two was recommended. Subsequently, large scale test and salvage excavations were carried out at these sites, located on a crest above the Coxs River (OzArk 2004a). Part of the site revealed deep soils with evidence for cultural stratification. Sediment samples were dated using the OSL technique providing determinations of 7, 400 $\pm$700 BP at 30 cm depth and 13, 500 $\pm$1, 000 BP at 45 cm depth. While these sediment samples may not directly date the lithic assemblage, they do give an indication of potential age range, particularly the presence of a pre-Bondaian assemblage in the deepest spits. This interpretation is supported by an absence of Bondaian technical features within the lithic assemblage from spits 3 and 4.

The assemblage from the lower spits lacked backed artefacts and evidence of asymmetric alternating flaking and no flakes with faceted platforms were recovered. This Pre-Bondaian assemblage is dominated by quartz, and has higher frequencies of quartzite and igneous artefacts than the more recent assemblage and average artefact weight is higher than in the upper spits. The assemblage from spits 1 and 2 both include backed artefacts, some cores show asymmetric alternating platforms and some

flakes have faceted platforms. Both upper spit assemblages are dominated by quartz, but siliceous tuff / FGS is more frequent in spit 1 than in spit 2. A few bipolar artefacts occur in spit 2. A piece of utilised pigment was also found in spit 2. Average artefact weight is lowest in spit 1 (Table 3).

Table 2: Summary of the assemblage from Lidsdale open site, Area I

Age BP	Spits	Total artefacts	% Quartz	% S.Tuff	Mean weight Quartz	Mean weight S.Tuff	% Backed artefacts	% Cores	% Bipolar artefacts
	1	559	*71.4*	*26.1*	1.2g	1.2g	*2.1*	*0.6*	
7,400±700 before 2000AD (K-0032) (ANU_{OD}1591)	2	642	*84.6*	*12.8*	1.6g	2.4g	*1.9*	*1.1*	*0.6*
13,500±1000 before 2000AD (K-0033) (ANU_{OD}1592)	3+4	284	*79.9*	*11.6*	2.9g	3.9g		*1.4*	

(Assemblage data from White 2004; sediments dated using OSL, reported in OzArk CHM 2004)

5.2 Local Context

A search of the DEC AHIMS database (search date 7.2.06) shows the presence of 46 recorded sites within a 20 x 20 km square area centred on the current study area and all but one of these occur within a 10 x 10 km area centred on the current study area. Table 3 provides a breakdown of site types. The most frequent site type recorded in the vicinity of the current study area is the small open camp site, which is most often found on level, well drained terrain close to permanent water. Artefacts on these sites usually number less than 50, although it was noted by Silcox (1988 as reported in Gay 1999: 13) that site size appears to be greatly affected by ground surface visibility conditions at the time of recording. The next most prevalent site type is rock shelters with art and/or deposit. Although there is potential for these sites to occur in close proximity to the current study area – i.e. to the east along the escarpments associated with the Great Dividing Range. No appropriate outcrops or overhangs of sandstone were noted during the current survey.

Table 3: Number, type and percentage frequency of sites within a 20 x 20 km^2 including the Invincible study area.

Site Type	Total	*%Frequency*
Open Camp Site	30	*65.21*
Shelter with Deposit	5	*10.86*
Scar tree	1	*2.17*
Shelter with Art	2	*4.34*
Open Camp Site with PAD	5	*10.86*
Isolated Finds	2	*4.34*
Stone Arrangement	1	*2.17*
Totals	***46***	***100***

A stone arrangement was recorded to the east in Ben Bullen State Forest, and a couple of isolated finds have also been recorded. The paucity of scarred trees within the AHIMS database is likely to be the result of the intensive clearing for the purposes of settlement.

Two sites on the AHIMS database (# 45-1-007 & # 45-1-0069) are shown as situated within the Invincible Mine area c. 2.5 km south of the current study area. These are both open camp sites recorded in 1982 by Haglund, however, no associated report for these recordings was located. These sites are plotted in on Figure 2 and occur on relatively flat land (the valley floor) at the confluence of three drainage lines adjacent to the southern most pits within the Invincible property. No permits have been issued for their legal destruction and therefore we assume that they remain intact.

Brayshaw & Haglund (1992) surveyed an easement linking Mt Piper Power Station with Angus Place Colliery. This study recorded two open camp sites and one isolated find. During his 2002 study for the Boulder project, Kelton attempted to relocate these sites and was unsuccessful, concluding that site # 45-2-0217 must have been destroyed during the construction of the transmission line easement immediately south of the haul road (Kelton 2002: 32). Site # 45-2-0216, however, although not relocated by Kelton, was subsequently relocated by OzArk EHM during their 2004 survey in the face of the proposed Neubecks Open Cut Coal Mine (OzArk 2004).

Silcox (1997) undertook archaeological survey within the current mining lease area for the original Invincible ML 68 open cut coal mine and haulage road. No sites were detected within the study area. A copy of the BLALC letter of results for this assessment has been attached in Appendix 2.

To the southeast of the Invincible study area, Kelton (2002) undertook survey of a c. 50 ha area for the proposed Boulder Road coal mine, which has now been incorporated into the proposal for the Neubecks Open Cut Coal Mine. During this survey, Kelton identified one isolated find (BP-IF1 - # 45-1-2582), apparently situated on a high flat spur overlooking the tributary into Neubecks Creek, and one open camp site (BP-OS1 - # 45-1-2581) containing seven recorded artefacts in a disturbed context next to the transmission line easement immediately east of the Castlereagh Hwy.

In 2003 further survey was undertaken (Appleton 2004) in the face of proposed coal mining at Pine Dale Coal Mine, immediately north of Enhance Place coal mine, c. 6 kms SE of the current study area. This study recorded one isolated find – WC1A (a silicified metasedimentary flake).

OzArk (2004b) undertook survey for the proposed Neubecks open cut coal mine. This survey was carried out over the Neubecks valley, on the property between Pinedale and Boulder. The Indigenous heritage component of the study recorded five (5) Indigenous sites. Two were open camp sites with Potential Archaeological Deposit – PAD, a further two were small open camp sites and the last is an isolated find. Both open camp sites with PAD were recorded on knolls / elevated spurs while the remaining sites were located on the colluvial / alluvial terraces adjacent to Neubecks Creek.

OzArk (2005 a & b) undertook a survey within ML 1448 Lamberts Gully and recorded one open camp site with potential archaeological deposit (SVW-OS1 with PAD). This site was located adjacent to an ephemeral drainage line on flat ground at

the base of the surrounding hills. Previous studies undertaken within the same study area (Rich and Gorman 1992, Rich 1993a and 1993b and Brayshaw 1993) identified eight Aboriginal sites. Of these three Aboriginal open camp sites # 45-1-0218, # 45-1-0208 and an isolated find IF2 (not registered on the DEC AHIMS) remain intact within ML 1448. Two of the sites (open camp site # 45-1-0208 and IF2) were not relocatable.

OzArk (2005c) undertook archaeological assessment within the North Ivanhoe rehabilitation project which is located on the neighbouring property on the western side of the Castlereagh Highway. The survey assessed 23 ha of land over the site of the proposed Ivanhoe North Rehabilitation Project and recorded no Indigenous sites. The degree of slope was assessed as generally unsuitable for camping locations and would have more likely been used for resource gathering.

5.3 Predictive Model for Site Location

Predictive modelling aims to establish a theoretical model for site location / distribution within a given area. This model provides a comparative situation against which the results of the investigation can be discussed, taking into account the affects of post formation processes, such as visibility, land use etc.

Proximity to a permanent water supply is generally considered the primary factor determining the location of Aboriginal camp sites. In the Sydney region, stream ordering has been used to predict the potential for site occurrence, and further to indicate the possible nature of these sites in terms of their complexity. Results of an integrated series of studies including a serious excavation component (Jo McDonald CHM 1997), suggests a high correlation between the permanence of a water source and the permanence and/or complexity of the areas' Aboriginal occupation. This was further reflected in the lithic assemblages from sites close to permanent water, which suggested that a greater range of activities were represented (e.g. tool use, manufacture and maintenance, food processing and quarrying). Sites near ephemeral water sources had evidence for one-off occupation (e.g. isolated knapping floors or tool discard), and creek junctions were also proven to be foci for site activity.

Using the concept of stream ordering, previous research within the general area (Section 5.1) and the knowledge gained from a review of the local context in Section 5.2, the following general predictions can be made regarding the nature of sites and their location in the current study area:

- On major creeklines and rivers archaeological evidence will tend to indicate more permanent or repeated occupation. Sites may be complex, with a range of lithic activities represented, and may even be stratified. Proximity to resource rich zones also indicates a higher likelihood of the presence of complex occupation sites.

    - There are no significant waterways within the current study area.

- Further from permanent water, sites are likely to be smaller, less complex and more likely to be the result of one-off occupation episodes.

  - The current study area is situated on mid-high slopes quite distant from permanent water.

From the known sites outlined previously in Section 5.2, and the landform potential as detailed above, it is possible to say that the most likely sites to be encountered in the Invincible study area are:

- Scarred trees (frequently close to creeks and rivers but also found further afield). Few mature trees of an age to bear cultural scars remain in the study area, although some may occur upslope of the former open cut;

- Open camp sites (on elevated terraces and low spurs close to water). Due to the ephemeral nature of the water courses within the study area and the significant slope of the landform, such sites are unlikely, but if present may be the result of one-off occupation episodes;

- Natural mythological or cultural / ceremonial sites may occur anywhere, although are less likely on significant slopes;

- Isolated finds may occur anywhere, especially in disturbed locations near water sources or in areas close to ephemeral water – i.e. headwaters.

For the purposes of the current study site type definitions can be found in Appendix 4.

5.4 Survey Methodology

The Invincible study area was traversed using pedestrian transects with the surveyors no more than 10 - 15 m apart. All areas of significant ground surface visibility were surveyed and all mature trees that were of an age to possess cultural scars were inspected. In general, surveyors did not continue beyond the designated buffer boundary (Figure 3) as impacts are unlikely beyond this. Pink and blue flagging tape provided by the representative of the Proponent was used to identify the limits of the study area.

5.5 Survey Results

The Indigenous heritage survey of the current study area recorded no Indigenous sites.

5.6 Discussion

The current study area is comprised of only one landform unit:

- Moderate to gentle hill slopes

Within the region, overlaying site locations with the general landform unit divisions shows most open sites are situated on or close to the valley floor and the gentle slopes of the adjacent terraces, spurs and knolls. They are generally located close to drainage lines and the majority appear to be small camp sites / one-off activity sites predominantly characterised by quartz artefacts. Shelters are obviously only recorded where suitable overhangs are present.

The drainage features within the study area are unlikely to have provided even a semi-permanent water supply and the study area did not possess outcropping sandstone boulders. Prior to the original open cut some areas on the more gentle slopes or the spur may have been suitable for one-off camping, but no artefacts were noted in previous surveys despite the limited visibility afforded by the various types of disturbance.

As noted in the predictive model outlined in Section 5.3, hill-slopes with no discernible raw materials or resources, and situated at a distance from water are unlikely to bear evidence of past Aboriginal occupation, a prediction borne out by the results of this study.

5.6.1 Aboriginal Site Assessment

The appropriate management of cultural heritage items is usually determined on the basis of their assessed significance as well as the likely impacts of any proposed developments. Scientific, cultural and public significance are currently identified as baseline elements of this assessment, and it is through the combination of these elements that the overall cultural heritage values of a site, place or area are resolved.

As no Aboriginal sites were recorded within the current study area the remainder of this section has been omitted from this report.

5.6.2 Likely Impacts of the Invincible Extension Project

The proposed Invincible Open Cut Extension Project will see extensive ground surface disturbance over the majority of the study area, as delineated in Figure 3. Impacts to vegetation and overburden will occur resulting in total remodification of the landscape. As no Indigenous sites were recorded, there will be no impacts to heritage as a result of this project.

5.6.3 Relevant Legislation

Base line principles for the conservation of heritage places and relics can be found in the Burra Charter[3], which recognizes that there are places worth keeping because they can enrich our lives on many levels. The significance of such places may be embodied

[3] The Burra Charter defines the basic principles and procedures to be followed in the conservation of all kinds of places such as monuments, buildings, Aboriginal sites, roads, archaeological sites, whole districts or even regions. It was first adopted in 1979, based on the Australian ICOMOS (International Council on Monuments and Sites) review (1977) of the 1966 Venice Charter (Australian ICOMOS Inc. 1998).

in fabric (physical material), environmental setting, contents, use or its meaning to people, and should be assessed through methodical data collection. Since its adoption in 1979, The Burra Charter has become the standard of best practice in the conservation of heritage places in Australia, and heritage organisations and local government authorities have incorporated the inherent principles and logic into guidelines and other conservation planning documents. The Burra Charter generally advocates a cautious approach to changing places of heritage significance. This conservative notion embodies the basic premise behind legislation designed to protect our heritage, which operates primarily at a State level.

A number of Acts of parliament provide for the protection of Aboriginal heritage at various levels of government[4]. The three most important statutes in New South Wales are:

- *The Environmental Planning and Assessment Act (EP & A Act) 1979*
- *The National Parks and Wildlife Act 1974*
- *The Heritage Act 1977*

The Environmental Planning and Assessment Act 1979 requires that environmental impacts, including cultural heritage, are considered at a land-use planning and decision making level.

Under this Act Aboriginal heritage is protected in three different ways:

1. Through planning instruments such as Regional Environmental Plans (REP's) and Local Environmental Plans (LEP's). Such plans outline permissible land use as well as identifying potential constraints. S111 of the EP & A Act delineates that determining authorities must examine and take into account to the fullest extent possible all matters affecting or likely to affect the environment by reason of that activity.

2. S228 of the EP&A Regulation (2000) lists impacts to the environmental resource, including cultural heritage, which must be considered before development approval is granted.

3. All State Government agencies acting as determining authorities on environmental issues must consider a range of community and cultural factors, including Aboriginal heritage, in their decision-making process. The factors to be considered in such assessments are set out in the EP & A Regulations (1980), Part VII.

[4] NSW Heritage Office 1998: Living with Aboriginal Culture, p. 3

The National Parks and Wildlife Act 1974 (as amended; particularly sections 83-91A) provides statutory protection for all Aboriginal relics and places, regardless of significance, land tenure or whether they have been previously recorded in the DEC Aboriginal Sites Register. Areas may be gazetted as Aboriginal 'places' when the Minister is satisfied that sufficient evidence exists to demonstrate that the area is or was of special significance to Aboriginal people.

Under this Act it is an offence to knowingly damage, deface or cause or permit the destruction of an Aboriginal relic or place without the prior written consent of the Director-general of the NSW DEC. Prosecution for such offences may include the imposition of financial penalties and/or imprisonment. Reporting the discovery of previously unknown Aboriginal sites to the DEC within a reasonable time of discovery is also obligatory.

The Heritage Act 1977 (as amended) protects the State's natural and cultural heritage and contains measures to protect archaeological remains. Generally, Aboriginal sites are protected by the NP&W Act, but if certain sites are deemed as having great significance, they can be further protected by a heritage order, issued by the Minister, on the advice of the Heritage Council.

6. RECOMMENDATIONS

6.1 Indigenous heritage

Under Section 91 of the NP & W Act (1974 as amended) it is mandatory that all Aboriginal sites recorded under any auspices be registered with the NSW DEC Aboriginal Heritage Information and Management System (AHIMS). As a professional in the field of cultural heritage management it is the responsibility of OzArk EHM to ensure this process is undertaken. To this end it is noted that no sites were recorded or previously recorded within the study area.

The following recommendations are made on the basis of:

- Legal requirements under the terms of the *National Parks and Wildlife Act of 1974* (as amended) whereby it is illegal to damage, deface or destroy an Aboriginal relic/object without the prior written consent of the Director, DEC;

- The findings of the current investigations undertaken within the study area; and,

- The interests of the Bathurst Local Aboriginal Land Council, and the Indigenous community.

It is recommended that:

1) No sites were recorded within the Invincible Open Cut Extension Project study area and consequently there are no constraints to the proposed development on

the grounds of cultural heritage.

2) Should any 'Aboriginal objects' or other Indigenous sites be identified elsewhere within the study area during the course of the mining or rehabilitation activities, work in that area should immediately cease and a DEC Archaeologist and the Bathurst LALC be contacted to discuss how to proceed;

3) One copy of this report should be sent to:

Mr Warwick Peckham
Coordinator Bathurst Local Aboriginal Lands Council
PO Box 1500
Bathurst NSW 2795

Manager, Western Aboriginal Heritage Unit
Cultural Heritage Division,
NSW DEC
PO Box 2111
Dubbo, NSW, 2830.

NB: This final recommendation has been undertaken by OzArk EHM P/L on behalf of the client.

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