

4 THE ARCHAEOLOGICAL RECORD

The result of the search of the Aboriginal Sites Register (Aboriginal Heritage Information Management System – AHIMS) for all sites within the references Eastings 768000-784000, Northings 6612000-6628000 resulted in a listing of only one site in the 256km² search area. The site, Site #19-3-0010 was recorded as scarred tree, “Laluba: Bunda Wallah Waterhole”. However, the site is nearly four kilometres to the north of the Panels 1 to 7 Survey Area. Details of the search are included as **Appendix vii**.

Earlier, reference was made to the archaeological investigation for the Pit Top Area (AASC, 2007) which reported that seven archaeological sites had been recorded (including a Wild Orange Tree of no known direct cultural association). Unfortunately none of those sites appear on the AHIMS Site Register, however, the locations of the sites are shown in **Figure 6**. Of the six (non-resource) archaeological sites, two were isolated artefacts (one of which was described as containing three flakes), there were two scarred trees, and two artefact scatters, one of “12 flakes”, and the other of “>10 artefacts ... including flakes and cores”. None of the seven identified sites have been disturbed with specific site measures provided for within the Aboriginal Cultural Heritage Management Plan (ACHMP) developed by NCOPL in consultation with Narrabri LALC and Gomeroi.

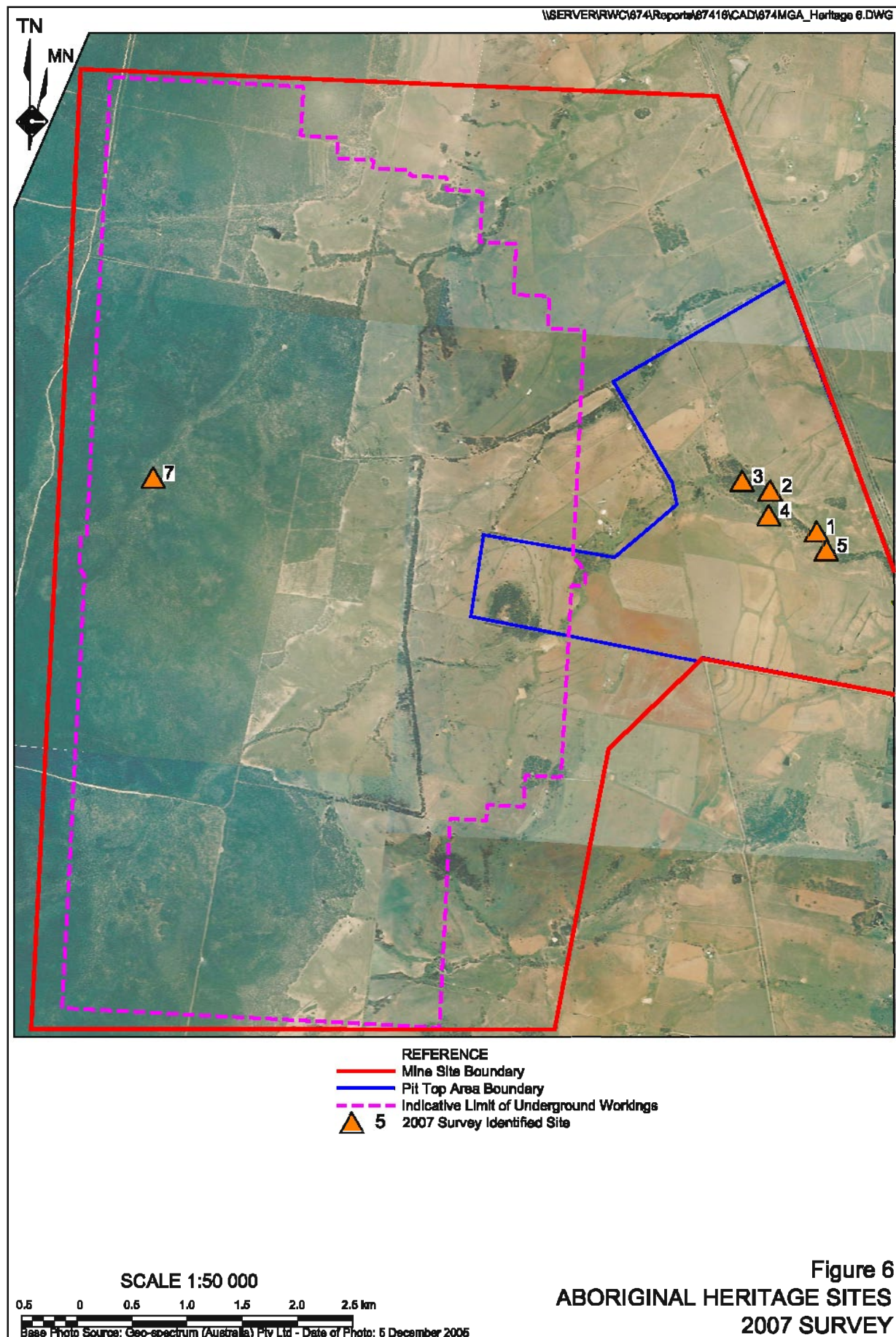
The generally low count of sites within the AHIMS search area should not be interpreted as representing the frequency or distribution of sites in the area. Apart from the sites recorded in the late 1970s, sites are usually only found and recorded during investigations for proposed developments, and as there have been no new developments in the search area since before the 1970s no sites have been found.

Also, unfortunately, many of the site references on the AHIMS Site Register are inaccurate. Since the first sites were recorded on the Sites Register in 1974, the computer programme written for the site register has been rewritten and/or upgraded at least three times, and each time the data was re-entered into the system there were errors, both in site names and in map references.

Also during that time, there were considerable changes to the maps available to field workers, firstly from 1:63,360 (inch) scale (Imperial) military topographic maps, to 1:250,000 military topographic maps (printed in 1942), and then to 1:250,000 scale topographic maps (printed at various times), and then to 1:100,000 and 1:50,000 scale Topographic maps (printed in 1983), and then more recently to 1:25,000 scale maps (printed in 2001). It is recognised the only maps available for the “Baan Baa” area are 1:50,000 scale maps printed in 1985³.

Archaeologists have used various strategies to locate sites on maps, from compass and line-of-site, to sight referencing to topographic features, to using hand-held or vehicle-mounted Global Positioning Systems of varying degrees of accuracy. The current (2001) Topographic Map Series warns that “Satellite (GPS) derived values may be in error by up to 20 metres”, but during the late 1980s and 1990s the satellite signals were deliberately ‘warped’ by the American controllers, to avoid the use of the satellites by enemy forces, and GPS readings during that period were out by as much as 200m. While there were computer programmes that could correct the warped references very few people went to the trouble to correct them.

³ As the only maps available for the Baan Baa area were drawn to AGD 66 format all GPS readings taken during the current investigation were recorded as AGD 66 references, however, NCOPL provided aerial photographs to assist in the survey that were gridded to GDA 94 format. Consequently it was necessary to provide a conversion table converting the AGD 66 readings to GDA 94 references to enable the mine to accurately plot the locations of the sites on its working plans. When Site Recording Forms for the sites are lodged with DECC to list them on the AHIMS Site Register they will show the AGD 66 references to enable other researchers to plot the sites onto the current Topographic maps, but a copy of the converted reference will be attached to the forms for the benefit of other users. A copy of the map reference conversion table is included as **Appendix vii**.



5 MODELS FOR SITE LOCATION

5.1 Site Types and Location

In order to design an investigative strategy, it is firstly necessary to develop a predictive model for site location. This is not to determine where the investigation should be conducted, but to establish a theoretical model for the distribution of archaeological material against which the effectiveness and subsequent analysis of the survey results can be tested, compared and reasoned. The basis upon which the predictive model is derived must, however, be one of consideration of which archaeological material might realistically be expected to not only be present, but also detectable.

The first objective of any archaeological investigation must be to observe and record sufficient of the archaeological record that is present to be able to propose that it is representative of the record as a whole. The investigative strategy is therefore directed and designed to detect that which is representative of the record in the particular study area, and naturally, as different study areas will comprise variations in environment, vegetation, topography, etc., so the investigative strategy must be designed to best suit the circumstances. The objective must be to detect material evidence, and so it is necessary to consider the extent to which artefactual material may be present, and the degree to which it is visible or might be discovered.

There are several factors, which are likely to affect, firstly, where Aboriginal people are most likely to have been, secondly, where they have left evidence of their activities, and thirdly, the degree to which that evidence is observable in the present record.

People visited places mainly to obtain resources, and in general places that were richest in resources were more likely to have been visited by people than those places with fewer resources. Important resources were permanent water, ephemeral water, food resources, stone raw material sources, shelter (from sun, wind, and rain), and perhaps suitable surfaces for rock art, and proximity to mythological natural features. Those resources may have been a factor in the suitability of a location for particular ceremonial activities but cultural boundaries also influenced the choice of ceremonial grounds. Alternatively, sites frequently occurred along preferred access routes and particularly where that route coincided with a watercourse.

However, the attractions of such an environment frequently resulted in the archaeological record becoming discontinuous or significantly disturbed, as stock and vehicles impacted upon it in the post-European contact phase.

Frequency of visits and use of particular locations was also determined by the 'accessibility' or freedom from environmental constraints in the area. For example, whether there were alternative, preferred or easier ways to travel around or over natural barriers, be they geological, geographical, cultural, or imposed by fauna or flora, or whether they were only seasonally accessible, such as mounds on flood terraces, or the availability of water during periods of drought, or whether or not floods, fire or snow hindered access.

Few past Aboriginal activities are represented by surviving material evidence. This in part is because many activities did not leave material evidence (eg. tools were reused), but it is also because very little cultural material survived. An exception to this was shellfish, which was very durable.

The survival of material that is durable was also affected by recent European land use. Cultivation has destroyed many archaeological sites. However, cultivation can also help expose sites that might otherwise be covered. This brings us to the other important point about site distribution, which is that to a great extent site distribution recorded by archaeologists reflects the distribution of places where the ground surface is sufficiently eroded to expose artefactual material.

By far, the majority of recorded sites have been stone artefact scatters or isolated stone artefacts, and in the vast majority of sites they were found in one or more of the following contexts:

- i) On or adjacent to deposits containing quartz, quartzite, jasper, silcrete, chert, chalcedony, metamorphosed greywacke, and other indurated or siliceous sedimentary rocks, or redeposited fine-grained volcanics, or
- ii) On river banks or adjacent to river banks where the watercourse contains river pebbles of quartz, quartzite, jasper, silcrete, chert, fine-grained volcanics, basalts, etc., and particularly at the junctions of watercourses, or
- iii) On ridges and spurs overlooking watercourses or on high vantage points affording uninterrupted views of swamps, water holes, saddles, passes, and any other likely access path into the observer's area, or
- iv) In the vicinity of outcrops of suitable raw material such as basalt, silcrete, chert, or other highly silicified sedimentary rock.

Other site types do occur and perhaps because of their lower and less predictable profile, are present in far greater numbers than we are aware of. People die but there are few recorded burials. One reason may be that in many instances the soils are too acid for the preservation of bone, but a far more likely reason is simply that burial frequently entailed subsurface internment, and a surface survey will only discover a burial where there has been erosion of significant disturbance to the surface deposits. As a consequence many burials have only been discovered when exposed by erosion of a sand body or river terrace.

Other site types such as carved trees, scarred trees, stone arrangements, Bora rings, etc., may once have been present, but are unlikely to have survived in easily accessible country from the attention of non-indigenous people. Thus, much of what might have existed is now lost or destroyed, and the archaeological record has become biased by the post-contact utilisation of resources, and by the selective exploitation and preservation of particular environments.

Other factors which affect the degree to which sites are recorded during an investigation include the time of year at which the fieldwork is performed (the seasonality of some vegetation growth) and the conditions under which the survey is performed – (wet, dry, cold, windy, poor light, etc.).

A brief description of site types such as isolated artefacts, open scatters, camp sites, knapping floors, quarries, middens, mounds, hearths, carved trees, scarred trees, stone arrangements, Bora rings, burials, engravings, paintings, grinding grooves, occupation deposits (and Potential Archaeological Deposits(PAD)), and ceremonial and mythological sites is included as **Appendix viii**.

5.2 A Predictive Model for the Survey Areas

Based on all of the above, the following model for site distribution was proposed for the Panels 1 to 7 Survey Area, in which there was no reliable water source, few exposures of sandstone bedrock, and no rock overhangs, and which in the absence of both water and shelter, there were unlikely to be any places where PADs were likely to occur.

- Isolated artefacts may be present and visible in erosion features.
- Low-density artefact scatters may be present and visible in erosion features, but it is unlikely that any debitage will be visible
- There is a potential for trees more than 150 years old to exhibit scarred surfaces
- There is a potential for any trees more than 150 years old to exhibit carved surfaces
- There are unlikely to be any engravings, and/or grinding grooves.
- There are unlikely to be any PADs.
- In the absence of shelters or overhangs there is no potential for shelters to exist and therefore no potential for art sites, and therefore no potential for undisturbed occupation deposits.
- There will be no Aboriginal stone quarries.
- There will be no shell middens
- There will be no visible evidence of burials
- There will be no surviving Bora rings
- There will be no stone arrangements
- There are no known cultural associations with the area.

6 THE SURVEYS

6.1 The Survey Strategies

6.1.1 Panels 1 to 7 Survey Area

Having studied the topographic map and the aerial photograph, it was determined that the objectives of the investigation were to undertake as full and as comprehensive a survey as possible. There was easy access to all parts of the area that were to be surveyed, and so the only constraints to an effective survey would be any constraint the groundcover would be to archaeological visibility.

The investigators walked the Panels 1 to 7 Survey Area, three-abreast, thereby covering a corridor of up to 50m wide. **Figures 4** and **5** identify the area of the Panels 1 to 7 Survey Area covered by this pedestrian survey. Some areas where regrowth and grass groundcover were a constraint to archaeological visibility, were not surveyed, but close attention was paid to all creek banks, erosion features, tracks, gateways, dam walls and animal pads. In addition, all large-girth trees were examined for scars and scarring.

6.1.2 Panels 8 to 26 Survey

In order that a more definitive statement could be made regarding the likely site numbers and distribution within the Mining Area over Panels 8 to 26, a field 'reconnaissance' survey was undertaken targeting those places in which it was predicted from the results of the survey of the Panels 1 to 7 Survey Area, sites were most likely to occur. **Figures 4 and 5** identify the area of the Panels 1 to 7 Survey Area covered by this pedestrian survey. As the Panels 8 to 26 Survey Area is unlikely to be disturbed for at least seven years, it is probable that many of the sites recorded on aggrading surfaces will have been covered, and different sites will become exposed on degrading surfaces in the meantime. The survey was undertaken, therefore, not for the purpose of recording every site there might be in the area, but to provide a firmer basis on which to assess the cumulative impact of salvaging sites in the Panels 1 to 7 Survey Area.

The areas that were surveyed for the reconnaissance were along the banks of Kurrajong Creek and its tributaries, and in some instances, the slopes immediately above the creek lines. Only a brief survey was made of Pine Creek and its tributaries in the Pilliga Forest area within the Mining Area over Panels 8 to 12. The forest extends over the Mining Area above Panels 8 to 17, and comprises over 60% of the total Mining Area above Panels 8 to 26. Based on this survey effort, less than 5% of the Pilliga Forest area was surveyed. However, from the brief survey that was made in the Pilliga Forest it was clear that although there were numerous areas in which there was no groundcover, the fine-grained sandy deposits concealed any artefactual material that might have been present. No sandstone bedrock was observed in the creek lines that might have been used for sharpening axes.

The survey team also examined the central knoll (above Panel 17) in the Pilliga and found that the knoll of weathering sandstone bedrock contained no overhangs or surfaces suitable for engraving or for use as a grinding surface. This was a similar finding to that predicted after seeing several other knolls during a familiarisation drive around the property on the first day of the survey of Panels 1 to 7 Survey Area.

6.1.3 Brine Storage Area Survey

The Brine Storage Area Survey was a relatively small area and with easy access. So the survey strategy was to walk the entire area (see **Figures 4 and 5**), targeting any ground surface exposures and in particular the rim of the basin – elevated areas overlooking flood plains are often found to contain Indigenous sites, and in walking between these places, walking through connecting areas of poor archaeological visibility.

6.1.4 Water Pipeline Survey Area

At the time of the investigation it had not been determined whether the water pipeline route would utilise the road easement between the mine and the railway crossing point, or whether in order to avoid impacting upon the roadside vegetation, to use the railway maintenance track. Therefore, both were surveyed.

Beyond Turrawan the investigators inspected the banks to either side of the road to the point where there was no ground surface visibility, which corresponded with the descent of the road to the river floodplain. However the road easement across the floodplain contained a number of trees with scars. These were closely examined, and two were found to exhibit surveyors' stamped letters and numerals, but none were identified as being of Indigenous origin.

6.2 Details of the Survey

6.2.1 Panels 1 to 7 Survey

The field survey was undertaken by Appleton (ASR), assisted by Kristie Toomey, Sites Officer, Narrabri LALC, and Mick Trindall, Sites Officer, Gomerioi. The survey took five days, or over approximately 135 person-hours, on 30th and 31st March, 1st, 7th and 8th of April 2009.

The survey was made on foot, in dry conditions, in light ideal for observing any artefactual material present and observable. All of the areas shown shaded in yellow in **Figure 4** were surveyed on foot.

6.2.2 Panels 8 to 26 Survey

The reconnaissance field survey was undertaken by Appleton (ASR), assisted by Matt Trindall and Tahnesha Trindall (on different days), Sites Officers, Narrabri LALC, and Patrick Sevil and Mick Trindall, Sites Officers, Gomerioi. The survey took seven days, from 6th to 10th and 13th and 14th July.

The survey was made on foot, with a vehicle used to move from locations of higher archaeological potential, in dry conditions, in light ideal for observing any artefactual material present and observable. All of the areas shown shaded in yellow in **Figure 4** were surveyed on foot.

6.2.3 Brine Storage Area Survey

The field survey was undertaken by Appleton (ASR), assisted by Matt Trindall, Sites Officer, Narrabri LALC, and Patrick Sevil and Mick Trindall, Sites Officers, Gomerioi. The survey took place on 29 July 2009.

The survey was made on foot, in light ideal for observing any artefactual material present and observable. All of the areas shown shaded in yellow in **Figure 4** were surveyed on foot.

6.2.4 Water Pipeline Route Survey

The field survey was undertaken by Appleton (ASR), assisted by Matt Trindall, Sites Officer, Narrabri LALC, and Patrick Sevil and Mick Trindall, Sites Officers, Gomerioi. The survey took place on 30th July 2009.

The survey along the road easement and railway maintenance track to the railway crossing point was made on foot. From Turrawan to the junction opposite the “Broadwater” turn-off the investigators travelled by vehicle, frequently stopping to inspect erosion features and mature trees wherever they occurred. From the road to Namoi River the investigators travelled on foot. The light on the day was ideal for observing any artefactual material present and observable.

6.3 Site Recording

All relevant observations as to the topography, vegetation cover, and conditions, were recorded in a field-log, and photographs taken with an Olympus Camedia SP-510UZ Zoom Digital Camera, to record the character of the survey area, and to witness survey conditions.

All sites were recorded using a hand-held Garmin etrex GPS (Global Positioning System). Following each day's fieldwork the sites were plotted onto the gridded aerial photograph to check the accuracy of the conversion of the map references from AGD 66 to GDA 94. Only one inconsistency occurred and that was the Easting for Site 20 (see **Figure 7**), which appeared to be approximately 30m out. However, this was not surprising as the GPS reading was taken late in the day and through the tree canopy, conditions not conducive to accurate readings on a hand-held GPS.

A comprehensive photographic record was made of both where the sites were located, as well as in those environments in which no sites occurred. To limit the size of this report, only the photographs of site locations have been included.

6.4 Effectiveness of the Survey Technique

The effectiveness of the survey in identifying scarred or carved trees was comprehensive, but the level of groundcover in the cleared areas was a severe constraint to a totally effective ground survey. However cleared vehicle tracks occurred as ideal transect sampling areas in many of the grassed paddocks, and extensive scalds and wash-out areas in other locations provided excellent archaeological visibility.

The fact that only one isolated artefact was found at a distance greater than 50m to the nearest creek line supports the conclusion that only very few isolated artefacts are likely to occur in the grassed paddocks, and those that do exist will be in very disturbed contexts, having been altered during clearing, then harrowing, and finally ploughing. In addition cattle grazing and active degradation and down-slope migration of the loamy soils would result in artefacts gravitating down-slope over a period of time.

6.5 Effective Coverage: Panels 1 to 7 Survey

Table 1 is divided into units delimited by observed topographical features, environments, and/or land use, briefly described in terms of 'horizontal' or map area, soil, and archaeological visibility, and the percentage of the area actually surveyed.

Figures 4 and **5** show the effective survey coverage based on the assumption that most artefactual material if exposed and visible can be observed for up to 5m to either side of the path of the observer. Clearly, this would vary significantly between a path walked through dense vegetation, and a path across a claypan, and is given as a guide only. In some areas such as the creek bank/flood plain in the vicinity of Sites 16 to 18, and 39 (see **Figure 7**) there was so little groundcover on scalded surfaces that artefacts were visible from as much as 20m away.

In such open country, horizontal visibility was such that it was clear that any exposed surfaces would be visible from at least 40m or so away, and it could be argued that while there was no surface visibility in the grassed areas in between that they also were surveyed as to their potential to contain archaeological material. However, to be consistent with best practice the "effective coverage" has been limited to the area no more than 10m to either side of the paths taken by the investigators.

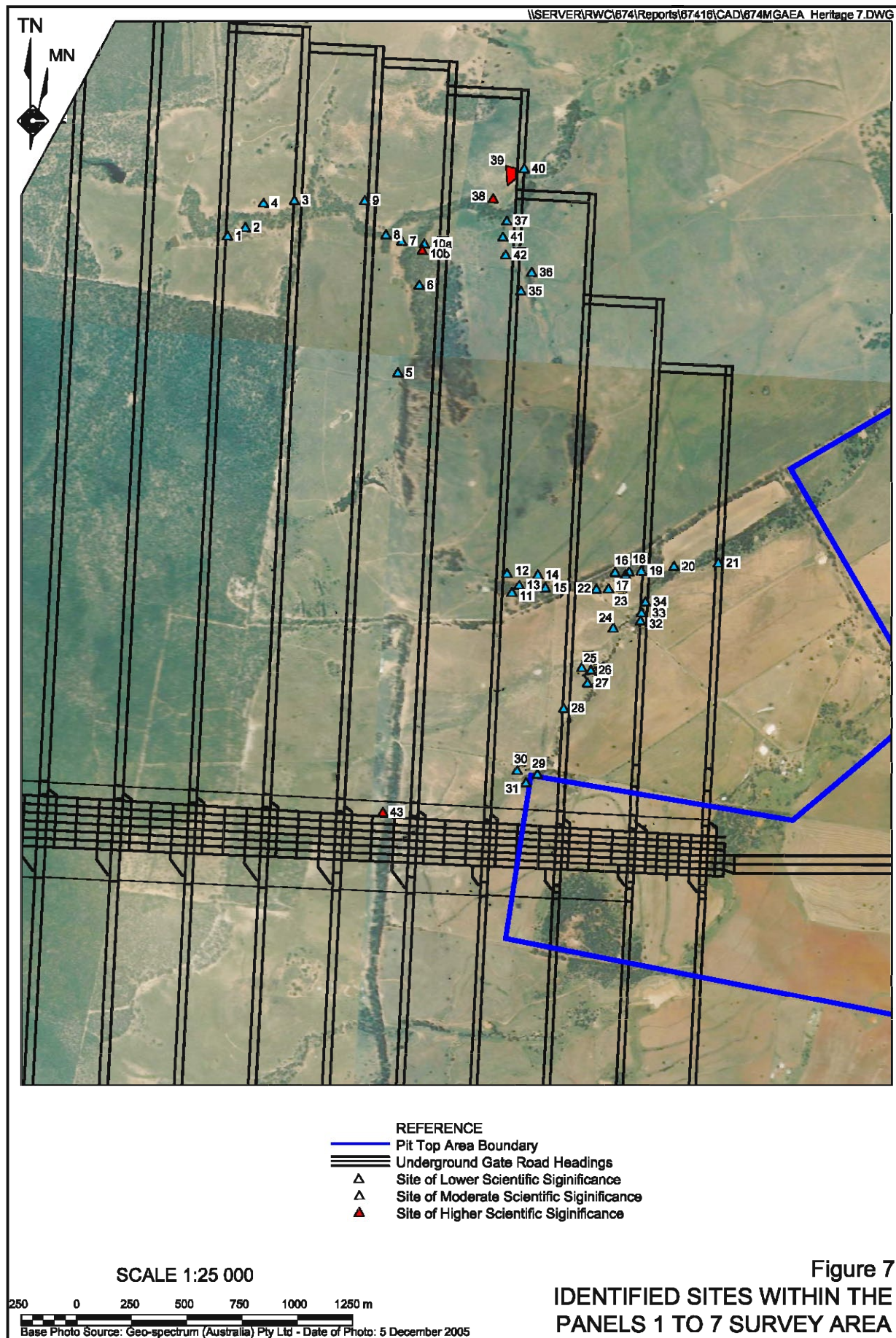


Table 1
Survey Coverage

| Area | Description | Survey area (80ha - 8,000,000m ²) | Rock/ surface soil | Vegetation | Average surface visibility | Exposures | Approx area surveyed on foot | Average visibility of arch. exposures | Archaeology |
|------|--|---|--|---|----------------------------------|--|---------------------------------------|--|--|
| 1 | Undulating slopes - cleared | 5,770,000 sqm | Weathered sedimentary loamy soils | Cleared for pasture | < 5% | Vehicle tracks, stock pads, crests of contour banking, scalds and wash-outs | < 10% | 95% | Majority of sites recorded in the 50m strip to either side of creek lines |
| 2 | Undulating slopes - uncleared remnant scrub | 350,000 sqm | Weathered sedimentary loamy soils | Predominantly eucalypt and cypress | < 5% | Minor tracks, drip-lines and vehicle tracks | 5% | 50% | Nil |
| 3 | Water courses (incl. banks 20m to either side) | 500,000 sqm | Weathered sedimentary loamy soils with small creek bed exposures of tessellated met-sed rock, and decomposing sandstone bedrock | Ribbon riparian remnant woodland of predominantly eucalypts and Casuarinas | 50% | Scalds, stock wear, bank slumping, vehicle crossings, drip-lines | 90% | 95% | Majority of sites recorded in the 50m strip to either side of creek lines, plus scarred tree |
| 4 | Pilliga woodland/scrub | 880,000 sqm | Weathered Pilliga sandstone | Pilliga woodland and scrub | < 2% | Vehicle tracks | < 5% | 50% | Nil |
| 5 | Cleared Pilliga | 500,000 sqm | Weathered Pilliga sandstone | Grassland | < 5% | Vehicle tracks and minor slope-wash/ scalding | 5% | 95% | One fireplace recorded. |

The photographic record that follows provides a visual reference for the survey conditions and various aspects of past impacts to the study area.

7 THE RESULTS

7.1 Panels 1 to 7 Survey

43 sites were recorded during the investigation and Site Recording Forms will be lodged with DECCW to list them on the AHIMS Site Register. Note that the map references were recorded on a hand-held GPS set to AGD66 and converted to GDA94 and rounded off to the nearest 10m. **Figure 7** shows the artefact locations plotted onto the aerial photograph of the Survey Area. **Plates 1 to 53** (included as **Appendix v**) provide photographs of the identified sites.

For reason of legibility, the sites are indicated by number only, so for example Site “**Pine Creek T2/ISO 4**” is shown in **Figure 6** as “**4**”. Full descriptions and photographs of all 43 sites are included in **Appendix v**. **T1** and **T2** in the site names refer to Pine Creek Tributary 1 and Pine Creek Tributary 2. Finally, **ISO** refers to an isolated artefact, **OS** refers to an open scatter, **AGG** refers to axe-grinding groove, **ST** refers to a scarred tree and **FP** to a fireplace. Site names are given as they will be described on the Site Recording Forms.

7.2 Panels 8 to 26 Survey

As a result of the reconnaissance survey of the Panels 8 to 26 Survey Area, an additional 69 sites were recorded (see **Figure 8**). With the exception of three sites at the southern end of Panel 23 (Sites 107, 111 and 112), all of the additional sites were either isolated artefacts (14 sites), or low density scatters (52 sites). Full descriptions and photographs of all 69 sites are also included in **Appendix v**. All relevant detail of each site has been recorded on site recording cards that will be forwarded to DECC (in accordance with the requirements of Section 91 of the *National Parks and Wildlife Act 1974*).

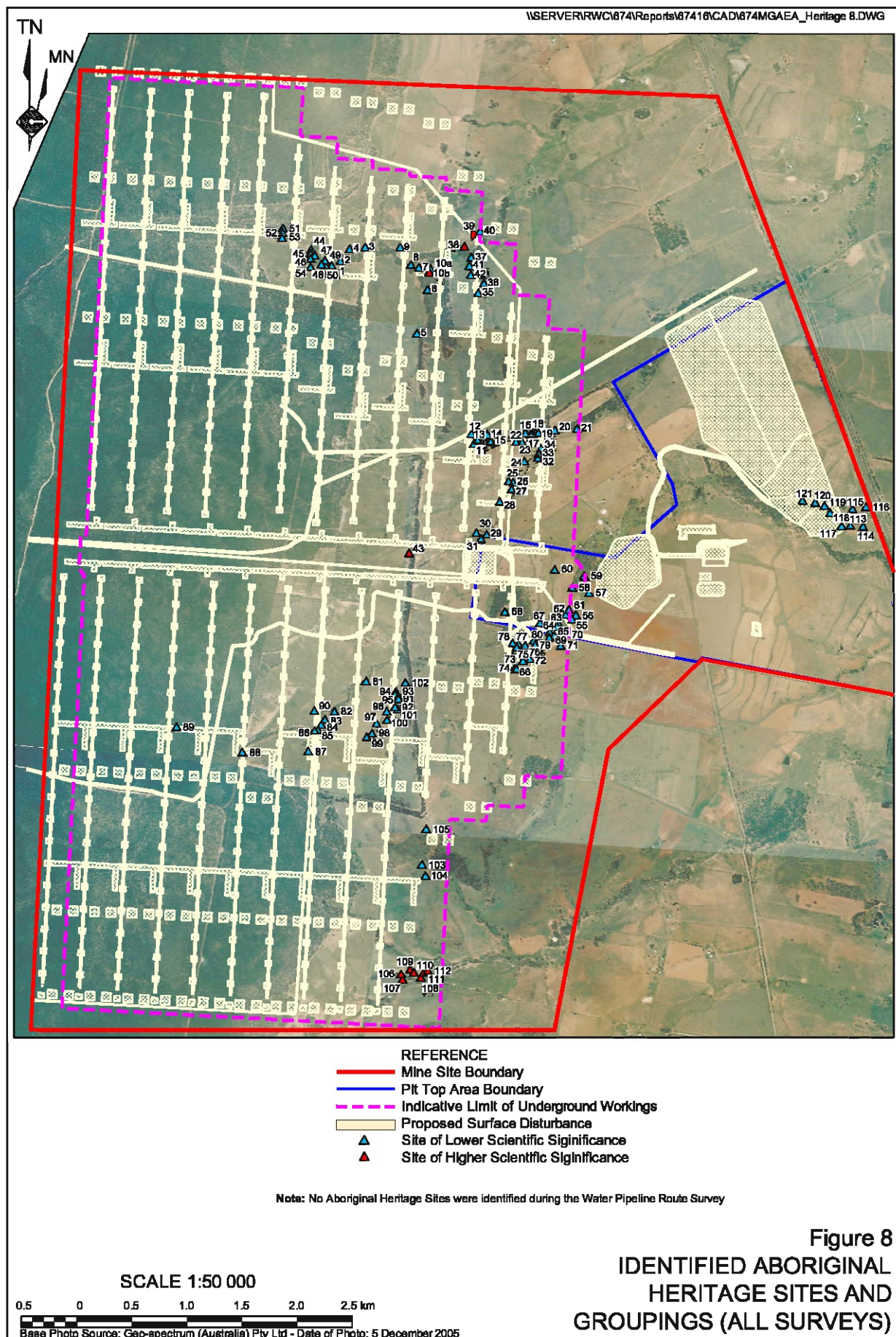
7.3 Brine Storage Area

Nine sites were recorded in the investigation of the Brine Storage Area, comprising three isolated artefacts, two sites of two artefacts, two sites of three artefacts, and two sites of five artefacts (see **Figure 8**). Full descriptions and photographs of all nine sites are also included in **Appendix v**.

Site recording cards will be forwarded to DECCW (in accordance with the requirements of Section 91 of the *National Parks and Wildlife Act 1974*).

7.4 Pipeline Route Survey Area

No sites were recorded in the investigation of the proposed water pipeline route.



7.5 Summary

A table listing the artefactual contents of every site recorded to date over Mining Area (Panels 1 to 26) is included as **Appendix ix**. The table shows that of the 121 sites, 97 (81.51%) contained 1 to 5 artefacts, 13 (10.92%) contained 6 to 10 artefacts, 5 (4.20%) contain 11 to 20 artefacts, and 4 sites (3.37%) contained in excess of 20 artefacts. In simple terms four in every five sites will contain five artefacts or less, and only four in 121 sites will contain more than 20 artefacts.

8 SIGNIFICANCE ASSESSMENT

8.1 Introduction

The DECCW policy to safeguard all sites, Aboriginal places, and archaeological material of significance wherever possible requires that some means of assessing the significance of the sites is necessary. This is not only for the purpose of determining whether longwall mining can proceed as proposed, but also to provide Cultural Resource Managers with the information for future management of the area.

8.2 Cultural Significance

The Aboriginal or cultural significance of Aboriginal relics and sites can only be assessed by the Aboriginal community, and in particular, the Elders. It is the responsibility of the archaeologist to ensure that the Elders or elected representatives of the Aboriginal community are advised of the survey results, and are consulted as to their knowledge and opinion of the significance of the area, and to transcribe and present those expressions in report form.

In this instance, Narrabri LALC has stated that “*sites that have been recorded should not be impacted on*”, and that, “*In relation to knapping areas that have been recorded these areas that require preserving and our recommendation is that the bore holes should be relocated*”. Narrabri LALC further states that it is, “*keen to support and work with Narrabri Coal Mine with preserving these sites*”. A copy of the recommendations supplied by Narrabri LALC and Gomeroi are included as **Appendix vi** and **Appendix vii** respectively.

8.3 Research Potential

8.3.1 Panels 1 to 7 Survey

36 of the 41 artefact containing sites identified within the Panels 1 to 7 Survey Area are of very low artefact density (<10 artefacts) and in disturbed contexts.

Sites 38 and 39, however, contain at least 113 artefacts and maybe as many as 500 artefacts. Such an assemblage would provide a good sample for further analysis into choices of material, knapping strategies and tool types. If either of these sites cannot be avoided, it is recommended the artefacts are salvaged and the archaeologist should take advantage of the opportunity to provide a comprehensive analysis of the sites and their contents.

If Site 43, a fireplace, will be impacted upon by surface works it is recommended that the fireplace should be scientifically excavated in accordance with best practice in an attempt to recover sufficient charcoal or ash to obtain a C₁₄ (radio-carbon) date. This region contains many sites none of which have been dated and it would be of significant scientific value to be able to obtain a date to better understand past Aboriginal occupation of the region.

8.3.2 Panels 8 to 26 Survey

62 of the 69 sites identified by the reconnaissance survey of the Panels 8 to 26 Survey Area are of low artefact density. They are therefore of little research potential. However the complex of sites numbered 106 to 112 occurs in an environment in which there are likely to be many more artefacts, and as the total number of artefacts in this one area is estimated to exceed 500 there is a broad enough sample to provide useful information on knapping strategies, material choice, material use, and intra-site activity areas to warrant the assessment that the complex of sites has potential research value.

8.3.3 Brine Storage Area

None of the nine sites recorded in the Brine Pond Storage Area are of research potential.

8.3.4 Water Pipeline Route

No sites were recorded

9 DISCUSSION

9.1 Introduction

This investigation was undertaken after extensive consultation with the registered Aboriginal stakeholders, and with the full participation of all registered Aboriginal stakeholders. For the reasons described in Section 6.1.2, the discussion of impacts on artefacts is restricted to those of the Panels 1 to 7 Survey Area, Brine Storage Area and Water Pipeline Route Survey Areas. The results of the Panels 8 to 26 Survey Area are considered in relation to the cumulative impact of any disturbance associated with the proposed Longwall Project on the identified sites within the Panels 1 to 7 Survey Area.

9.2 The Results

43 sites were recorded within the Panels 1 to 7 Survey Area during the investigation. Of those there was one scarred tree, and one fireplace. There were 12 sites containing isolated artefacts and a further 20 containing between two and five artefacts. Eight sites contained more than five artefacts and of these only five sites contained 10 or more artefacts. Only one site was believed to contain more than 100 artefacts. Thus the archaeological record appears on first viewing to be represented by many very low density sites and only one site in which there were artefact densities of “more than 5 artefacts per square metre”.

However, if we ignore the DECCW practice of determining that where there is a 50m separation between artefacts they shall be recorded as two sites, and group sites according to their environmental niche, we produce a more informative result. For example, if we group Sites 16, 17, 18, 19, 22 and 23 we find that the group contains at least 38 artefacts; and if we group Sites 38 and 39 we find the group contains in excess of 113 artefacts. Other site clusters in which the number of artefacts suggested that the location was visited more than on one occasion were Sites 11, 12 and 13; Sites 32, 33 and 34; and Sites 1, 4 and 7. But of the 41 sites containing stone artefacts only the extensive scatters at Sites 38 and 39 were locations that could be categorised as places that were used on a number of occasions, and where a variety of activities took place.

Sites 38 and 39 represent camp sites, visited on many occasions and representing both knapping sites and multiple activity sites. From the variety of materials present in those sites, and from the low cortex percentages for those artefacts, it appears that these two locations were used as camp sites along a route along Pine Creek 2, and that the probable source of the material was from creek-bed pebbles derived from conglomerates at a lower elevation (when travelling north), or that the material was sourced from the conglomerates in the creek beds of the Pilliga (when travelling south), and that the initial reduction (removal of the bulk of the cortex) occurred closer to the material source.

We might therefore conclude that against a background of scattered very low density sites these two groups represent areas of multiple visits, occupation and use. Such sites in this environment were probably the aggregation sites, or sites where people regularly camped on their way through the Panels 1 to 7 Survey Area.

The number of sites within the Panels 1 to 7 Survey Area was surprising given that there was no reliable source of water and no useful stone resources other than the sandstone floaters. However, while the number of sites was surprising the very low artefact density for all but Site 39 was as predicted. In the absence of a useful stone source any artefacts in the Survey Area would have been brought in from elsewhere. Useful stone was therefore not readily available and material would not have been discarded unless it had been curated or reduced to a shape or size no longer useful. In such circumstances there would be few knapping floors, or if there were knapping floors the knapping waste would be minimal. The artefacts assemblage would therefore comprise of odd-shaped flaked pieces and flakes produced during the modification of flakes, flaked pieces and cores brought in from elsewhere and discarded as being unsuitable for further modification or alteration.

The Panels 1 to 7 Survey Area occurs in marginal country with few reliable resources, and while Aboriginal people probably passed through the area in transit to other places, it is unlikely that they would have chosen to occupy the area for any length of time, or that they would leave a lasting archaeological record other than where they camped.

While the distribution of sites within the Panels 1 to 7 Survey Area is directly associated with watercourses it is likely that other isolated artefacts or low density scatters occur concealed beneath the pasture grasses, however, they would not be in their depositional context, having been disturbed during land clearing, harrowing, ploughing, and the construction of contour banks and dams. Such a background of very low density sites is typical of open country on the western slopes and is generally considered to be the “archaeological background” with a typical artefact density in the order of one artefact per $>1,000\text{m}^2$.

None of the sites were datable, however, the Bondi-style point in Site 1 may have been an abandoned attempt to fashion a Bondi Point, although in the absence of a completed Bondi Point the similarity in general shape may only be coincidental. But if indeed it was an abandoned Bondi-type flake then the artefact could have been produced between 1500 and 8,000 years ago, as that is the time frame in which Bondi Points have been radio-carbon (C14) dated from the context in which they occurred elsewhere (Val Attenbrow, pers. comm.).

9.3 Disturbance to the Archaeological Record

9.3.1 Panels 1 to 7 Survey

As previously noted, depending on the gas drainage requirements of the Longwall Project some of the identified sites may be disturbed upon during the construction of gas drainage infrastructure and/or access tracks to these locations. NCOPL has stated that it will avoid sites wherever it can, but that in the interest of mine safety, there may be limited scope to relocate gas drainage boreholes.

If a site cannot be avoided, the appropriate archaeological management strategy will be to salvage the artefacts and remove them to a secure place agreed to by the Aboriginal stakeholders.

Following the field investigation NCOPL produced a revised plan of the proposed footprint of the proposed gas drainage and ventilation infrastructure, together with the archaeological site locations. As a result it is now possible to predict which sites might be impacted upon and therefore should be salvaged; and which sites will be avoided, and therefore can remain in-situ. **Figure 9** identifies the proposed surface disturbance required for the gas drainage and ventilation infrastructure for Panels 1 to 7. Based on the proposed disturbance presented in **Figure 9**, a list of the sites located in the immediate vicinity of proposed surface disturbing activities has been compiled.

This list has been compiled, not to definitively represent the exact sites which will need to be salvaged, rather to provide an indication of sites located in the immediate vicinity of proposed surface disturbing activities. Consequently, it is noted that it may be necessary for other sites not contained in the following list to be salvaged, and possible for some of the sites on the list to be avoided.

It should be noted that NCOPL is aware of the relative significance of Sites 10, 19, 38 and 39 and consequently these sites will be avoided in the final design of gas drainage and ventilation infrastructure.

Salvage Strategy

It is recommended that the sites should not be salvaged until such time as NCOPL commences the construction of the surface infrastructure above a panel. Although the plan in **Figure 9** is the conceptual layout the actual site of gas drainage boreholes and supporting infrastructure, it may be varied to avoid geological features or environments to minimise impact to the environment or to take advantage of a preferred location, eg. to minimise the impact to the creek line. Currently the layout of the surface infrastructure could impact on the following sites:

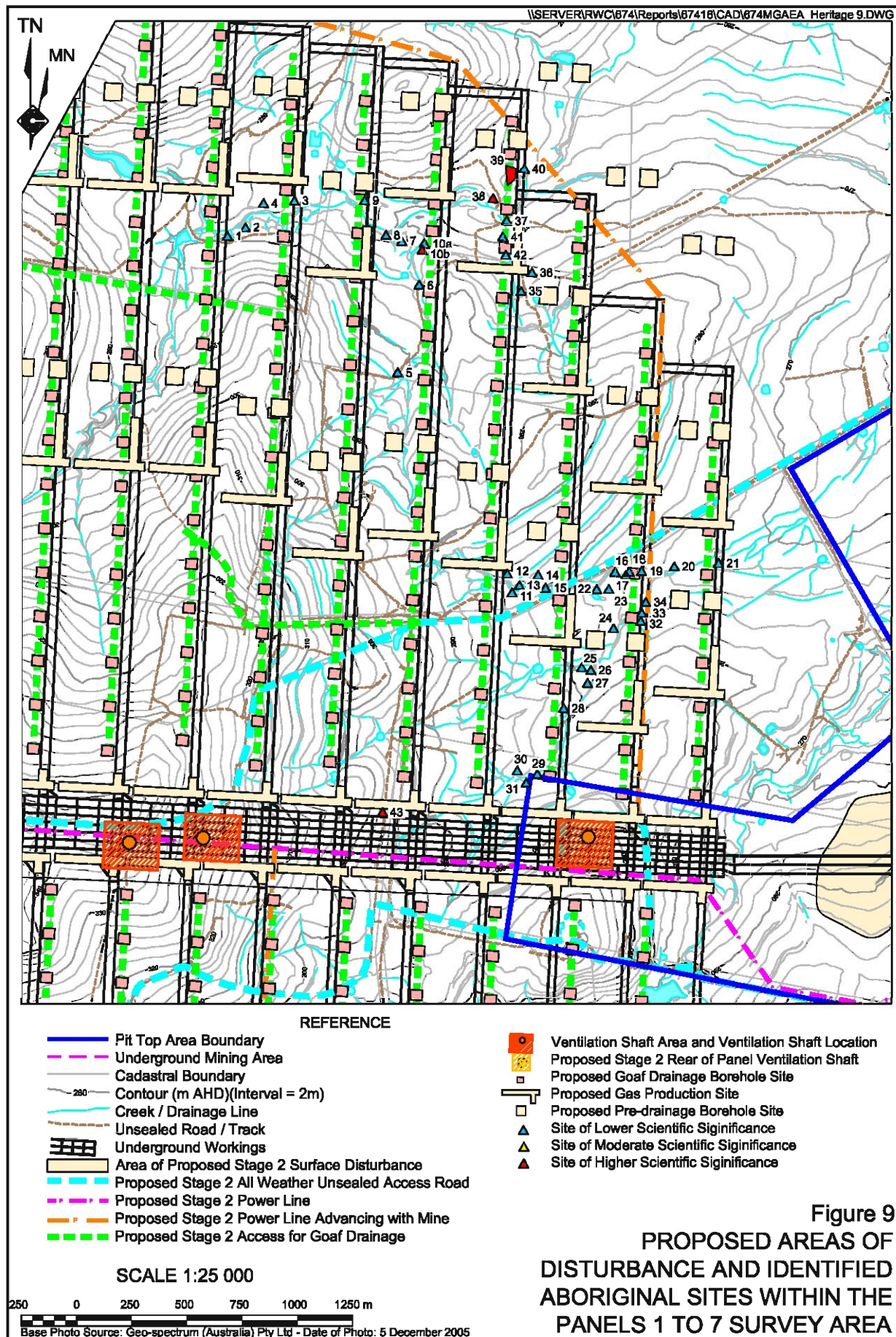


Figure 9
 PROPOSED AREAS OF
 DISTURBANCE AND IDENTIFIED
 ABORIGINAL SITES WITHIN THE
 PANELS 1 TO 7 SURVEY AREA

| Site | Site name | Site type | No of artefacts. |
|------|----------------------|-------------------|------------------|
| 1 | Pine Creek T2/OS 1 | Artefact scatter | <15 |
| 3 | Pine Creek T2/OS 2 | Artefact scatter | 7 |
| 6 | Pine Creek T2/OS 5 | Artefact scatter | 3 |
| 9 | Pine Creek T2/ISO 3 | Isolated artefact | 1 |
| 11 | Pine Creek T1/OS 8 | Artefact scatter | 11 |
| 12 | Pine Creek T1/OS 9 | Artefact scatter | 3 |
| 15 | Pine Creek T1/OS 11 | Artefact scatter | 2 |
| 28 | Pine Creek T1/ISO 9 | Isolated artefact | 1 |
| 29 | Pine Creek T1/IAO 10 | Isolated artefact | 1 |
| 30 | Pine Creek T1/OS 19 | Artefact scatter | 2 |
| 32 | Pine Creek T1/OS 21 | Artefact scatter | 2 |
| 33 | Pine Creek T1/OS 22 | Artefact scatter | 2 |
| 34 | Pine Creek T1/OS 23 | Artefact scatter | 4 |
| 35 | Pine Creek T2/OS 24 | Artefact scatter | 2 |
| 40 | Pine Creek T2/OS 27 | Artefact scatter | 4 |
| 43 | Pine Creek T1/FP1 | Fireplace | - |

At that time the archaeologist and representatives from the two Aboriginal organisations should return to the Mine Site to salvage the artefacts from those sites that will be impacted upon. The artefacts in those locations that will not be impacted upon will be left in situ. The salvage of the artefacts for any particular one or two panels could be completed in a day.

Summary

ASR recommends that once NCOPL has determined where the impacts will occur and which archaeological sites will be affected,

- that the archaeologist should return to the Panels 1 to 7 Survey Area with the Sites Officers from Narrabri LALC and Gomeroi, to salvage the artefacts from those sites.
- The artefacts will be taken by the archaeologist to allow him time to produce a full analysis of the material.
- The salvaged artefacts will be returned to the authorised Aboriginal organisation within 21 days of the salvage.
- The salvaged artefacts will be placed in the care and control of the Aboriginal organisation agreed to by Narrabri LALC and Gomeroi.
- The archaeologist will produce a report of the salvage, including full descriptions of the salvaged material, and an interpretation of the archaeological record within the Salvage Area (because of the time lapse between salvages it is suggested that the reports should be produced as a series of reports, the final report providing a composite overview of the complete salvage operation, and analyses of the salvaged material)
- Subsequently, copies of the reports will be given to Narrabri LALC, Gomeroi, DECCW and the Proponent.
- The archaeologist will lodge updated Site Recording Forms for those sites that have been salvaged with DECCW for amending the AHIMS Site Register.

The impact of salvaging artefacts on the local and regional archaeological record is considered in Section 8.5 as a cumulative impact.

9.3.2 Panels 8 to 26 Survey

As referred to previously NCOPL cannot at this time forecast where and when the impacts from surface infrastructure will occur in Panels 8 to 26 so far ahead of when such impacts will occur, and so it is not possible to state which sites will or will not be impacted upon. It is proposed that a further detailed archaeological investigation will take place prior to proceeding with developing the surface infrastructure for Panels 8 to 26.

The objective of undertaking a reconnaissance survey of Panels 8 to 26 in this study was to establish that the pattern of site distribution in Panels 1 to 7 was representative of site distribution throughout the Mine Area, primarily for the purposes of assessing the cumulative impact of salvaging the sites in Panels 1 to 7 nominated above.

9.3.3 Brine Storage Area

It is recommended that all of the 9 sites recorded in the Brine Storage Area should be salvaged. While the likely impact from constructing the pond would require that only 6 of the sites should be salvaged, to avoid any inadvertent damage to the three remaining sites from vehicular traffic in future years, ASR recommends that all nine should be salvaged.

9.3.4 Water Pipeline Route

As no sites were recorded no salvage strategy is required.

9.4 Subsidence-related Impacts

From the results of the comprehensive survey of the Panels 1 to 7 Survey Area, it is now possible to re-assess what the likely impact from subsidence will be on the archaeological record. The results show that there was one scarred tree, one axe-grinding groove site, one fireplace, and 40 stone artefact scatters. No other site types were present, or were predicted to be present in the Panels 1 to 7 Survey Area.

Scarred Trees

The scarred tree (Site 20) was a healthy, living tree with an apparently strong root system. While it is possible that subsidence could result in a changed drainage pattern and that the tree could be undermined if the creek was to shift towards it, it is probable that the tree's root system would resist undermining and that the tree would not fall. With regard to this particular tree, it is assessed that any impact to the tree resulting from subsidence would be minimal if at all.

Axe-grinding Grooves

The three axe-grinding grooves occur on two sandstone floaters (Site 10b) and so the only impact to the site from subsidence would be the vertical displacement of the floaters, which would have no impact on the axe-grinding grooves.

Artefact Scatters

All of the artefact scatters and isolated artefacts occur on actively degrading surfaces, and some occur within active gullies, and so it is reasonable to assume that most of the artefacts have been displaced by slope-wash, stock movement, land clearance, ploughing, harrowing and vehicular traffic. There would be very few artefacts in their original depositional context or provenance. Indeed, the two sites in which most artefacts occur, Sites 39 and 19, have both been significantly disturbed. Site 39 occurs in scalds on and between contour banking, and Site 19 occurs in the deposits of a collapsed dam wall.

Any subsidence in the Panels 1 to 7 Survey Area is likely to displace artefacts vertically, but horizontal displacement presently occurring as a consequence of natural impacts, might be accelerated or decelerated according to the context in which they occur, and the extent of subsidence.

On the basis of the above it is assessed that the likely impact to open artefact scatters from subsidence to be minimal.

9.5 Cumulative Impact

There are two aspects to consider in assessing the cumulative impact of salvaging sites within the Panels 1 to 7 Survey Area. Firstly the impact of salvaging sites relative to the total number of known sites in the Panels 1 to 7 Survey Area together with the number of sites recorded in the Pit Top Area; and secondly, the impact of salvaging sites in the Panels 1 to 7 Survey Area relative to the predicted total number of sites likely to be present in the Mine Site (Panels 8 to 26 Survey Area).

Known Sites in the Panels 1 to 7 Survey Area

43 sites were recorded in the Panels 1 to 7 Survey Area and six artefactual sites were recorded in the Pit Top Area (AASR, 2007). Within the Panels 1 to 7 Survey Area (Sites 1 to 43 of **Appendix ix**), 32 (78.1%) of the 41 sites containing artefacts contained 1 to 5 artefacts, three (7.3%) of the sites contained 6 to 10 artefacts, four (9.8%) contained 11 to 20 artefacts, and only one site (Site 39) contained in excess of 20 artefacts. While the Aboriginal community considers all sites to be significant, only Sites 38, 39 and 43 have been identified as having research potential (due to the number of artefacts or type of site).

The representativeness of these results is borne out by the analysis of the collective results for the subsequent surveys of Panels 8 to 26, the Brine Storage Pond Area, and the Water Pipeline Route, which show that of 121 sites, 97 (81.51%) contained 1 to 5 artefacts, 13 (10.92%) contained 6 to 10 artefacts, 5 (4.20%) contained 11 to 20 artefacts, and four sites (3.37%) contained in excess of 20 artefacts. In simple terms four in every five sites contained five artefacts or less, and only four of the 120 sites contained more than 20 artefacts.

NCOPL has committed to avoiding Sites 38 and 39, as well as Sites 10 (grinding grooves) and 19 (an artefact scatter of 18 artefacts), in the Panels 1 to 7 Survey Area.

Disturbance to any other site would have a low cumulative impact on the archaeological record as these represent low density artefact scatters or other site types which are frequently identified.

Further mitigating the cumulative impact of the Longwall Project, the Proponent has committed to salvaging those Aboriginal sites that cannot be avoided and undertaking the archaeological research recommended in Section 8.3. The cumulative impact would be further mitigated by retaining the salvaged artefacts in a 'keeping place', such that a direct connection to the Aboriginal community could be maintained.

Site Prediction for the Panels 8 to 26 Survey Area

The southern half of the Mine Site contains two major tributaries of Kurrajong Creek, both of which are of the magnitude of Pine Creek 2. It can be anticipated therefore that there will be a similar number and type of sites along these two watercourses, as identified along the tributaries of Pine Creek within the Panels 1 to 7 Survey Area. If the number of sites recorded in the 800ha area of the Panels 1 to 7 Survey Area is extrapolated over the remaining 2 400ha of the Mine Site yet to be surveyed, and taking into account that there are likely to be fewer sites upstream in the Pilliga Country, then it is reasonable to assume that at least another 120 sites will be recorded in the remaining area. This would produce a total of 170 sites occurring within the Mine Site Area, the vast majority (at least 90%) of which would be isolated artefacts or scatters of five or less artefacts. This prediction is supported by the results of the reconnaissance survey of the Panels 8 to 26 Survey Area within which 69 sites were identified of which 82% contained five artefacts or less.

The Proponent has confirmed that it will endeavour to avoid those sites with more than 20 artefacts within the Panels 8 to 26 Survey Area (the complex of Sites 106 to 112), either through the design of the gas drainage infrastructure or by reducing the length of the panel. As a consequence of the reconnaissance survey it is reasonable to conclude that the salvage of any of the other 106 sites is likely to be of little cumulative impact as 80% of the sites contain five artefacts or less.

Therefore, even if as many as 60 sites are salvaged across the Mine Site it is probable that the total number of salvaged artefacts from 60 sites would be less than 200, and that at least 2 000 artefacts (based on the expectation that there are other sites similar to Site 39 on both Kurrajong Creek tributaries) would remain in-situ in the undisturbed sites.

In terms of representativeness, it can be said that the sites remaining after salvage would be representative of the type, number and content of sites throughout the Survey Area. Similarly, the cumulative impact of salvage of a predicted number of sites in the Mine Site Area, relative to the predicted number of sites likely to occur in the Mine Site Area, as extrapolated from the results of the survey of the Panels 1 to 7 Survey Area, is assessed to be low.

10 RECOMMENDATIONS

This investigation was undertaken after extensive consultation with the “registered Aboriginal stakeholders”, and with the full participation of all “registered Aboriginal stakeholders”.

As a result of the investigation 43 Indigenous sites were recorded in the Panels 1 to 7 Survey Area. A further 69 sites were identified as part of a reconnaissance survey of the Longwall 8 to 26 Survey Area, however, this survey was undertaken to provide information on which a cumulative impact assessment could be based. Whilst many of the sites were of low density, and individually of very low cultural and scientific significance, several of the sites, and one in particular, Site 39 is assessed to be of both cultural and scientific significance.

While ASR recognises that the issuing of a project approval under Part 3A of the EP&A Act negates any requirement to redesign its proposed development plans to avoid impacting upon the sites, it is recommended that NCOPL, subject to the constraints imposed by mine safety considerations, consider relocating surface disturbing activities to avoid the archaeological sites.

It is further recommended that in the event that they can be avoided, that Sites 10, 19, 38 and 39 should be fenced off with fluorescent para-webbing to protect them from inadvertent or accidental damage from vehicular traffic, until such time as the ground surface work to install the goaf drainage boreholes and their access roads has been completed. At that time, the fencing should be removed to allow the cattle to continue to graze the site areas, and thereby provide a measure of weed control and potential grass-fire hazard reduction that would otherwise not occur if the fencing was to remain.

The fenced-off areas should be described as 'Environmental Protection Zones' to avoid damage to the sites that might otherwise occur if they were described as Indigenous or Culturally Sensitive Areas.

With regard to other sites that were recorded but which are not specified above, it is recommended that they should be avoided wherever possible, but where it is not possible, that the archaeological material in the affected sites should be salvaged by the archaeologist assisted by Sites Officers representing Narrabri LALC and Narrabri Gomeroi Traditional Owner Group.

NCOPL are also reminded that while the issuing of a project approval under Part 3A of the EP&A Act negates the provisions and constraints that might otherwise apply under existing legislation, NCOPL should be cognisant of the provisions of the *National Parks & Wildlife Act 1974* (as amended) with regard to skeletal remains.

The owners, and their employees, earthmoving contractors, subcontractors, machine operators and their representatives, whether working in the survey area or elsewhere, should be instructed that in the event of any bone being unearthed during earthmoving, work should cease immediately in the area of the find.

In the event that any bone cannot be clearly identified by a qualified archaeologist as being of animal remains the police are to be informed of its discovery, and officials and/or their representatives of the Narrabri Local Aboriginal Land Council, and the Narrabri Gomeroi Traditional Owner Group, advised that the bone is subject to police investigation.

Work should not recommence in the area of the find, until both the police (if bone has been found) and those officials or representatives have given their permission to do so. Those failing to report a discovery and those responsible for the damage or destruction occasioned by unauthorised removal or alteration to a site or to archaeological material may be prosecuted under the *National Parks and Wildlife Act 1974*, as amended.

GENERAL GLOSSARY: The definitions that follow are for terms used in this and other reports written by the author, and do not necessarily apply to their use in different contexts.

ADZE : A modified flake with at least one steeply-retouched working edge. While all adzes are generally considered to be wood-working tools it is probable that some also served as cores and others as scrapers. Adzes with a uniform butt were frequently hafted to make a chisel-like tool, but the intended use of the adze determined the size of the adze and whether it was hafted (Flenniken and White, 1985).

AHD: Australian Height Datum

ARCHAEOLOGICAL DEPOSIT :

Sediments which contain evidence of past Aboriginal use of the place, such as artefacts, hearths, burials etc.

ARTEFACT : Any object that has attributes as a consequence of human activity (Dunnell, 1971). In this report 'artefacts' has been used generally to describe pieces of stone that have been modified to produce flakes, flaked pieces, cores, hammerstones, or axes.

BACKED BLADE :

A stone tool manufactured from a flake on which one margin has been modified by the removal of small flakes to blunt the edge or margin opposite the cutting edge.

BORA GROUND :

A ceremonial site comprising of one or two connected circles composed of compacted or mounded earth, or defined by an arrangement of stones, of 2 to 30m diameter, generally used in male initiation rites.

CAMPSITE : A place at which the density of artefacts and the variety of material indicates that people 'frequently' used the place as a stopping or resting place. Such places are also likely to contain or be close to water resources, food resources, or stone material resources. In this report a campsite is used to describe artefact scatters that are associated with hearths or fireplaces, as distinct from scatters that are not associated with hearths or fireplaces, which are described as Open Scatters.

CHALCEDONY :

A form of silica (partially translucent), which occurs as linings in cavities in rocks. When banded it is known as AGATE (Department of Mines, 1973). Chalcedony is uniformly coloured and agate has curved bands or zones of varying colour (Cook & Kirk, 1991).

CHERT : Another name for sedimentary chalcedony. It occurs most frequently in limestones, or in marine sedimentary rock, or as pebbles in sedimentary rock. In its depositional context it is often concentrated in bedding planes. Chert found in deep-water limestones is formed from radiolaria and diatoms (siliceous planktonic micro-organisms) (Cook & Kirk, 1991).
Chert is a form of amorphous or extremely fine-grained silica, partially hydrous, found in concretions and beds. It is classified as a chemical sedimentary rock although it may be precipitated both organically and inorganically (Department of Mineral Resources, n.d.).

CONGLOMERATE :

Naturally cemented gravel. Conglomerate is a coarse-grained clastic sedimentary rock composed of generally rounded fragments of other rock types larger than 2 mm in diameter, set in a fine-grained matrix of sand, silt, or any of the common natural cementing materials (Department of Mineral Resources, n.d.).

CORE : A piece of stone from which flakes have been removed, that cannot otherwise be described as a retouched or modified artefact.

CORTEX : The naturally altered surface of stone – eg. the water-worn surface of river pebbles.

DEBITAGE : The small waste material observed in knapping floors. Generally, waste material is described as all those fragments having a maximum dimension of less than 10mm

FLAKE : A fragment of stone exhibiting features indicating that it has been deliberately removed from a core piece. These features are evident as:

- i) Platform: Plane or point at which a blow was delivered to remove the flake.
- ii) Bulb of Percussion: Convex surface that occurs on the face or ventral surface of a flake, radiating from the point of impact, produced as a consequence of the force pattern.

iii) Eriallure: see below.

Other terms:

- i) Dorsal: The back or outer face of a flake as it would have been prior to removal from a core. Frequently either ridged or exhibiting negative flake scars when removed in secondary flaking, with a natural weathered cortex when removed in primary flaking.
- ii) Ventral: The 'chest' or inner face of a flake as it would have been prior to removal from the core. The surface upon which the Bulb of Percussion occurs.
- iii) Platform Preparation: The removal of flakes from a surface to produce a level platform. May be evidenced by retouch scars to the platform.
- iv) Retouch: The removal of small flakes from an edge or margin of an artefact to modify its shape or sharpen its edge.
- v) Proximal: The end of a flake closest to the striking platform.
- vi) Distal: The end of a flake furthest from the striking platform.
- vii) Margin: The edge of an artefact.
- viii) Eriallure: A small circular to elliptical negative flake scar occurring on the surface of the bulb of percussion on flakes of very fine-grained or highly silicified material. It occurs 'naturally' as a consequence of internal forces generated at the time of flake removal.
- ix) Split Cone: Occurs when the flake splits down its axis frequently removing part of the striking platform. Generally believed to be produced by faulty knapping technique, but is also probably a consequence of flawed material.
- x) Transverse Snap: Occurs when a flake snaps across its axis. Generally believed to be caused by post-depositional impacts such as human or stock treadage, or vehicular traffic.

FLAKED PIECE :

A fragment of stone exhibiting flake scars indicating that it is an artefact, but not displaying diagnostic features, such as a Bulb of Percussion, Striking Platform, or an Eriallure.

GREYWACKE :

A type of sandstone, grey or greenish-grey in colour, tough and well indurated and typically poorly sorted (Clark & Cook, 1986).

A generally poorly sorted, dark sandstone containing feldspar and sand-sized rock fragments of metamorphic or volcanic rocks (Department of Mineral Resources, n.d.).

Usually a dark and coarse-grained rock compared to mudstones and siltstones that are much finer-grained and better sorted.

HOLOCENE PERIOD :

The period from 10,000 years ago to the present.

IGNEOUS ROCK :

Rock formed by the cooling and solidification of magma on or below the earth's surface (Geography Dictionary, 1985).

In situ : In its original place – as deposited.

ISOLATED ARTEFACT :

A solitary stone artefact, at least 50m from its nearest neighbour. This is based on NPWS policy that two artefacts within 50m of each other constitute a site.

KNAPPING FLOOR:

A discrete scatter of artefacts in which at least two artefacts are recognisably of the same material, and derive from the same piece of stone. Also described as a stone tool manufacturing site or floor.

LOCATION : The place at which an artefact is found, or a place identified as having either archaeological or Aboriginal significance.

MEASUREMENT :

I) Flake:

- i) Length: Measured along the percussion axis at right angles to the platform.
- ii) Width: The greatest width measured at right angles to the percussion axis.
- iii) Thickness: The greatest thickness measured at right angles to the percussion axis.

II) Flaked piece:

- i) Length: The longest dimension
- ii) Width: The greatest width measured perpendicular to the length.
- iii) Thickness: The greatest thickness measured perpendicular to the length.

III) Core:

- i) Length: The longest dimension.
- ii) Width: The greatest width measured perpendicular to the length.
- iii) Thickness: The greatest thickness measured perpendicular to the length.

MIDDEN : A refuse heap or stratum of food remains, such as mollusc shells, and other occupational debris (Dortch, 1984 – see also Meehan, 1982).

MUDSTONE :

A fine-grained detrital rock, usually quite massive and well consolidated. May be black through grey to off-white, browns, reds and dark blues/greens. Frequently found in association with sandstones (Cook & Kirk, 1991).

Identification is often aided by colour variations in layering. A source for stone material tool manufacturing material found as river pebbles in creek beds, and artefacts often display a water-worn cortex.

NEGATIVE FLAKE SCAR :

A concave surface resulting from the removal of a flake, occurring on the surface of the rock from which a flake has been removed.

PLEISTOCENE PERIOD :

The period from about 10,000 years ago to 2 million years ago.

POTENTIAL ARCHAEOLOGICAL DEPOSIT (PAD) :

Synonymous with Potentially Archaeologically Sensitive : Having the potential to contain archaeological material although none is visible.

QUARTZITE :

Quartzites are formed by the regional or contact metamorphism of quartz arenites, siltstones, and flints (cherts). They are composed essentially of quartz, and usually have a fine-grained granoblastic (grains are roughly the same size) texture. Generally massive, but may sometimes show sedimentary structures (Cook & Kirk, 1991).

ROTATION :

The removal of flakes from a core by blows directed at different angles, to different platforms. May be evident on the dorsal surface of a flake as negative flake scars, which do not follow the same direction as the percussion axis of the flake. This may be confused with scars produced during core preparation.

SCAT : The solid waste material produced by an animal – dung, droppings, manure (Triggs, 1985).

SCATTER : Two or more artefacts occurring within 50 metres. Scatter may also be used in the context of 'background scatter', meaning the general distribution of artefacts across the landscape that cannot be recognised as discrete concentrations.

SILCRETE : A near surface or surface siliceous induration (Desen & Peterson, 1992).

A conglomerate consisting of surficial sand and gravel cemented into a hard mass by silica.

A siliceous duricrust (Bates & Jackson, 1980).

Crusts may form as a result of low, infrequent rainfall, on reasonably flat surfaces. These are known as duricrusts – those cemented by silica are known as silcretes (Clark & Cook, 1986), sometimes referred to locally as 'billy' (Gentilli, 1968), or 'grey billy'.

Silcrete on the northern tablelands of NSW forms at the surface contact between sediments of the Sandon Beds and the Armidale Beds with overlying basalt, where groundwater (more rich in silica than surficial water) interacts with surficial water and precipitates new quartz as the matrix to the sediments (N.D.J. Cook, Dept. of Geophysics, UNE, pers. Comm.).

In softer formations of quartz sands, groundwater has apparently been responsible for the formation of concretionary layers of silcrete. Under altered climatic conditions, the less competent beds erode away leaving concretions. Since they are often the size of old-fashioned woollies and are greyish and white, they are popularly known as gray billy (slang for billy goat) (Fairbridge, 1968).

SITE : A discrete area or concentration of artefactual material, place of past Aboriginal activity, or place of significance to Aboriginal people.

TRIMMING FLAKE: A micro-flake of less than 10mm maximum dimension, of no “useful” size, produced in reducing a core to a workable shape.

SOIL SCIENCE TERMS (taken from Banks, 1995, and others as referenced).

BEDROCK : Outcrop of *in situ* rock material below the soil profile.

BENCH : A strip of relatively level earth or rock breaking the continuity of a slope.

BLOWOUT : A closed depression formed in the land surface by wind eroding sands and depositing them on adjacent land.

CHERT: A very fine-grained amorphous silicate sedimentary rock, commonly a layer of chemical precipitate or micro-organism skeletal remains (Milford 1999).

CLAY: Soil material composed of very fine particles less than 0.002 mm size. When used to describe a soil texture group, such a material contains more than 35% clay (Milford 1999).

CLAYPAN : A depression caused by the aeolian deflation of sediments, or by the presence of a prior lake.

CONGLOMERATE: A poorly-sorted detrital sedimentary rock composed of rounded gravels, stones or cobbles in a matrix of much finer material (Milford 1999).

DUNE : A ridge built up by wind action composed of sands, silts, or sand-sized aggregates of clay.

FLOODPLAIN : A large flat area, adjacent to a watercourse, characterised by frequent active erosion and aggradation by channelled and overbank stream flow.

GIBBER : A level surface covered by a thick deposit of gravel or broken siliceous pebbles, occurring in the more arid parts of the continent, thought to have been formed from the break-up of a siliceous (silcrete) surface crust, and termed gibber plains (Whittow, 1984) – see also silcrete.

GILGAI : Surface microrelief associated with soils containing shrink-swell clays. Gilgai consists of mounds and depressions, or irregularly distributed small mounds and subcircular depressions varying in size and spacing. Vertical interval usually <0.3m; horizontal interval usually 3-10m, and surface almost level. Sometimes called ‘crab-hole’ soils.

Goaf: The extracted area that the immediate roof or overburden collapse into following the extraction of coal.

GREYWACKE: A tough, well-indurated type of sandstone distinguished by detrital quartz crystals and rock fragments set in a finer-grained matrix (Milford 1999).

GULLY : An open incised channel in the landscape generally greater than 30cm deep and characterised by moderately to very gently inclined floors and steep walls (Milford 1999).

HUMMOCK : A small raised feature above the general ground surface.

LANDFORM ELEMENTS :

Crest : Landform element standing above all points in the adjacent terrain.

Flat : Neither a crest or a depression <3% slope.

Upper slope : Adjacent to and below a crest or flat but not a depression.

Midslope : Not adjacent to a crest, a flat or a depression.

Lower slope : Adjacent to and above a flat or a depression but not a crest.

LITHOSOLS : Shallow soils showing minimal profile development and dominated by the presence of weathering rock and rock fragments.

METAMORPHIC: Rocks whose composition, texture and/or structure have been altered through tectonic pressure and/or heat (Milford 1999).

METASEDIMENTARY: Partially-metamorphosed sedimentary rock (Milford 1999).

MUDSTONE: A fine-grained dark-coloured sedimentary rock, formed from lithified mud; similar to shale but more massive (Milford 1999).

pH A measure of the acidity or alkalinity of a soil. A pH of 7.0 denotes neutrality, higher values indicate alkalinity, and lower values indicate acidity. The pH scale is logarithmic, i.e., a pH of 4.0 is ten times as acid as a pH of 5.0, and one hundred times as acid as a pH of 6.0. (DLWC 1999).

RILL : A small channel cut by concentrated runoff through which water flows during and immediately after rain.
A small ephemeral channel, generally no more than 30 cm deep, created by concentrated runoff (Milford 1999).

RIPARIAN (Zone): The zone comprising the creek banks and areas immediate adjacent to a water course.

RUNOFF : That portion of precipitation not immediately absorbed into or detained upon the soil and which thus becomes surface flow.

SCARP/CLIFF : A steep slope terminating a plateau or any level upland surface.

SCRUB : vegetation structure consisting of shrubs 2-8m tall.

SHEET EROSION : The removal of the upper layers of soil by raindrop splash and/or runoff.

SOIL PROFILE :

“A HORIZON”: The top layer of mineral soil. This may consist of two parts:

A₁ HORIZON: Surface soil and generally referred to as the topsoil.

A₂ HORIZON: similar in texture, but paler in colour, poorer in structure, and less fertile.

“ B HORIZON”: The layer below the A Horizon. This consists of 2 parts:

B₁ HORIZON: A transitional horizon dominated by properties characteristic of the underlying B₂ horizon.

B₂ HORIZON: typically contains concentrations of silicate clay and/or iron, and/or aluminium and/or translocated organic material.

“C HORIZON”: The parent rock. Recognised by its lack of pedological development, and by the presence of remnants of geologic organization.

“R HORIZON”: Hard rock that is continuous (Charman & Murphy, 1993; 350-1).

SPUR : A ridge which projects downwards from the crest of a mountain as a water-parting (Whittow, 1984).

SUBSOIL : Sub-surface material comprising the B and C Horizons of soil with distinct profiles; often having brighter colours and higher clay contrasts.

SURFACE CONDITION :

Gravelly : Over 60% of the surface consists of gravel (2-69mm).

Hardsetting : Soil is compact and hard.

Loose : Soil that is not cohesive.

Friable : Easily crumbled or cultivated.

Self-mulching : A loose surface mulch of very small ped forms when the soil dries out.

SWALE : A linear level-floored open depression excavated by wind or formed by the build-up of two adjacent ridges.

SWAMP : Watertable at or above the ground surface for most of the year.

TOPSOIL: The surficial layers of the soil profile, typically the A Horizon, which is usually darker, more fertile, better structured and contains more organic matter than underlying soil materials (Milford 1999).

TERRACE : A flat or gently inclined surface bounded by a steeper ascending slope on its inner margin and a steeper descending slope on its outer margin (Whittow, 1984).

TOPSOIL : A part of the soil profile, typically the A₁ horizon, containing material that is usually darker, more fertile and better structured than the underlying layers.

UNDERSTOREY : A layer of vegetation below the main canopy layer.

WEATHERING: The physical and chemical disintegration, alteration and decomposition of rocks and minerals at or near the earth's surface by atmospheric and biologic agents (Milford 1999).

BIBLIOGRAPHY

- Australian Archaeological Survey Consultants Pty Ltd. 2007. Narrabri Coal Project, Aboriginal Heritage Assessment: Specialist Consultant Studies Compendium Volume 1, Part 4. Unpublished report for Narrabri Coal Pty Ltd.
- Banks, R.G. 1995. *Soil landscapes of the Curlewis 1:100,000 sheet*. Department of Conservation and Land Management.
- Bates, R.L., and J.A. Jackson (Eds). 1980. *Glossary of Geology*. Second Edition. American Geological Institute, Virginia.
- Clark, I.F., and B.J. Cook. 1986. *Geological Science: Perspectives of the Earth*. Australian Academy of Science, Canberra.
- Cook, D., and W. Kirk. 1991. *Field Guide to the Rocks and Minerals of the World*. Kingfisher Books, London.
- Charman, P.E.V., & B.W. Murphy. 1993. *Soil: Their Properties and Management*. Sydney University Press.
- Department of Mineral Resources. 1992. *Metallogenic Study and Mineral Deposit Data Sheet SH/56 13-14, SI/56 1-2. Tamworth-Hastings 1: 250,000 Metallogenic Map*.
- Department of Mineral Resources. n.d. Information Sheet : Sedimentary Rocks.
- Department of Mines. 1973. *Minerals and their Characteristics*. Geological Survey of New South Wales, Number 141.
- Desen, J.L., and J. Peterson. 1992. Mapping the Australian Duricrusts: can Distribution be derived from Terrain Maps. *Australian Geographical Studies*, 30(1): 87-94.
- Ditton Geotechnical Services Pty Ltd. 2008. Mine Subsidence Predictions and Impact Assessment for the Proposed Stage 1 (Longwalls 1 to 24) of the Narrabri Coal Mine, Narrabri. DGS Report No. NAR-001/1. Unpublished report for Narrabri Coal Operations Pty Ltd.
- Dortch, C. 1984. *Devil's Lair: a study in prehistory*. Western Australian Museum.
- Dunnell, R.C. 1971. *Systematics in prehistory*. Free Press, New York.
- Fairbridge, R.W. 1968. Induration. *Encyclopaedia of Geomorphology, Encyclopaedia of Earth Science Series*, Vol. III, pp.554-55. Reinhold Book Corporation, New York.
- Flenniken, J.L., and L.P. White. 1985. Australian flaked stone tools: a technological perspective. *Records of the Australian Museum*, 36: 131-51.
- Gentilli, J. 1968. Duricrust. In R.W. Fairbridge (Ed.), *The Encyclopaedia of Geomorphology, Encyclopaedia of Earth Science Series*, Vol. III, pp.296-7. Reinhold Book Corporation, New York.
- Geography Dictionary*. 1985. Longman Group, Harlow.
- Meehan, B. 1982. *Shell bed to shell midden*. Australian Institute of Aboriginal Studies, Canberra.

Simpson, B. 1966. *Rocks and Minerals*. Pergamon Press, Oxford.

Triggs, B. 1985. *Mammal tracks and signs: a fieldguide for southeastern Australia*. Oxford University Press, Melbourne.

Walker J., & M.S. Hopkins. 1990. Vegetation. In R.C. McDonald, R.F. Isbell, J.G. Speight, J. Walker & M.S. Hopkins (Eds), *Australian Soil and Land Survey*, pp. 58-86. Inkata Press, Sydney.

Whittow, J. 1984. *Dictionary of Physical Geography*. Penguin, London.

Other references.

http://en.wikipedia.org/wiki/Pilliga_forest

APPENDICES

- Appendix i – Advertisement to “Interested Aboriginal stakeholders”**
- Appendix ii – Response from Narrabri LALC**
- Appendix iii – Response from Narrabri Gomeroi Traditional Owner Group**
- Appendix iv – Proposed Investigative Strategy for the Archaeological Investigation of the Project Site.**
- Appendix v – Site Details and Photographs**
- Appendix vi – Aboriginal Stakeholder Recommendations**
- Appendix vii – Results of the search of the AHIMS Site Register**
- Appendix viii – Site Types**
- Appendix ix – Summary of the Site Types Identified on the Mine Site and Water Pipeline Corridor**

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Appendix i

Advertisement to “Interested Aboriginal Stakeholders”

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PUBLIC NOTICE
ARCHAEOLOGICAL INVESTIGATION

Application is to be made for Part 3A Approval for Stage 2 Longwall Proposal, Narrabri Coal Mine, adjacent to the Kamilaroi Highway, 30km south-southeast of Narrabri.

In accordance with “Guidelines for Aboriginal Cultural Heritage Impact Assessment and Community Consultation” (July 2005), Part 6 Approvals of the National Parks & Wildlife Act 1974 (as amended) Aboriginal stakeholders with an interest in the project are invited to register their interest within 14 days, with John Appleton, Archaeological Consultant, Tel. 02 6772 6512, Fax. 02 6772 4567, Mob. 0428 651 789.

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Appendix ii

Response from Narrabri LALC

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Mr John Appleton
Archaeological Consultant

9th September 2008

Dear John

Re: Expression of Interest Narrabri Coal Mine.

We note your public notice for Aboriginal stakeholders with an interest in the project Archaeological investigation for part 3A approval for Stage 2 Longwall proposal, Narrabri Coal Mine, 30 km south-southwest of Narrabri. This was advertised in the Courier on Tuesday 26th August 2008.

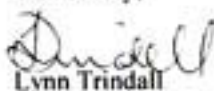
We hereby inform you that the Narrabri Local Aboriginal Land Council intention to submit and register their interests as per the NSW Aboriginal Land Rights Act as amended 2007 and under part 6 of the National Parks and Wildlife Act 1974 (as amended) "The Aboriginal objects and Aboriginal places".

We recognise that input from the Aboriginal community is an essential part of assessing the significance of those Aboriginal objects likely to be impacted by an activity.

Narrabri Local Aboriginal Land Council therefore submits their expression of interest in this activity and as an active stakeholder we would like to be consulted on all issues relating to this project.

We look forward to hearing from you, if you require any further information please contact me on the above number.

Yours truly,



Lynn Trindall
Chief Executive Officer
On behalf of Narrabri Local Aboriginal Land Council

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Appendix iii

Response from Narrabri Gomeroi Traditional Owner Group

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Mr Brad Trindall
6 Eleanor Street
NARRABRI NSW 2390

0429 455 671

Mr John Appleton
Archaeological Consultant
02 6772 6512

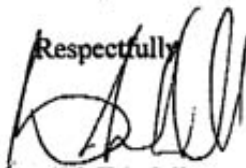
Dear Mr Appleton

I write in response to Public Notice advertisement in the Narrabri Courier dated 26 August 2008, Tuesday Edition.

I would like to register an interest in the Stage 2 Longwall Proposal at Narrabri Coal Mine pertaining to "Guidelines for Aboriginal Cultural Heritage Assessment and Community Consultation" on behalf of the Narrabri Gomeroi Traditional Owners group.

Should you wish to discuss this matter with me further I can be contacted on the above details.

We appreciate the opportunity to take part in discussions relating to Cultural Heritage management within our Traditional Lands.

Respectfully

BRS Trindall

On behalf of the Narrabri Gomeroi Traditional Owner Group

27 August 2008

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Appendix iv

Proposed Investigative Strategy for the Archaeological Investigation of the Project Site

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Archaeological
Surveys
&
Reports
Pty Ltd

John Appleton
A.C.I.S., A.C.I.M., B.A. (Hons)
16 Curtis Street, Armidale, NSW 2350

Tel. 02 6772 6512 Fax 02 6772 4567 Mob. 0428 651 789
Email: japples@northnet.com.au

ABN 67 075 625 722

.....

NARRABRI COAL MINE

PROPOSED INVESTIGATIVE STRATEGY FOR THE ARCHAEOLOGICAL INVESTIGATION OF THE PROJECT SITE

1. BACKGROUND

The Narrabri Coal Operations Pty Ltd (Narrabri Coal) is currently establishing the Narrabri Coal Mine Longwall operations between Narrabri and Boggabri, North West Slopes, NSW.

Previously, in March 2007, an archaeological investigation of the proposed **Pit Top Area** was undertaken by Australian Archaeological Survey Consultants Pty Ltd, assisted by Edward Trindall, representing the Narrabri Local Aboriginal Land Council.

As a consequence of feasibility studies and investigations undertaken by other consultants of the potential impacts from the proposed coal mine operations, it was identified that there was a possibility that mining would result in subsidence of the area above the mining operations. Consequently the Company commissioned R.W. Corkery & Co. Pty Limited (RWC) to prepare an Environmental Assessment to fulfill the conditions for Part 3A approval. Subsequently, RWC engaged Archaeological Surveys & Reports Pty Ltd (ASR), to undertake an archaeological survey of the entire area above the proposed mine workings in order to assess the potential impact of subsidence on any Aboriginal sites that might be present.

The survey of the area in which subsidence might occur would not be a comprehensive survey but one targeted at those potentially most sensitive locations and/or environments in which sites were most likely to occur such as creek lines, outcropping bedrock, and stands of old growth trees, to establish a reliable predictive model for the future management of any sites that might be impacted upon. The investigation of the area that might be impacted upon by subsidence is hereafter referred to as the **"Subsidence Area Overview"**.

Also, the preliminary investigations identified that it would be necessary to remove seam gas from the coal seam by constructing in-seam bore holes drilled at 300m centres, each borehole plumbed to panel gas drainage and the gas reticulated to a surface vacuum plant. Thus there would be an additional surface impact from access roads for vehicles and machinery required for the installation and drilling of the GOAF Drainage Boreholes. The archaeological investigation in this area was to be of greater resolution than that for the Subsidence Area Overview, and would target identified impact areas such as the GOAF Borehole sites and access roads. The first stage of mining will be for the "Longwall Panels 1-7 Area", and so the investigation for this phase will hereafter be referred to as the **"Archaeological Investigation of Longwall Panels 1-7 Area"**. It should be noted that this is only the first stage of a sequence of mining phases, and that further archaeological investigations will be required for other panels prior to them coming on to line over subsequent years.

This project is being undertaken as a 'Part 3A Major Project', hence the procedures to be followed are those required under the provisions for Part 3A Approval, which are to be in accordance with "Interim Community Consultation Requirements for Applicants" (H.O. 2004)

The proposed investigative strategy or methodology described below is in compliance with the requirements of the "Interim Community Consultation Requirements for Applicants", Part 6 Approvals of the National Parks & Wildlife Act 1974 (as amended); in-so-far-as they apply to the requirements for Part 3A "Major Projects".

2. ABORIGINAL PARTICIPATION

In accordance with the guidelines an advertisement was placed in the Narrabri local newspaper, "The Courier", on August 26th 2008, inviting Aboriginal stakeholders to register their interest. As a consequence Narrabri Local Aboriginal Land Council (LALC) and Narrabri Gomeroi Traditional Owners Group (Narrabri Gomeroi) registered their interests in being consulted.

Subsequently, Appleton (ASR) made a number of attempts to arrange a meeting of the registered stakeholders, but during the telephone conversations with Craig Trindall, Acting Chair, Narrabri Gomeroi, he stated that he would not accept that Narrabri LALC, as a registered stakeholder group, was entitled to choose its own representatives, and insisted that the Land Council's representatives should be chosen by the Narrabri Gomeroi. He restated this position on several occasions and it became clear that a meeting would not resolve the issue, but would be more likely to be counter-productive.

As a consequence, and after discussions with officers from DECC, and Narrabri Coal's representatives it was decided that both of the registered stakeholder groups would be invited to provide two representatives each, all four of whom would be paid for their participation in the fieldwork. Other representatives from either organisation would be permitted to participate in the fieldwork but would not be entitled to payment. Either organisation could provide alternative representatives on different days, providing those representatives had completed the necessary mine site induction. In the event that either of the organisations could not provide one or two representatives on any particular day, the survey would proceed with those representatives that were present, and neither organisation would be permitted to substitute one of their own representatives for the other organisation for the purposes of increasing their entitlement to more than two paid field-workers.

3. “Archaeological Investigation of Longwall Panels 1-7 Area”.

3.1 The survey area

The survey area is shown in the attachment, Figure 1.

As Figure 1 shows much of the area to be investigated is cleared pasture, although over two-thirds of the area above Panel 7 is uncleared Pilliga country. As the figure shows there are several significant drainage lines, and although the contour lines indicate that the area is of low relief, there is some potential for there to be shelving sandstone bedrock in the upper reaches of the creeks where they discharge from the Pilliga. But, there is no evidence for shelters or overhangs, nor is there a reliable water supply. The Predictive Model for the location of sites in the survey area is proposed as follows.

- Isolated artefacts may be present and visible in erosion features.
- Low-density artefact scatters may be present and visible in erosion features, but it is unlikely that any debitage will be visible

- There is a potential for trees more than 150 years old to exhibit scarred surfaces.
- There is a potential for any trees more than 150 years old to exhibit carved surfaces.
- There is some potential for there to be exposed sandstone bedrock in the upper reaches of the creeks, and therefore some potential for engravings, and/or grinding grooves.
- There may be some areas in which there is no archaeological evidence, but which have the potential to contain archaeological deposits (PADs).
- In the absence of shelters or overhangs there is no potential for shelters to exist and therefore no potential for art sites, and therefore no potential for undisturbed occupation deposits.
- It is unlikely there will be any Aboriginal stone quarries.
- It is unlikely there will be any shell middens.
- It is unlikely there will be any visible evidence of burials.
- There will be no surviving Bora rings.
- It is unlikely there will be any stone arrangements.

3.2 The survey methodology

In accordance with OH&S Standards, all investigators will be required to arrive on site with steel-toe-capped boots, fluorescent vests, long-sleeved shirts, long trousers and a hat. Hard hats will not be required, however, if the mine is operating at the time of the investigation, all investigators will be required to wear hard hats – the mine can provide the hard hats if necessary.

It is proposed that the Aboriginal representatives will be fully briefed on the objectives of the investigation at the commencement of the survey.

It is proposed that the survey will be undertaken entirely on foot, with the exception of when it is necessary to travel to property access points or to return to the survey area each day.

The survey will be focussed on two objectives. Firstly to identify any sites along the lines of the proposed GOAF Boreholes, including the Access Roads to those Boreholes; and secondly to identify any sites along the creek banks and drainage lines. Hence, there will be eight transect surveys north/south along the Borehole line and Access Road corridors, and the connecting east/west links, and a number of topographically determined routes along the creek banks and drainage lines.

It is proposed that all of the areas described above will be fully investigated.

It is proposed that all Aboriginal sites occurring within the Survey Area will be fully recorded, both photographically and in writing, and that those sites will subsequently be recorded on the AHIMS Site Register. Part 3A Approval overrides any protection that might otherwise have applied to environmental or cultural issues such as the National Parks & Wildlife Act 1974 (as amended). If any sites are recorded and Part 3A Approval is given there will be an opportunity to salvage any cultural or artefactual material.

It is proposed that the archaeologist will produce a report of the results of the investigation, and that copies of the report will be provided to each of the participating Aboriginal organisations, to DECC, and to the client.

It is proposed that the Aboriginal organisations will be given the opportunity to salvage the artefactual material, with the assistance of the archaeologist, and that the salvaged material will be removed and taken away by the archaeologist to enable him to produce a full analysis and detailed description of the salvaged material in a report written to record the salvage. The archaeological material will then be handed over to the organisation identified in the "Care & Control" application (that would be necessary to support the application for salvage).

Copies of the report detailing the results of analysis of the artefactual material will be provided to each of the participating Aboriginal organisations, to DECC, and to the client.

3.3 Survey schedule

It is anticipated that the survey will take four to five days to complete. The straight-line transects should take in the order of two to two-and-a-half days, and the creek banks should take a similar period.

4. "Subsidence Area Overview".

4.1 The survey area

The survey area is shown in the attachment, Figure 2. Note that it **excludes the area surveyed as "Archaeological Investigation of Longwall Panels 1-7 Area"**. It is stressed that this investigation is not to identify every site within the search area but to identify those topographical contexts in which sites are likely to occur, that would be impacted upon by

subsidence. Thus while artefact scatters would be recorded when found, as a general rule, artefact scatters are unlikely to be impacted upon by subsidence unless they are in a potentially precarious location or where a change to drainage patterns caused by subsidence could threaten the integrity of the sites. The primary objectives of the survey are to identify contexts of potential archaeological/cultural significance that might be impacted upon by subsidence, so that mine management can be informed in advance of what measures or management strategies need to be taken into account prior to extending the company's operations beyond Panels 1-7, for which further detailed "Archaeological Investigation of Panels" will be required. As with Panels 1-7, any artefactual material identified during the detailed investigation will be salvaged where those sites would be impacted by the GOAF Borehole lines and access roads.

As Figure 2 shows much of the area to be investigated is cleared pasture, although a significantly large area of the western section is Pilliga country. As the figure shows there are a number of significant drainage lines, and although the contour lines indicate that the area is of low relief, there is some potential for there to be shelving sandstone bedrock in the upper reaches of the creeks where they discharge from the Pilliga. A senior mine official familiar with the survey area informed ASR that there are no overhangs or shelters within the survey area, but that they occur to the west of the western boundary. The Predictive Model for site location in the survey area might therefore be as follows.

- Isolated artefacts may be present and visible in erosion features.
- Low-density artefact scatters may be present and visible in erosion features, but it is unlikely that any debitage will be visible
- There is a potential for trees more than 150 years old to exhibit scarred surfaces.
- There is a potential for any trees more than 150 years old to exhibit carved surfaces.
- There is some potential for there to be exposed sandstone bedrock in the upper reaches of the creeks, and therefore some potential for engravings, and/or grinding grooves.
- There may be some areas in which there is no archaeological evidence, but which have the potential to contain archaeological deposits (PADs).
- In the absence of shelters or overhangs there is no potential for shelters to exist and therefore no potential for art sites, and therefore no potential for undisturbed occupation deposits.
- It is unlikely there will be any Aboriginal stone quarries.
- It is unlikely there will be any shell middens.
- It is unlikely there will be any visible evidence of burials.

- There will be no surviving Bora rings.
- It is unlikely there will be any stone arrangements.

4.2 The survey methodology

In accordance with OH&S Standards, all investigators will be required to arrive on site with steel-toe-capped boots, fluorescent vests, long-sleeved shirts, long trousers and a hat. Hard hats will not be required, however, if the mine is operating at the time of the investigation, all investigators will be required to wear hard hats – the mine can provide the hard hats if necessary.

It is proposed that the Aboriginal representatives will be fully briefed on the investigation at the commencement of the survey.

It is proposed that the survey will be undertaken predominantly on foot, with the exception of when it is necessary to travel to property access points or to return to the survey area each day.

The survey will be focussed on three objectives. Firstly to identify contexts/topographical zones in which there is a potential for archaeological sites to exist; and secondly to assess what the impact from subsidence is likely to be in those particular contexts; and thirdly to propose an appropriate management strategy for the preservation (if possible), or alternatively, the salvage of those sites.

It is proposed that all of the areas described above will be sample surveyed, targeting topographical features and anomalies in the landscape sufficiently as to be able to reliably predict the likely presence of, and the content and distribution of sites and site types in the areas of future phases of mining.

It is proposed that all Aboriginal sites occurring within the Survey Area will be fully recorded, both photographically and in writing, and that those sites will subsequently be recorded on the AHIMS Site Register. Part 3A Approval overrides any protection that might otherwise have applied to environmental or cultural issues such as the National Parks & Wildlife Act 1974 (as amended). There will be no salvage of any artefactual material recorded during this survey. Salvage will only occur after the detailed Archaeological investigation of nominated panels has been undertaken when required.

It is proposed that the archaeologist will produce a report of the results of the investigation, and that copies of the reports will be provided to each of the participating Aboriginal organisations, to DECC, and to the client.

4.3 Survey schedule

It is anticipated that the survey will take four to twelve to fifteen working days to complete, depending upon the distribution and density of sites, the ease of accessibility to the individual properties, the degree of grassfire risk, and weather conditions. To minimise the lost time travelling recrossing back and forth through previously surveyed areas on a daily basis it will be necessary to use a vehicle, and because of the potentially high fire risk of driving a vehicle over very dry tall grass travelling will be along tracks and roads wherever possible, which means using gateways, and a great deal of time can be wasted merely opening and closing gates. Many drainage lines may also be unsafe to cross in a vehicle following rain.

5 SUMMARY

To summarise, the field survey for Narrabri Coal will have two components. The first survey, **“Archaeological Investigation of Longwall Panels 1-7 Area”**, will be a detailed survey of the GOAF Boreholes and access roads above Panels 1-7. All sites will be recorded, and those that will be impacted upon will subsequently be salvaged. The archaeologist will remove and analyse all salvaged material and produce reports of both the investigation and the analysis of the salvaged material.

The second survey, the **“Subsidence Area Overview”**, will be of the entire surface area above the proposed mine workings that have the potential to cause subsidence. The objective of this survey is to identify those sites that might be impacted upon by subsidence. It is not an attempt to locate every site, but is targeted to identify those sites, which because of their context or topographical location, might be damaged or destroyed by subsidence. This is not a survey to record every site that might be impacted upon by GOAF Boreholes or access roads. Those studies will be undertaken when required, and any sites that need to be salvaged will be salvaged at that time.