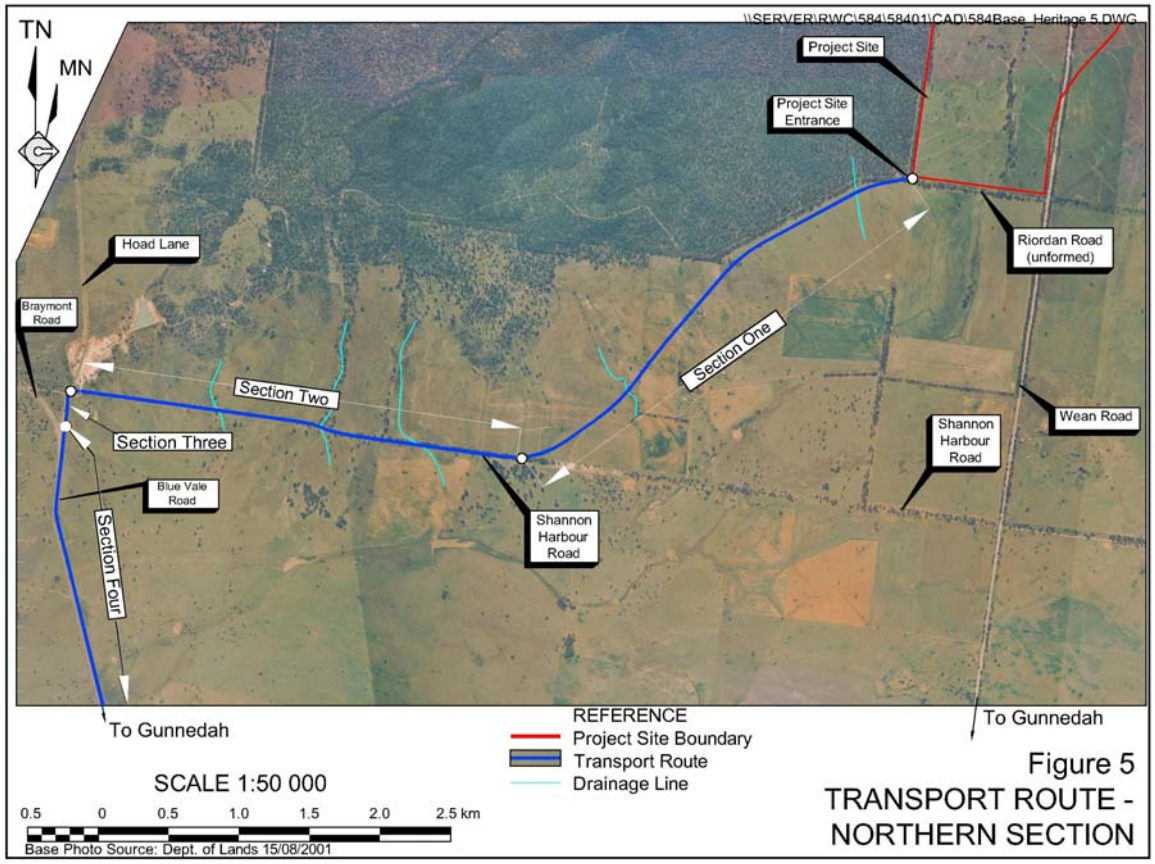

Note: A Colour Version of this figure is available on the project CD

1.3 Potential Impact of the Project

The Project, if approved, would involve the following activities.

- Coal mining by open cut mining methods over the area defined by the "limit of mining" (114.1ha). The limit of open cut mining has been defined by drilling and a review of economic, geological and environmental considerations as described in Section 2.3. The area proposed for auger mining is identified beyond the western limit of open cut mining and incorporation of this into the mine plan would be determined primarily by economic factors at the time.
- Open cut mining would be by the conventional haulback method involving the sequential removal of soil and overburden / interburden materials above and within the coal seams, coal removal, and progressive backfilling and rehabilitation of the mined-out areas. Open cut mining may be supplemented by auger mining, to a distance of 200m beyond the western limit of the open cut.
- Annual ROM coal production would increase from an initial level of approximately 0.75Mtpa to a maximum annual rate of 1.5Mtpa.
- Programmed placement of overburden and interburden materials from the open cut area to a combination of out-of-pit and in-pit overburden emplacements.
- On-site size reduction of the ROM coal using a crushing plant positioned within the Coal Handling and Processing Area.

- Relocation of a section of Wean Road.
- Upgrading sections of the Shannon Harbour Road and intersection onto Hoad Lane to be incorporated into the transport route.
- Transportation of coal from the Project Site to the Whitehaven CHPP for washing and/or despatch to export markets via rail to Port Newcastle. At least 85% of the Project ROM coal would require washing.
- Backloading of coarse and fine reject material from the Whitehaven CHPP for placement in the mined-out areas within the limit of mining.
- Installation of a range of services, structures and transportable buildings.
- Progressive shaping and rehabilitation of the areas of disturbance within the Project Site.

There is a potential for any archaeological contexts occurring within the footprint of any of the features and structures described above to be severely impacted upon or destroyed.

The constructed section of the transport route would have an impact width of 10m to 15m with further peripheral impacts possible from road construction machinery (turning circles, parking and laydown areas) and construction of fence lines, along the road easement margins.

As a consequence of this survey, it is unlikely that the same area will ever be surveyed again, thus from an archaeological perspective, this was an opportunity to observe and record any sites that might be present, and to propose a strategy for the management of any known or potential archaeological and/or cultural material in the future development of the area.

2 ABORIGINAL CONSULTATION

Prior to the investigation Mrs Ellen Draper, Chairperson, Red Chief Local Aboriginal Land Council (LALC), was contacted, and she confirmed that the study areas were within the Red Chief LALC management area. Mrs Draper arranged for Les Field and Wayne Martin, Sites Officers, to assist in the investigation, which was performed on 18th February 2002.

Both Sites Officers are experienced field workers and are regularly employed in the ongoing works at Whitehaven Coal Mine. Neither of the Sites Officers was aware of any specific Aboriginal associations with the survey area.

Both prior to and during the field survey, Martin and Appleton (ASR) discussed the potential for particular site types to be present, and the particular environments in which they might occur. They reviewed the survey strategy at regular intervals, and discussed the results as each section was completed. At the conclusion of the survey, the results were discussed in general, and the Sites Officers agreed to provide ASR with a copy of a letter conveying their recommendations on behalf of the Red Chief LALC, a copy of this letter is included as **Appendix i**.

The survey of the transport route was undertaken on 23rd July 2002. Les Field and Gary Griffiths, Sites Officers, Red Chief LALC, assisted Appleton in the survey. Both prior to and during the survey, Field, Griffiths and Appleton (ASR) discussed the potential for particular site types to be present, and the particular environments in which they might occur. At the

conclusion of the survey they discussed the results in general, and the Sites Officers agreed to provide ASR with a copy of a letter conveying their recommendations on behalf of the Red Chief LALC, a copy of which is included as **Appendix ii**.

Shortly following the completion of the site investigations and field surveys in 2002, the Project was placed on hold in favour of other local coal mine projects. In 2006, the Proponent advised that they would be continuing with an application for project approval for the Project and the Aboriginal Heritage Assessment was recommenced. Representatives of Red Chief (LALC) were consulted to confirm their previous recommendations. Representatives of the Bigundi Biame Traditional People were also consulted in relation to the previous field surveys undertaken.

In January 2007, an advertisement notifying of the 2002 field survey results and inviting comments from Aboriginal stakeholders was placed in the "Namoi Valley Independent" (in accordance with the Department of Environment and Climate Change's interim guidelines for community consultation). The coordinator of the Gunida Gunyah Aboriginal Corporation responded to the advertisement and requested consultation prior to disturbance of the identified sites.

3 THE ENVIRONMENTAL CONTEXT

Any discussion of the likely presence of Aboriginal cultural remains or of the basis why such remains might be discovered must be within the context of the environment and the resources that would have been available to any Aboriginal occupants of the area.

3.1 The General Geology, Topography and Soil Landscape

The Project Site occurs within the Sydney-Bowen Basin, a major structural basin, which extends from Batemans Bay in the south, to Collinsville, Queensland in the north. The New South Wales portion of the basin is divided into northern and southern sections by a transverse structural high to the north of Narrabri. The southern section of the Sydney-Bowen Basin has been divided into two lower category structural basins, the Sydney Basin and the Gunnedah Basin (Menzies 1974). The study area occurs in the Gunnedah Basin.

The geological structure in which the Project Site is located occurs in the northern half of the Gunnedah Coal Basin, which occurs in the eastern half of the Gunnedah Basin, and extends from just north of Narrabri south-eastwards to Murrurundi (Menzies 1974).

The Project Site straddles the broad upper valley of the headwaters of an unnamed intermittent creek, one of many tributaries of the Namoi River which flow in a sweeping arc southwards then westwards to join the Namoi to the north of Emerald Hill. The northern end of the Project Site straddles a saddle that separates Driggle Draggle Creek, which flows to the northwest, from the valley of an unnamed creek, referred to on the Project Site as the "Central Drainage Line".

The Elevation of the Project Site varies from a few metres above 300m AHD in the northeastern corner, down to approximately 268m AHD in the central drainage line on the southern boundary.

The transport route occurs on the lower slopes and edges of a broad valley floor. Elevations along the route vary from approximately 278m AHD where it leaves the Project Site, down to approximately 268m AHD where it joins Shannon Harbour Road, then continues over gentle undulations to join Hoad Lane at approximately 279m AHD.

The landscape in the region is generally described as being of 'undulating low hills and level plains of black cracking clays'. These black cracking clays are associated solely with Tertiary basalt or alluvium derived from Tertiary basalt. Associated soils include red structured earths, brown and red cracking clays, and red-brown earths (Murphy & Eldridge, 1993; 131). Site-specific soil surveys have been undertaken which showed the soils to be a mixture of Grey Chromosols, Grey Dermosols, Grey Vertosols, Brown Chromosols and Yellow Chromosols overlying conglomerate.

The surface soils in the Project Site and along the transport route vary with elevation. Between 340m AHD (beyond the north-western boundary of the Project Site) and approximately 290m AHD the surface is scattered with lag conglomerates. These give way to coarse, gritty, sedimentary deposits further downslope, and below 280m AHD the surface soils consist of stoneless, dusty, loam deposits.

3.2 Vegetation

As can be seen from the Topographic map, **Figure 1**, and the photographic record, the vast majority of the Project Site has been cleared for pasture, leaving only a small, partly cleared woodland in the northwestern section, and remnant strips of woodland along the road easements of Wean Road and the east/west cross road, Jaeger Lane, and along the banks of the central drainage line. The remnant woodland strips comprise predominantly of box gum, with some ironbarks and unidentified ribbon gums.

A number of Kurrajong trees were observed in the cleared paddocks of the northern section, but they may have been planted to complement pasture grasses as feed for cattle.

There is a ribbon of remnant open dry sclerophyll woodland along the closed Council Road to the southwest of the Project Site, and along the Shannon Harbour Road easement, but the transport route will be aligned to minimise the impact to the existing vegetation.

Prior to clearing, the landscape throughout the Project Site and along the transport route corridor probably supported an open to semi-closed dry sclerophyll woodland dominated by box type eucalyptus species, with less densely wooded areas of grassland.

3.3 Water Resources

The only local source of water is the central drainage line of the unnamed creek. At the time of the survey of the Project Site (mid February) the creek was dry and the only water was in existing farm dams along the drainage line. However, it is probable that even before land clearing and damming had silted up the creek bed that surface water would have only been an available resource for a few days following heavy rain.

Aboriginal use of the country was probably therefore restricted to periods immediately following rain when there was surface water, and after the rain had stimulated growth in the vegetation and increased the variety and numbers of other potential food resources, such as macropods, birds and insects etc., attracted to the revitalised vegetation.

3.4 Stone Resources

As referred to in Section 3.1, there was very little stone in the survey area with the exception of the colluvial and lag deposits of conglomerate stone on the western slopes behind the "Belmont" homestead. A number of large pebbles and small cobbles that would have been suitable for knapping stone tools were observed on the slopes and it was therefore not surprising when artefacts were later found along the western bank of the central drainage lines.

Elsewhere in the survey area, lag deposits of angular, poorly silicified, meta-sedimentary rock were scattered around the paddocks, and particularly in the southeastern sector, but the rock was entirely unsuitable for knapping. Any artefacts in areas, other than downslope of the western slopes, would have been brought into the area, and would therefore only be found as isolated artefacts or small scatters of micro-debitage produced in the maintenance of tools.

3.5 Previous Impacts

As described above almost the entire survey area has been cleared for pasture. In addition, the low-lying areas opposite and downstream of the "Belmont" homestead have been contoured to reduce erosion and optimise surface run-off collection.

The remnant woodland in the northwestern section has been significantly disturbed by tree-stump removal, and tree felling for firewood. Many trees have been ring-barked.

The least affected environments occur along the Jaeger Lane road easement, but even there the clearing of fencelines and maintenance to the road shoulders and spoon drains have impacted upon the understorey and ground cover.

The central drainage line has been dammed opposite the "Belmont" homestead and further downstream.

The Project Site is also bisected north to south by Wean Road, and east to west, by Jaeger Lane.

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 230000-243000, Northings 6567000-6598000 found that ten sites had previously been recorded in the 403km^2. search area. Details of the search are included as **Appendix ii**.

The low density of known sites, however, should not be seen as being indicative of the typical distribution and density of sites in the region, but merely indicates that no previous archaeological investigations have taken place in the area. Sites are generally recorded during investigations required to comply with Development Applications or to meet local or state government statutory requirements, and so in an area in which very little if any development has occurred since 1979 (when the Environmental Planning & Assessment Act was enacted), there have been very few opportunities in which sites might be observed and recorded.

In noting that the absence of sites in the local area merely reflects the fact that no previous surveys have taken place in the area, it is considered highly probable that sites exist along nearby watercourses, and in the vicinity of natural stone resources, and on and around prominent natural features such as Bald Hill, along Rangira Creek (approximately 8km to the southeast of the Project Site) and Birken Head Rock further downstream.

It is also worth noting that sites were recorded along Driggle Draggle Creek northwest of the Whitehaven Coal Mine and to the southwest of the Project Site (Appleton 1999), and that Driggle Draggle Creek would have provided a natural alternative route, passing via the saddle between the ridges of Vickery State Forest and Community Conservation Area Zone 2 - Kelvin, between the Namoi Valley and the Rangira Creek valley and its prominent outcrops.

5 MODELS FOR SITE LOCATION

5.1 Site Types and their 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 PADs), and ceremonial and mythological sites is included as **Appendix iii**.

5.2 A Predictive Model for the Study Area

Based on all of the above, the following model for site distribution was proposed for the study area, in which there are no shelters or overhangs, only one defined drainage line, and which generally has no sources of stone suitable for knapping tools and implements other than on the western slopes behind “Belmont” homestead.

- Isolated artefacts may be present and visible in erosion features along the banks of the central drainage line, particularly downslope of the lag conglomerates.
- Low-density artefact scatters may be present and visible in erosion features along the banks of the central drainage line, particularly downslope of the lag conglomerates, 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 a potential for PADs to be present.
- In the absence of any shelters there will be no art sites.
- In the absence of sandstone bedrock there will be no engravings, or grinding grooves.
- There will be no shell middens.
- There will be no intact occupation deposits.
- There are no known Mythological sites.
- There will be no stone quarries.
- There will be no visible evidence of burials.
- There will be no surviving Bora rings.
- There will be no surviving stone arrangements.

6 THE SURVEY

6.1 The Survey Strategy

Prior to the investigation it had been decided that as the survey area was quite large that the investigators would target particular environments and features where it was predicted that sites might occur, and at the same time include a cross-section of areas in which it was predicted there would be no sites, to provide a balanced testing of the predictive model.

However, it soon became obvious that archaeological visibility was extremely variable between fallow paddocks, heavily grazed paddocks, and recently ploughed/harrowed paddocks. While there was generally good archaeological visibility in those places where artefacts were predicted to occur, there were significant differences in the archaeological visibility in those areas where it was predicted they would not occur, purely as a consequence of land use at the time of the survey.

The revised survey strategy was to perform transect surveys, parallel to the survey area boundaries, over the entire area, paying particular attention to any features or environments previously identified as being of potential archaeological sensitivity on the Topographic map or the aerial photograph. In that way all environments and areas of differing land use were sample-surveyed.

The transport route was fully surveyed on foot.

6.2 Details of the Survey

The survey was performed by Appleton (ASR), assisted by Les Field, and Wayne Martin, Sites Officers, Red Chief LALC. The survey of all surfaces other than the Jaeger Lane road easements was made entirely on foot, in dry conditions under a heavy, grey sky, but in light ideal for observing any artefactual material present and observable. The Jaeger Lane road easement was surveyed from a (very) slowly-moving vehicle.

Mr Bob Corbett, a representative of the Proponent assisted us in the survey of the creek banks to the south of the homestead. Mr Corbett is an experienced fieldworker, and identified a number of artefacts during the survey, however, to avoid any misrepresentation as to the survey areas surveyed by the archaeologist and the Aboriginal Sites Officers the areas surveyed by Mr Corbett have been omitted from the map of the survey coverage.

The field investigation of the transport route was undertaken by Appleton (ASR), assisted by Les Field and Gary Griffiths, representing Red Chief LALC, on 23rd July 2002. The survey took place under a clear sky, in light ideal for observing any artefactual material present and observable.

All of the areas shown shaded in pink in **Figures 6** and **7** were surveyed on foot (see CD for colour version).

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 C-3030 Zoom Digital Camera, to record the character of the survey area, and to witness survey conditions. The site references were recorded using a Garmin “etrex” hand-held Global Positioning System (GPS).

6.4 Effectiveness of the Survey Technique

As previously described the archaeological visibility in the Project Site was extremely variable, however, there was sufficient ground surface exposure on tracks, contour banks, and stock erosion features in environments in which artefactual material was most likely to be present if at all, for an effective sampling of the survey area. In addition to the more obvious ground

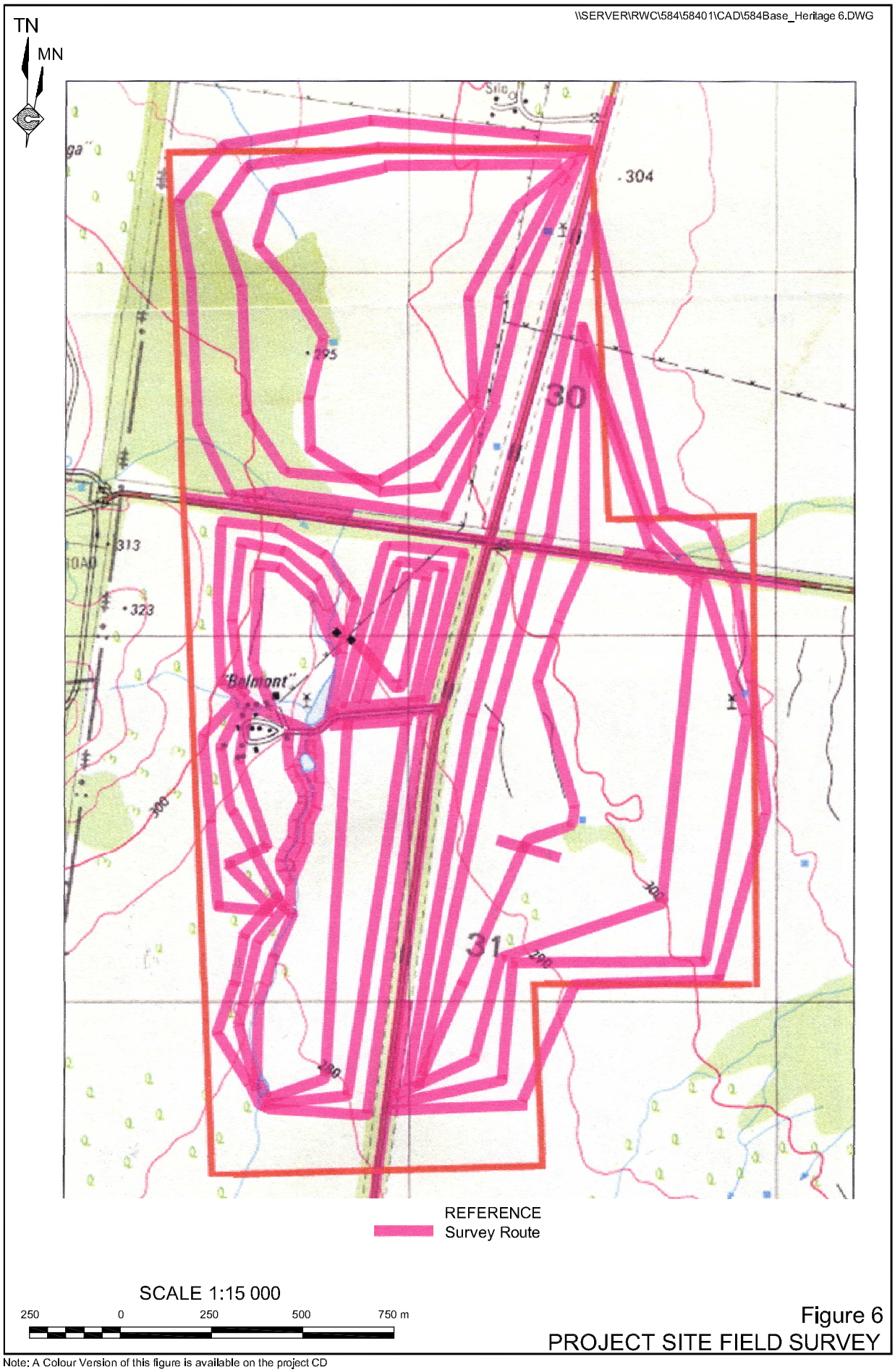

Figure 6
PROJECT SITE FIELD SURVEY

Note: A Colour Version of this figure is available on the project CD

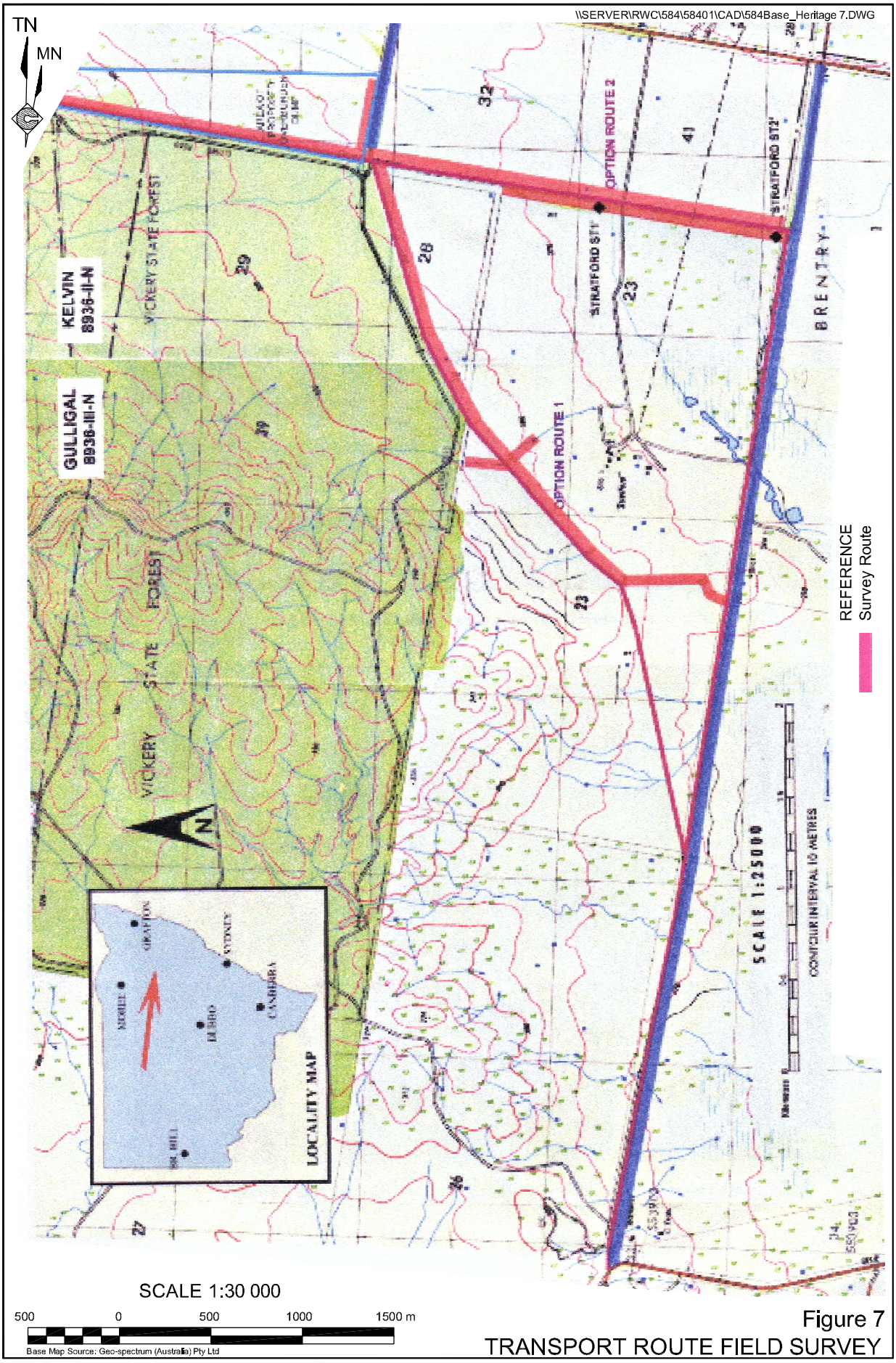

Figure 7
TRANSPORT ROUTE FIELD SURVEY

Note: A Colour Version of this figure is available on the project CD

surface exposures, many areas contained minor erosion features, which provided samples of those environments less likely to contain artefactual material. There was easy access to all mature trees in the open woodland area of the northwestern sector and along the road easements, and so the survey in respect of identifying scarred or carved trees was highly effective.

Archaeological visibility along the transport route was good and there was easy access to all extant vegetation and so the survey in respect of observing artefactual material and identifying scarred or carved trees was highly effective.

The survey technique was the most appropriate one to use in the circumstances, and the results are believed to be generally representative of the archaeological record in the survey area, (in which it was predicted there would be little artefactual material). Although the entire Project Site and transport route were surveyed, the groundcover was a constraint to the effectiveness of the survey in some specific areas, such as in the southeastern section of the Project Site, although even there the tops of the contour banking had been laid bare by stock wear and 'ant' scalds.

6.5 Effective Coverage

Table 1 summarises the effective coverage of the field survey and 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.

Table 1
Effective Survey Coverage

Area	Description	Approx. survey area	Rock/soil	Vegetation	Average surface visibility	Exposures	Approx area surveyed on foot	Average arch. visibility of exposures	Archaeology
1	NW Section, N of Yarrawonga Lane. Cleared area	Approximately 100.000 sqm	Loamy weathered sedimentary	Cleared paddocks with isolated kurrajong	> 40 %	Recently ploughed/harrowed	25%	70%	Nil
2	NW Section, N of Yarrawonga Lane. Woodland area	Approximately 50,000 sqm	Loamy weathered sedimentary with coarser sediments on higher ground	Open woodland of predom. Box gum	< 10 %	Bare ground around base of trees	25%	75%	Nil
3	NE Section, N of Yarrawonga Lane. Cleared area	Approximately 28,000 sqm	Loamy weathered sedimentary with coarser sediments towards the north	Cleared paddocks with eucalypt ribbon along minor drainage line	< 25 %	Grazing wear	40%	35%	Nil
4	SW Section, west of the creek	Approximately 100,000 sqm	Coarse sedimentary soils with a lag deposit of conglomerates	Cleared, with isolated eucalypts. Eucalypt ribbon along creek line	< 5 %	Stock trails and crests of contour banks	40%	80%	B3'
5	SW Section, east of the creek	Approximately 110,000 sqm	Loamy to coarser sedimentary soils	Cleared paddocks	< 5 %	Stock trails and crests of contour banks	40%	90%	B1' & 'B2'
6	SE Section	Approximately 180,000 sqm	Coarse grained soils with lag deposits of angular met-sedimentary stone	Cleared paddocks	< 3 %	Crests of contour banks	20%	75%	Nil
7	Road easements	Approximately 50,000 sqm	Loamy to coarser sedimentary soils in S, coarser to north	Eucalypt ribbon	< 3 %	Edge of spoon drain	25%	40%	Btree 1' & 'Btree 2'

The photographic record that follows (**Plates 1** to **27** – *colour version available on Project CD*) provides a visual reference for the survey conditions and various aspects of past impacts to the Project Site and transport route.