



**WERRIS CREEK COAL
ENVIRONMENTAL
MANAGEMENT SYSTEM**

Document Owner:	Environmental Officer
Revision Period:	3 YEARS
Issue:	FINAL
Last Revision Date:	02/07/2014
Date Printed:	02/07/2014

WHC_PLN_WC_HERITAGE MANAGEMENT PLAN

APPENDIX G – Archaeological Surveys & Reports Pty Ltd, The Salvage and Removal of the Narrawolga axe-grinding groove site, WCC, March 2007

**THE SALVAGE AND REMOVAL OF THE
“NARRAWOLGA” axe-grinding groove site,
WERRIS CREEK COAL MINE
Werris Creek, Northern NSW.**



Peter Allan of Nungaroo LALC after the last block had been moved.

John Appleton

ARCHAEOLOGICAL SURVEYS & REPORTS PTY LTD

MARCH 2007

Project No. 436/07

For

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EXECUTIVE SUMMARY

This report is a record of the salvage and removal of a cluster of axe-grinding grooves, known as the "Narrawolga" site, previously recorded during archaeological field survey for the Werris Creek Open Cut Coalmine, and has been prepared for Werris Creek Coal Pty Limited (Werris Creek Coal). It follows earlier reports of August 2004 (Archaeological Surveys & Reports Pty Ltd [ASR] 2004) prepared for R.W. Corkery & Co. Pty Limited (Corkery & Co.), and Management Plan (Werris Creek Coal 2005).

The Werris Creek Open Cut Coal Mine is located approximately 4 km south of Werris Creek and 11 km north-northwest of Quirindi in central northern New South Wales. The mine development lies within a 679 ha area covered by Mining Lease Application 249 (MLA 249) that incorporates the "Narrawolga" property and parts of the "Eurunderree" and "Cintra" properties (Werris Creek Coal 2005).

During the investigation a number of axe-grinding grooves were recorded in a location, described as a linear area approximately 90 m long by 35 m wide, between AMG E0275094 N65235420 and E0275134 N65234520 ("Quipolly" 9035-III-S, 1: 25,000 Topographic Map).

After a lengthy consultation process the Nungaroo Local Aboriginal Land Council and two stakeholder groups, that had registered an interest in the project, agreed to the removal of the axe-grinding grooves, and an application was made for Section 90 Consent to remove the site. Subsequently Section 90 Consent #2588 for removal was received, and the grooves were removed in accordance with the conditions of Consent.

This report provides a visual and descriptive record of the removal of the sandstone blocks on which the axe-grinding grooves occur, and their relocation to a storage area. The blocks will remain in the storage area until such time as the site location has been restored, at which time the blocks will be relocated in their original position thus restoring the significant features of the "Narrawolga" site.

TABLE OF CONTENTS

	Page
1. INTRODUCTION	
1.1 Location	1
1.2 Background	1
2. THE GEOTECHNICAL ASSESSMENT	5
3. MANAGEMENT OPTIONS	6
4. SECTION 90 CONSENT	7
5. MANAGEMENT PLAN OBJECTIVES	8
6. PRELIMINARY CONSULTATION WITH NUNGAROO LALC	9
7. CONSULTATION WITH OTHER INDIGENOUS STAKEHOLDERS	10
8. THE MANAGEMENT PLAN	12
9. PROVENANCING THE GROOVES	14
10. SALVAGE	14
10.1 Aboriginal participation	14
10.2 Site briefing	16
10.3 Site preparation	16
10.4 Equipment	17
10.5 The Storage Area	19
10.6 Recording	19
11. THE SALVAGE OF THE AXE-GRINDING GROOVE BLOCKS	20
11.1 Block 1	20
11.2 Blocks 2, 3 and 4	27
11.2.1 Block 2	28
11.2.2 Block 3	29

11.2.3 Block 4	29
11.3 Block 5	31
11.4 Block 6	34
11.5 Block 7	38
11.6 Block 8	39
11.7 Block 9	42
11.8 Block 10	44
12. COMPLETION	45
13. ARCHAEOLOGICAL OBSERVATIONS	48
14. EVALUATION	48
Acknowledgements	49
REFERENCES	50
APPENDICES	51
i) Correspondence from Nungaroo LALC	52
ii) Section 90 Consent to remove #2588	54
iii) Condition reports	59
FIGURES	
Fig 1 – Topographic map of the general area	2
Fig 2 – Location Plan Aboriginal Rock Grooves	15
Fig 3 – Just some of the equipment used to relocate the "Narrawolga" site	18
Fig 4 – Block 1 after sweeping	21
Fig 5 – Block 1 after high-pressure hosing	21
Fig 6 – Removing the surrounding bedrock to expose the sides of Block 1	22
Fig 7 – Drilling a series of holes to create a plane of weakness	22
Fig 8 – The Darda splitters in place	23
Fig 9 – The three Darda splitters are turned on as one	23
Fig 10 – The rock has been split	24
Fig 11 – Lifting bars are in place and the lift begins	24

Fig 12 – A hand nervously grasps the end of a lifting bar as it bends under the strain	25
Fig 13 – The underside of Block 1 showing the drill holes and one of the lifting rods	25
Fig 14 – The block is lifted onto a bed of crusher dust on the back of the low loader	26
Fig 15 – Block 1 is laid to rest where it will remain until the site is restored and the block relocated	26
Fig 16 – The left view shows Blocks 2, 3 and 4 being cleaned-up and the view on the right is from the same aspect after removal of loose material with the high-pressure hose	27
Fig 17 – Side view of Blocks 2, 3 and 4 in situ	28
Fig 18 – Block 2 ready for removal	28
Fig 19 – Block 3 in situ	29
Fig 20 – Blocks 3 and 4 in situ	29
Fig 21 – Block 4 is removed by the forklift	30
Fig 22 – Block 4 is lowered onto a bed of crusher dust for transportation to the storage area	30
Fig 23 – Block 5 after clean-up with the broom	31
Fig 24 – Block 5 after removal of the soil and with lifting rods in place	32
Fig 25 – Close-up of the crack in the lower section of Block 5 prior to removal	32
Fig 26 – Block 5 in the foreground before transportation	33
Fig 27 – Block 5 on arrival at the storage area	33
Fig 28 – Close-up of the break showing the internal faulting and separation	34
Fig 29 – Block 6 as it appeared when found	35
Fig 30 – Block 6 after clean-up with the pressure hose	35
Fig 31 – Block 6 is exposed	36
Fig 32 – Block 6 ready for lifting	36
Fig 33 – Block 6 being lifted	37
Fig 34 – Block 6 after removal	37
Fig 35 – Block 7 after sweeping	38
Fig 36 – Block 7 after the pressure hose had been applied	38
Fig 37 – Block 7 showing the extent to which roots had caused the breakdown of the block	39
Fig 38 – Block 8 after sweeping	40

Fig 39 – Block 8 after the pressure hose had been applied	40
Fig 40 – Side view of Block 8 showing the separation from the bedrock	41
Fig 41 – Block 8 being removed	41
Fig 42 – Block 9 prior to recovery	42
Fig 43 – Block 9 after the pressure hose had been used	42
Fig 44 – Block 9 exposed	43
Fig 45 – Block 9 is removed	43
Fig 46 – Block 10 as recorded in 2004	44
Fig 47 – The remains of Block 10 after its disagreement with the grader	45
Fig 48 – Werris Creek Coal Mine viewed from the "Narrawolga" storage area....	46
Fig 49 – Time to reflect after the last block has been off-loaded	46
Fig 50 – Crusher dust is built up around the blocks to retain ground moisture	47
Fig 51 – Relocation of the blocks has been completed and the area fenced off	47

1. INTRODUCTION

This report is a record of the salvage and removal of a cluster of axe-grinding grooves, known as the "Narrawolga" site, previously recorded during archaeological field survey for the Werris Creek Open Cut Coalmine, and has been prepared for Werris Creek Coal Pty Limited (Werris Creek Coal). It follows earlier reports of August 2004 (Archaeological Surveys & Reports Pty Ltd [ASR] 2004) prepared for R.W. Corkery & Co. Pty Limited (Corkery & Co.), and Management Plan (Werris Creek Coal 2005).

1.1 LOCATION

The Werris Creek Open Cut Coal Mine is located approximately 4 km south of Werris Creek and 11 km north-northwest of Quirindi in central northern New South Wales. The mine development lies within a 679 ha area covered by Mining Lease Application 249 (MLA 249) that incorporates the "Narrawolga" property and parts of the "Eurunderee" and "Cintra" properties (Werris Creek Coal 2005).

Figure 1 on the following page is detail a Topographic map showing the site location.

1.2 BACKGROUND

In August 2004 ASR undertook an archaeological investigation of the site of the proposed Werris Creek Coal Mine for Corkery & Co., acting on behalf of the proponents, Werris Creek Coal. John Appleton (ASR) performed the investigation, accompanied by Messrs Peter Allan and Shane Allan, Sites Officers, Nungaroo Local Aboriginal Land Council (LALC).

During the investigation a number of axe-grinding grooves were recorded in a location, described as:

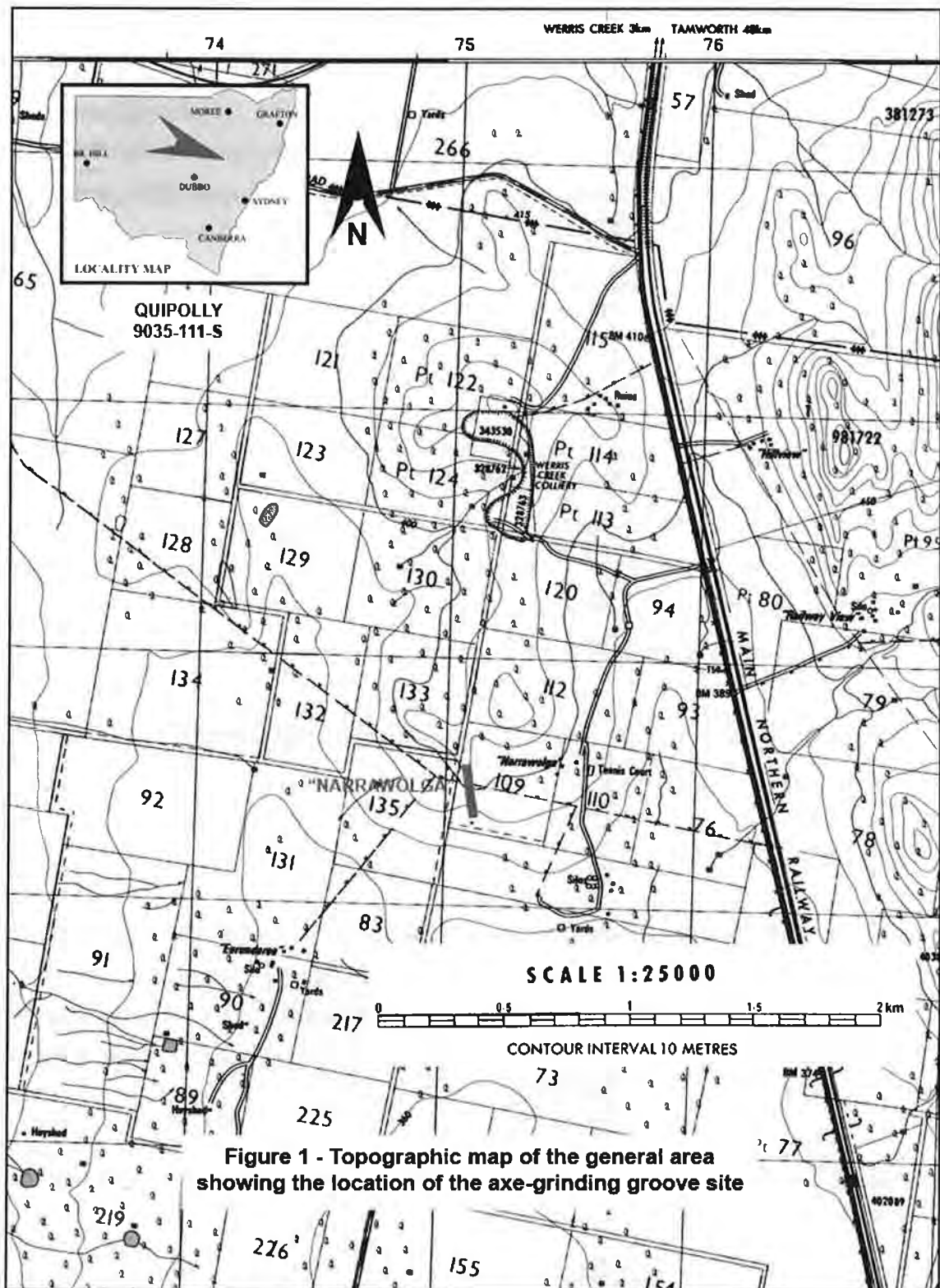


Figure 1 - Topographic map of the general area showing the location of the axe-grinding groove site

A linear area approximately 90 m long by 35 m wide, between AMG E0275094 N65235420 and E0275134 N65234520 ("Quipolly" 9035-III-S, 1: 25,000 Topographic Map.

"... comprising of 25 or more axe-grinding grooves ... The surface of the grooves are highly weathered but vary significantly in definition. It is unknown whether the variation is a consequence of differences in resistance of the rock surfaces to weathering and deterioration, or whether the differences are because of the grooves were made at different times. If however it is because of the latter then the grooves were made over a considerable length of time".

The site was named "Narrawolga", hereafter referred to as the grinding groove site.

Partly as a consequence of the results of the field investigation the mining company chose to revise the conceptual layout of the proposed coal mine, in order to avoid impacting directly on the archaeologically sensitive area. The recording of the location of the grinding groove site necessitated the relocation of the proposed soil overburden stockpile (in the vicinity of the site), and the haul road.

When Peter Allen reported the finding of the grinding groove site to the members of the Nungaroo LALC they agreed that the site was of high cultural significance to the Aboriginal Community, and that the site should be preserved *in situ* – however, the members were also anxious not to prevent mine operations that will have the potential to invigorate the local economy as well as provide both direct and indirect employment opportunities. From that point it became an issue of how to proceed in such a way that would both preserve the site *in situ* and allow mining to proceed.

The Nungaroo LALC was directly involved in the consultation process from the commencement of the archaeological investigation, and following the recording of the site, was fully appraised of both the potential constraints that preservation of the site would place on the operation of the proposed coal mine, and the various options available to it, both in terms of the future management of the site and the future

operations of the coal mine. Very conscious of the potential cultural significance of the site ASR gave the Land Council ample time for it to discuss and consider its options before discussing them further with the management of Werris Creek Coal.

As a consequence an agreement was reached between Nungaroo LALC and Werris Creek Coal which would allow the coal mining operations to proceed to within 100 metres of the site, while affording protection and preservation of the grinding groove site until such time as there was more accurate information upon which to base further discussion of management options for continuing operations within the buffer zone. A copy of the signed agreement was received by ASR on 29th July 2004, and is included as Appendix i.

The recommendations of Nungaroo LALC were:

That no mining should occur within 100 m of the axe-grinding groove site until the results of mining and blasting in the section beyond the buffer zone are known. Werris Creek Coal is to monitor the effects and impacts from mining and blasting in the eastern section to determine the effects on the sandstone substrate on which the axe-grinding grooves occur. When the results of monitoring are known Werris Creek Coal should consult further with Nungaroo LALC to determine the appropriate management strategy for the continued operation of the mine, and the appropriate conservation or preservation strategies for the care and management of the axe-grinding groove site.

In March 2005 Werris Creek Coal produced an "Archaeology and Cultural Heritage Management Plan" (Werris Creek Coal 2006), in satisfaction of Condition 45 of the Development Consent for the Werris Creek Open Cut Coal Mine (Development Consent No. 172-7-2004). The Minister for Infrastructure and Planning signed the Development Consent on 18th February 2005 (Werris Creek Coal 2005).

2. THE GEOTECHNICAL ASSESSMENT

In February 2006 Werris Creek Coal commissioned G.E Holt & Associates Pty Ltd (Holt) to undertake a geotechnical assessment of the potential impact of blasting on the grinding groove site (Holt 2006).

The scope of works was to comprise "... a site inspection, followed by geological and mine data gathering, an assessment of current blasting practice through examination of the blasting records, assessment of likely vibration levels, and determination of likely impacts and requirements for any protection from vibration caused by blasting".

Holt noted that the "pit outline was altered to exclude the site by placing a convex curve in the western wall of the proposed pit. This positioned the grinding grooves closest to the pit at 30 m from the crest. The grooves occur on a number of flat sandstone surfaces, which are not visibly connected because of the soil cover".

Holt found as a consequence of borehole testing that:

"... at the surface the rock is partly weathered, having been exposed in a near-to-surface location for considerable time. A feature of such weathering of near surface rock is a reduction in strength, and the development of joints and cracks, which break up the solid rock mass into discrete blocks. The blocks sit tightly together, but the sandstone unit is not a solid mass of rock near the ground surface. It is also not fully connected to the fresh rock beneath as a result of development of near-surface weathered joints and cracks. This enables the top 1.8 m on average to be removed by truck and dozer" (Holt 2006, 5-6).

In its assessment of the potential impact of blasting Holt stressed that:

"... it is vital to maintain stability of the crest of the highwall, and this is just the situation at the Narrawolga site, which is 30 m away from the planned crest of the highwall ... If back break from blasting causes too much damage in the uppermost sections of pit walls instability problems can arise" (Holt 2006, 9-10).

In their conclusions Holt stated that:

"The bedding dips into the proposed pit at between 30° and 33°. There is every chance that if the pit is oriented around the grinding grooves, as currently proposed, the face will fail, taking the sandstone containing the grinding grooves into the pit. This is not recommended from a safety viewpoint as such failure will provide little warning, failing along steeply dipping bedding planes" (Holt 2006, 14).

3. MANAGEMENT OPTIONS

Following receipt of the Holt report Mr Ray Robinson, Mine Manager, Werris Creek Coal Mine, considered his options, which were either to reduce the size of the pit to avoid the risk of slippage to the grinding groove site, and thereby reduce the scale of operations – which would seriously jeopardise the viability and longevity of operations; or alternatively, to remove the potential risk of damaging the grinding groove site. Given that it would not be practical or logistically possible to protect the site *in situ* and therefore not possible to remove the danger from the site, the preferable option was to remove the site from the danger.

In late February 2006 Mr Robinson forwarded a copy of the Holt report to ASR drawing attention to the conclusions of the report that although the site could be protected from blasting there was a risk that it could be damaged by slope instability. Subsequently Mr Robinson and Appleton discussed the procedure that would be necessary to remove the sandstone blocks away from the potential danger posed by slope instability, and stored until they could be safely restored to their original position after the danger had passed.

The proposal required the temporary removal of the blocks on which the axe-grinding grooves occur to allow coal mining to continue without damaging the blocks, and to storing the blocks in a secure area away from any risk of damage during mining operations, and to replacing them in exactly the same position when the mining operations have been completed and the mine rehabilitated.

Appleton's advice was that removal of the sandstone blocks, regardless of the fact that they would be subsequently replaced, would in the first instance "destroy" the integrity of the archaeological context, and would therefore require removal/salvage under Section 90 Consent.

4. SECTION 90 CONSENT

An application for Section 90 Consent requires that certain formalities are followed and specified requirements are fulfilled prior to lodgement of the application. In December 2004 DEC issued "Interim Community Consultation Requirements for Applicants" (Consultation Requirements) for engaging with the Aboriginal Community as part of the preparation of an application for a consent or permit under Part 6 of the National Parks and Wildlife Act 1974 (DEC 2004).

The Consultation Requirements specify that when a proponent or their consultant wish to proceed with an application they must follow the following procedure:

- Place an advertisement in the local press setting out the proposal and inviting Aboriginal stakeholders to register an interest in the proposal (the stakeholders must be allowed at least 10 days in which to respond).
- The consultant should prepare an assessment or management plan (or design plan).
- The proponent or their consultant should present or provide the proposed methodology to the registered stakeholders.
- The stakeholders are required to review and provide feedback to the proposal within a reasonable time (at least 21 days).
- The consultant is required to amend the management plan to reflect the wishes of the registered stakeholders.

- The revised management plan is to be presented to all registered stakeholders.
- The stakeholders are required to review and provide feedback to the revised management plan (no time limit is set by the guidelines).
- Once agreement has been reached as to the final management plan, the consultant should finalise the report and lodge it with the relevant application to DEC.

5. MANAGEMENT PLAN OBJECTIVES

As a basic requirement of the consultation process a Management Plan should be prepared which sets out how the proponent and their consultant propose to manage the sequence of events that will achieve their objective. In the case of Consents to salvage the objectives are directed to the managed removal of the archaeological evidence in such a way, insofar as it is possible, to preserve the cultural integrity of the site, optimise the scientific information that can be learnt from the site, minimise any impact to the artefactual material, and best preserve and manage the archaeological material recovered from the site.

In this instance in which it is proposed that the site will be restored once the site context has been rehabilitated the Management Plan sets out the procedure for the controlled removal (salvage) of the archaeological material, its storage, and ultimately its replacement.

The primary objectives of the Management Plan for the "Narrawolga" site were:

1. To address the concerns of the Aboriginal Community.
2. To facilitate the mining of the coal deposits in the vicinity of the axe grinding-groove site.

3. To avoid any damage to the "Narrawolga" axe grinding-groove site from mining operations by removing the sandstone blocks on which they occur to a safe place.
4. To provide a precise set of procedures to remove, store, protect and ultimately replace the sandstone blocks on which the axe grinding-grooves occur when the mine is rehabilitated upon completion of mining operations.
5. To restore the site to its former condition after mining operations have been completed.

6. PRELIMINARY CONSULTATION WITH NUNGAROO LALC

After lengthy discussions between Mr Robinson and Appleton (ASR), and subsequently between Mr Robinson and Mr Graham Holley, part owner of Creek Resources Pty Ltd (60% owners of Werris Creek Coal Mine, and a person with an established working relationship with Nungaroo LALC) Mr Holley approached Nungaroo LALC with the proposal to remove the sandstone blocks to enable the mine to continue operations as originally planned.

Subsequent to the discussion between Mr Holley and representatives of Nungaroo LALC, a constituted meeting of Nungaroo LALC unanimously agreed to the proposal and to an application for Section 90 Consent to remove the site, protect, replace and restore it as proposed.

In February 2006 Mr Robinson instructed ASR to proceed with the application for Section 90 Consent.

7. CONSULTATION WITH OTHER INDIGENOUS STAKEHOLDERS

Having obtained Nungaroo LALC agreement in principle to the proposal to remove the sandstone blocks the next step was to expand the consultation process in accordance with Interim Community Consultation Requirements for Applicants (National Parks and Wildlife Act 1974; Part 6 Approvals (DEC 2004).

Accordingly, an advertisement inviting all interested stakeholders to register an interest in proceedings was placed in the Quirindi Advocate of 8th March 2006.

Two responses to the advertisement were received, one from Simon (and Corey) Taylor and the other from Stephen (and Victor) Porter. As a consequence of the responses a letter detailing the proposal was sent to each of the families explaining why the action was necessary, and inviting them to discuss the issues further, or to meet Mr Robinson to discuss any concerns they might have (unfortunately Appleton was to undergo a total knee replacement [at one week's notice] and the hospitalisation, recovery and minimum legally permissible period before being able to drive again, meant that Appleton would not be able to travel by car again for at least three months from the date of the operation, 8th April 2006).

Subsequently, the stakeholders contacted Mr Robinson who met them on site and discussed the proposal at length.

On Monday 26th June 2006, Appleton rang Corey Taylor to see whether Corey wished to discuss the matter further, as it was still not clear that the Taylors would support an application for Section 90 Consent. Corey stated that he wanted Appleton to meet him in Quirindi to discuss the issues further. Further delays were incurred when Appleton was required to undertake urgent investigations at Port Macquarie (a week), Emmaville (a week) and an investigation of 110 km of seismic lines south of Cobar (two weeks), each of which were outstanding commitments that Appleton had deferred pending his recovery from the knee operation.

As a consequence it was Monday 31st August 2006 before Appleton could meet Corey Taylor to discuss the proposal. Corey expressed the feelings of his family that they would oppose the proposal to remove the grinding grooves. Appleton and Corey discussed the cultural and archaeological significance of the site both in terms of what was known, how the site fitted into the cultural and archaeological landscape, and how the site could be managed both in the short and long term. Discussion also included the findings and implications of the Holt geotechnical assessment and the identification of the potential risk of pit face failure. Appleton explained that if the grinding grooves were not removed there was a danger that there could be slippage of the mine face and that the grinding grooves would be destroyed. And that by removing the grinding grooves from the danger they would remain intact and could be replaced when mining was complete. The issues were discussed at great length to ensure that Corey understood the various options, risks, opportunities, and likely outcomes. Corey said that he would discuss the issues further with his father and family and advise Appleton in writing of their decision.

On 25th August Appleton received a fax from Corey stating that after lengthy consultation with the other members of his family that they agreed to the proposal, subject to several conditions, one of which was that Wollemi pines should be planted at the site.

Following receipt of the fax Appleton contacted Mr Robinson to discuss the conditions in Corey's fax. Mr Robinson said that he had no problems with any of the conditions, other than that he would have to seek an expert's advice on whether Wollemi pines would survive in the environment (given that Wollemi Pines thrive in a moist, gorge-like environment and that the mine site is on a dry, exposed ridge).

After several unsuccessful attempts to contact Victor Porter to confirm their earlier telephone conversation in which Victor had agreed to the removal of the axe grinding grooves, and subsequent replacement when the mine had completed its operations, Appleton spoke to Victor by telephone on 1st September 2006. Victor confirmed that he still agreed with the proposal and said that he would state as much in a letter to support the application for Section 90 Consent. Subsequently Victor's letter was received on 5th September 2006.

There being no further considerations the Management Plan was finalised as follows.

8. THE MANAGEMENT PLAN

- 1) A qualified surveyor, assisted by a qualified archaeologist (to identify the relevant blocks) would accurately provenance each of the sandstone blocks on which the grinding-grooves occur, and draw up a scaled plan of the site showing both the surface topography of the ridge on which the site occurs (to include the site and the surrounding area for a distance of 30 m from the outer limits of the site) and the alignment of each block.
- 2) Each block would be numbered, photographed, and archaeologically recorded in detail by the archaeologist and a representative of Nungaroo LALC.
- 3) Each block would be carefully removed by the appropriate machinery, numbered by the archaeologist with marking-paint on a surface other than the upper surface), and conveyed by truck to an enclosed (fenced) storage area: the procedure being monitored by the archaeologist and a representative of Nungaroo LALC. Representatives of the Taylor family wish to observe the removal of the blocks.
- 4) Once placed in the storage area each block would be examined for its condition, damage, etc. details of which should be recorded by the archaeologist on prepared Condition Reports, one for each block. The Taylor family expressed their wish to view the storage area.
- 5) Upon completion of the transfer of all of the blocks to the storage compound the archaeologist should prepare a report of the procedure, including details of the site, a copy of the surveyor's plan of the site, copies of the Condition Reports, and a photographic record of the events.

Access to the storage compound by suitably qualified people would only be permitted with the authority of the Mine Manager (Nungaroo LALC would be given periodic access to the storage area to check on the condition of the blocks and grinding grooves – Nungaroo LALC to give the Mine Manager 48 hours notice of its intended visit).

- 6) At such time as mining in the locality of the axe grinding-groove site has been completed, and the ridge on which the axe-grinding groove site occurred has been restored and rehabilitated and there is no further possibility that mining operations will impact upon the site, the blocks on which the axe grinding-grooves occur shall be mechanically replaced in accordance with the surveyor's site plan. The operation shall be monitored by the archaeologist and a representative of Nungaroo LALC.
- 7) A sign is to be erected at the roadside to the entrance to the mine to inform the public of the controlled removal and subsequent replacement of the grinding groove blocks with Aboriginal agreement.
- 8) Upon completion of restoration of the site the archaeologist shall prepare an amended Site Recording Form detailing what has taken place – attached to which shall be a brief photographic and descriptive report of the replacement procedure, and the condition of the restored grinding groove site – and lodge the completed form and attachments with DEC (copies also to the Mine Manager, Nungaroo LALC, and to each of the three Aboriginal groups involved in the community consultation process).
- 9) The Taylor family also recommended that several Wollemi Pines be planted within close proximity of the grinding groove site. The Mine Manager was awaiting an expert's report on the suitability of the plant to the particular environment. If the expert recommended that the species would not thrive in the environment the Mine Manager would consult further with the Taylor Family to select a more suitable species.

Subsequently, application was made for Section 90 Consent, and was obtained - Consent with salvage #2588, dated 8th December 2006 – included as Appendix ii.

9. PROVENANCING THE GROOVES

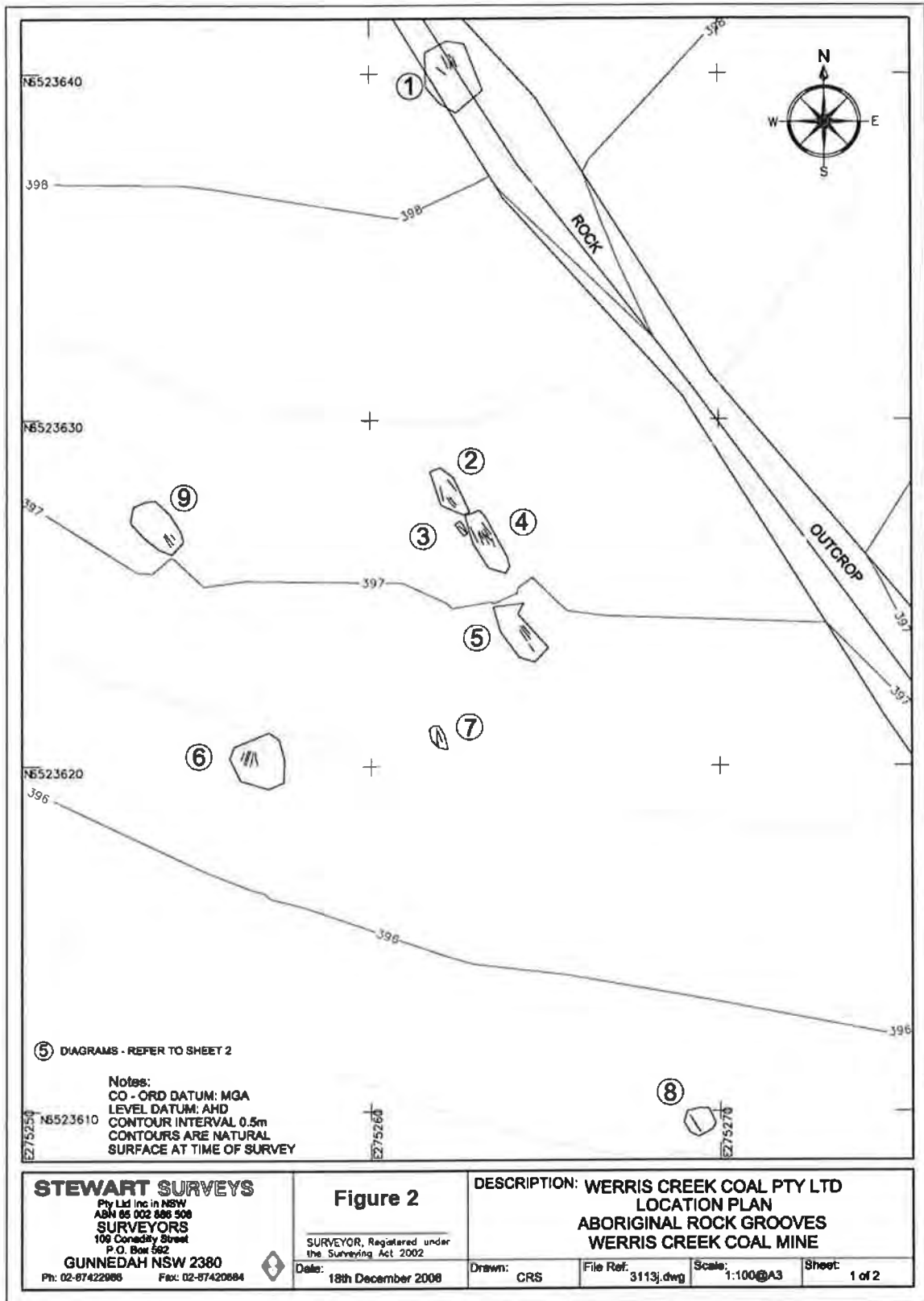
One of the conditions of Consent was that the axe-grinding grooves would be replaced in their 'original' position once the location had been restored and rehabilitated once mining had been completed, and so it was necessary for the grooves to be accurately plotted onto a site plan. Consequently, on 18th December 2006, Appleton (ASR) attended the site with Cliff Stewart of Stewart Surveys Pty Ltd, who plotted the locations of each of the blocks on which the grooves occurred, and the approximate axis and length of each groove, using a GPS (Global Positioning System - accurate to a few centimetres). A copy of the finished plan appears on the following page – note that the numbers used by the surveyors for each block have been used throughout the remainder of this report for consistency.

10. SALVAGE

10.1 Aboriginal participation

Prior to the investigation Ray Robinson (Mine Manager) contacted the Taylors and the Porters to invite them to attend the relocation of the axe-grinding grooves, but the Porters declined the invitation and Corey Taylor, a local teacher at Quirindi, could not take time off to attend.

Ray also invited Nungaroo LALC to send a representative, but Peter Allan, the Sites Officer could only be present for some of the time due to family business.



10.2 Site briefing

Upon arrival at the site and before any work began Appleton (ASR) briefed the crew that had been assembled to undertake the operation, on the archaeological and cultural significance of the site, and the agreed process for the relocation of the blocks on which the axe-grinding grooves occurred.

As described in the previous report it was unclear which of the nine blocks were floaters and which were attached to bedrock, but it appeared probable that Block 1 was a surface exposure of bedrock. But what was clear was that removal of the blocks would require professional expertise and the right machinery. The team commissioned by Ray Robinson to undertake removal of the blocks comprised Bruce Garland of 'Outback Sandstone' – a specialist in rock splitting, and Barry Bisby (Manager) and Danny Mitchell of 'B&G Concrete Sawing & Drilling'. Other people included in the briefing included Rob Snook, Site Manager, Werris Creek Coal Pty Ltd, who oversaw the operation, and organised and provided the personnel, plant, equipment and materials, and instructed the various drivers and machinery and plant operators who were necessary to complete the operation. Other personnel such as some of the machinery operators not present at the first briefing were briefed when they first arrived on site over the following days.

10.3 Site preparation

Since the initial archaeological investigation there had been significant grass-growth and accumulation of detritus overlapping the edges of the blocks and so it was decided that the first objective was to find the 'real' dimensions of each block. Firstly, each block was swept vigorously with a stiff broom to remove the detritus and expose the 'edge' of the block. Then a backhoe was used to excavate a trench approximately 50 cm deep around each block, no closer than 50 cm to the exposed edge. A high-pressure water-hose was then used to 'undermine' and break-up the soil around each block, the loosened soil being washed offsite down the surrounding trenches. Once each block had been exposed it became clear that three of the blocks were still attached to bedrock, blocks 1, 5 and 6.

It was decided that in order to minimise the potential for damage to occur to the axe-grinding grooves from the heavy machinery that would be necessary to remove the three attached blocks, that the six other blocks, the floaters, would be removed first.

For practical reasons the descriptions of the salvage of each block that follows is given in numerical sequence (according to the surveyor's numbering).

10.4 Equipment

The following list of equipment is provided to provide an insight into the scale of operations that was necessary for what might otherwise appear to have been a simple operation. ASR thanks Bruce, Barry, Danny and Rob for providing this information.

- "New Holland All Terrain Telescopic Fork Lift" (NHATT forklift)
- Low-loader
- "Caterpillar D11"
- Crane
- Road grader – "Caterpillar 160 H"
- "Darda Splitters C9" - 200 tons push
- "Darda Splitters C12" - 360 tons push
- "Darda Combi-shears" (4 ton lifting capacity)
- "Magnum Hydraulic Core Drills" – 48 mm diamond tipped, 610 mm depth
- High-pressure water hose
- Water truck
- Power Packs for splitters etc
- 150 Tonne of "crusher dust" – crushed basalt screened to –5mm
- 25 Tonne semi-trailer (to deliver crusher dust)
- 6 steel rods 40mm diameter 41-10 (lifting rods)
- Sundry items, such as crow-bars, brooms, shovels, hand-brushes, trowels, camera, scale bars, straw bales



Figure 3 - Just some of the equipment used to relocate the "Narrawolga" site

10.5 The Storage Area

Prior to the removal operation Ray Robinson had agreed that a 'safe area', referred to in the report as the storage area, would be set aside some distance from the coalmine working area where the blocks on which the axe-grinding grooves occurred, could be safely stored.

The area was approximately 300 m from the coalmine working area, well beyond the potential impact from fly-rock (from blasting) range, which from his experience in investigating a number of mines and quarries, Appleton has learnt is generally accepted by mining engineers to be about 200 m.

The blocks would be lowered onto a bed of crusher dust, which was then built up around each block to retain the moisture and to provide support to the decomposing undersides of the blocks.

Peter Allen, Sites Officer, Nungaroo LALC has agreed to visit the storage area monthly to spray the blocks and crusher dust with water to restore and retain the moisture level. If the crusher dust is allowed to become too dry there is a potential for the blocks to crack and disintegrate without the moist underlying support they have been used to.

10.6 Recording

In compliance with the Management Plan and the conditions of Consent a comprehensive photographic record was made of all phases of the operation, and Condition Reports compiled for each block, both prior to removal, and upon arrival and off-loading in the storage area – copies of the Condition Reports are included in the Appendices.

11. THE SALVAGE OF THE AXE-GRINDING GROOVE BLOCKS

The following descriptions and photographic record are provided as a means of identification and condition description of each block, that should assist in the handling and relocation of the blocks upon completion of mining and restoration of the "Narrawolga" site.

11.1 Block 1

From the outset this block was considered to be the one that would cause the most problems, primarily because it appeared to be part of the outcropping bedrock and be both robust and massive, and so removal of the grinding grooves would require the removal of a large surface area of rock.

A high-pressure hose was applied to the surface of the block to remove the lichen and detritus and reveal the faults and cracks that might be used to advantage during the removal operation. It soon became clear that the block was attached to the bedrock, but that there were cross-faults perpendicular to the axis of the outcrop, and that these might be used as lines of weakness to remove the surrounding bedrock from the block on which the grooves occurred. Initially a grader was used to try to remove the unwanted bedrock, but was unsuccessful, and so a 'D11' was used to open up an area large enough to allow the rock-splitters to be able to gain access to the vertical sides of the block on which the grooves occurred.

The rock-splitting team then drilled a series of downward sloping holes along one long side of the block to 'perforate' a plane of weakness through the rock, and then drilled another hole from one end of the block, at right-angles to the line of holes, to provide a second plane of weakness to ensure that the split, when it occurred, would rise rather than continue downwards. Once the holes had been drilled the Darda splitters were put in places, and when the signal was given, all three splitters were turned on at once. The result was exactly as the splitters had planned and predicted and the block was split with a clean break.



Figure 4 - Block 1 after sweeping



Figure 5 - Block 1 after high-pressure hosing.



Figure 6 - Removing the surrounding bedrock to expose the sides of Block 1.
The straw bale is protecting the grooves.



Figure 7 - Drilling a series of deep holes to create a plane of weakness.

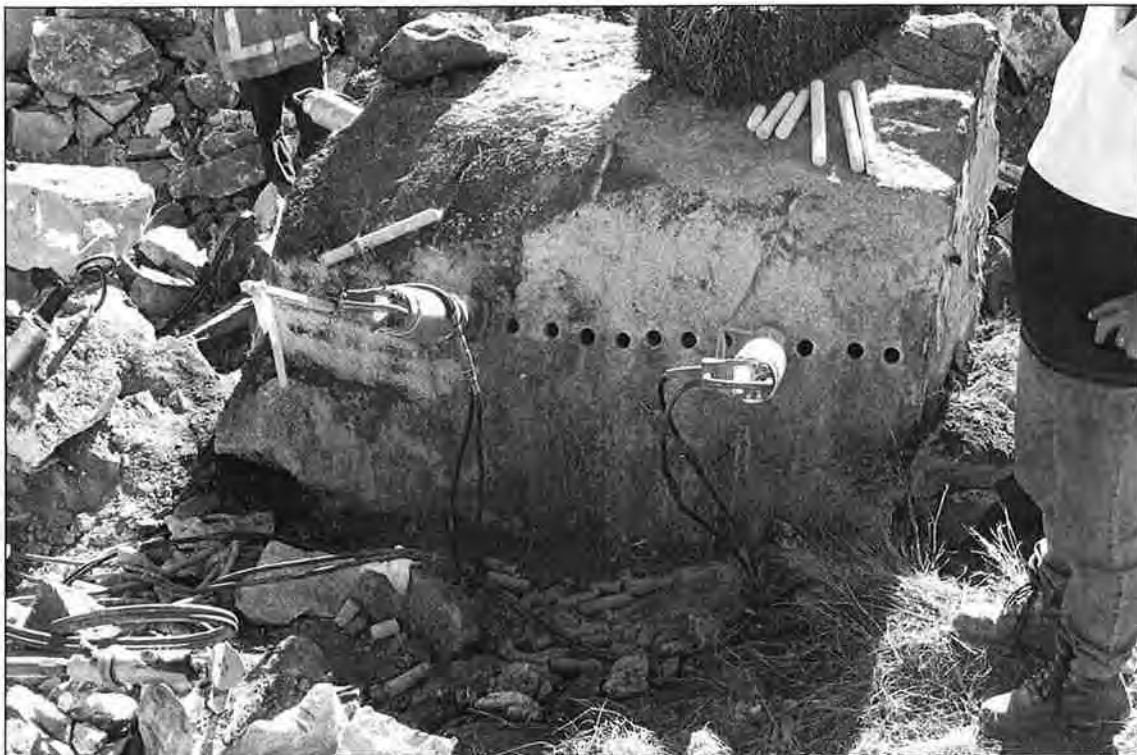


Figure 8 - The Darda splitters in place. The white rods are the sandstone plugs removed by the hollow drills.



Figure 9 - The three Darda splitters are turned on as one



Figure 10 - The rock has been split.



Figure 11 - Lifting bars are in place and the lift begins.



Figure 12 - A hand nervously grasps the end of a lifting bar as it bends under the strain.

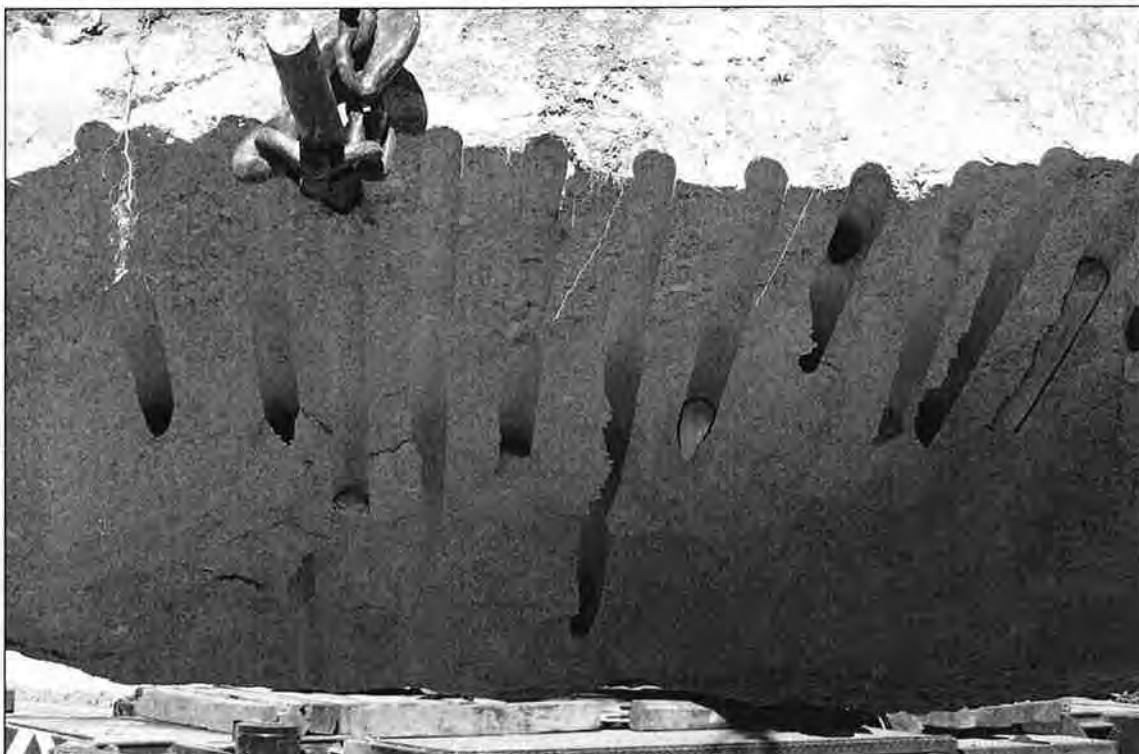


Figure 13 - The underside of Block 1 showing the drill holes and one of the lifting rods.

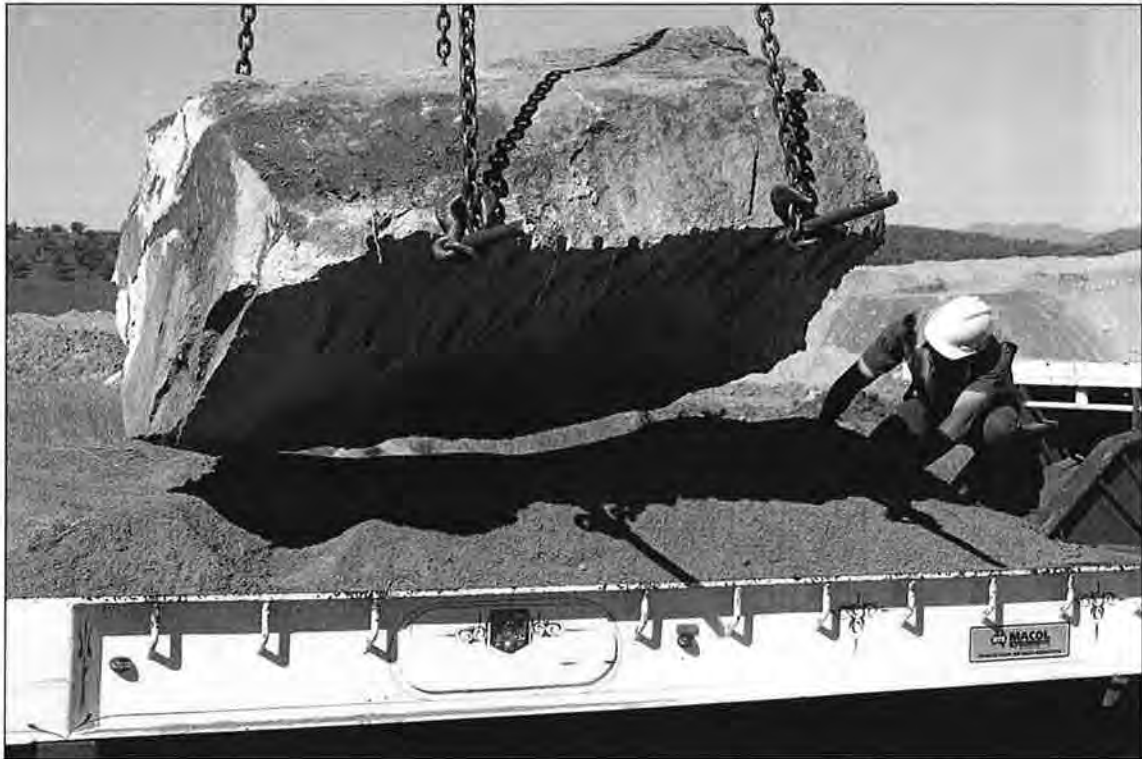


Figure 14 - The block is lifted onto a bed of crusher dust on the back of the low loader.



Figure 15 - Block 1 is laid to rest where it will remain until the site is restored and the block relocated.

The next job was to drill two more holes right through the block for the lifting bars (lengths of 40 mm diameter mild steel), and the block was ready for lifting. In the meantime a 'D11' cleared a road adjacent to the block to provide access for the low-loader that would be necessary to transport Block 1 to its new resting place – an area set aside some three hundred metres away from the mine where four truck loads of crusher dust had been spread out to provide a bed for the relocated blocks – see later.

11.2 Blocks 2, 3 and 4

These three blocks were in situ floaters that once formed a single bedrock surface exposure. There was no evidence to show whether they had become separated at the time they were used to sharpen axes, or whether the separation came later. For the purposes of control the three blocks are described as individual pieces.



Figure 16 - The left view shows Blocks 2 (foreground), 3 (centre right) and 4 being cleaned-up and the view on the right is from the same aspect after removal of loose material with the high-pressure hose (scales 1 m & 25 cm).



Figure 17 - Side view of Blocks 2, 3 and 4 in situ.

11.2.1 Block 2

As Figures 2 and 3 show Block 2 was a floater with a firm base that would be sufficiently robust to allow its removal with the New Holland All Terrain Telescopic Fork Lift (NHATT forklift).



Figure 18 – Block 2 ready for removal (scale 1 m).

11.2.2 Block 3

Block 3 was a small block that could be removed and carried by two people to the dozer and placed on the crusher dust in the bucket for transportation to the storage area.



Figure 19 - Block 3 in situ. Note the decomposing bedrock beneath it (scale 25 cm).

11.2.3 Block 4

Block 4 was a floater and was easily removed using the NHATT forklift.

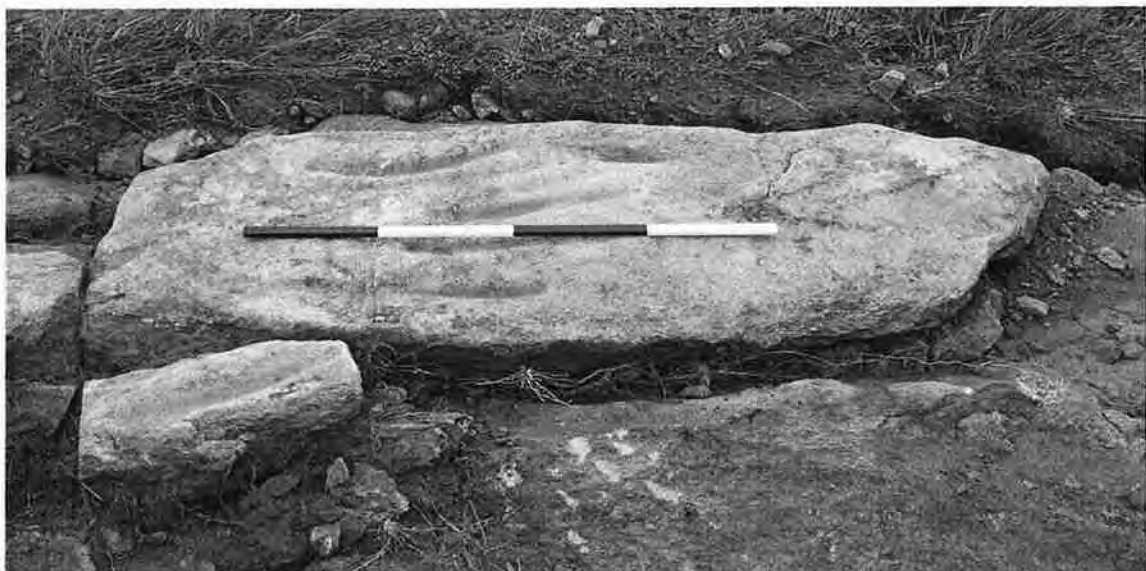


Figure 20 - Blocks 3 and 4 in situ. Note the left ends of the blocks line up to a fault line (scale 1 m).



Figure 21 - Block 4 is removed by forklift.



Figure 22 - Block 4 is lowered onto a bed of crusher dust for transportation to the storage area.

11.3 Block 5

Having swept Block 5 clean of debris it became clear that the edges of the block were badly decomposed, but it was still unclear whether or not it was a floater or attached to bedrock. However after the high-pressure water-hose had been applied to the surrounding soils it was noted that while the block was an in-situ floater that it was in such poor condition that it was likely to break unless it was supported from below.

A close inspection was made of the block and a large crack was found in the lower section. It might have been possible to use the horizontal faulting above the crack to separate the floater from its position, but because of the badly decomposed rock above the horizontal fault it was decided to lift the whole block out so that the more robust lower section would provide a support for the upper section, and so two holes were drilled through the base of the block to take lifting rods.

Removal of the block proceeded without any complications and it was safely loaded onto the low loader. However, on arrival at the storage area it was found that a part of the lower section of the block had failed through the crack observed previously. The damage occurred below the ground surface level at which the block would be restored and so would not be visible once relocated. No other damage to the block was observed.

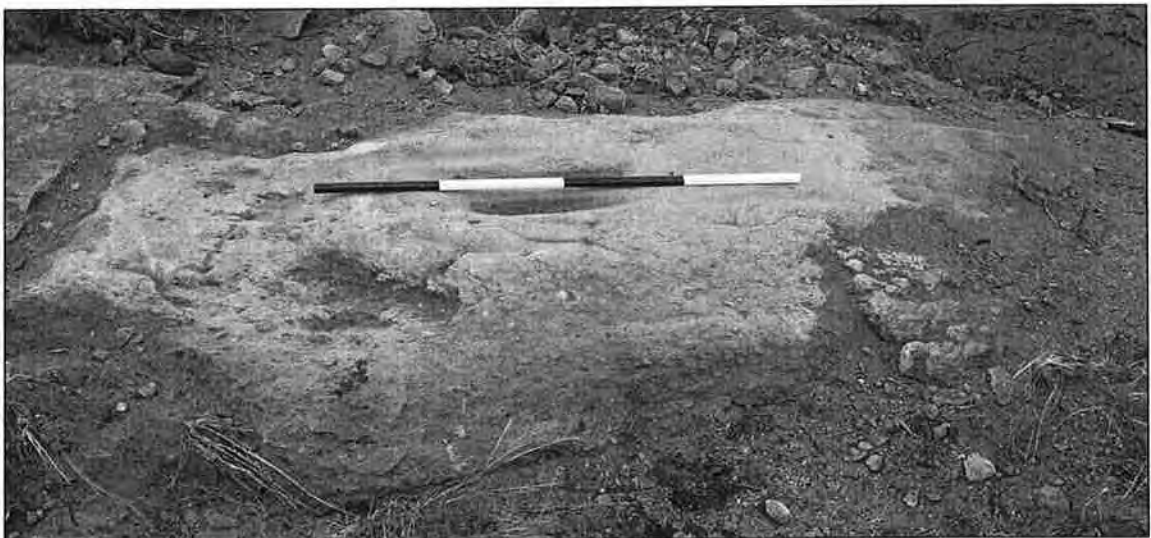


Figure 23 - Block 5 after clean-up with the broom. Note the decomposed rock on the right.



Figure 24 - Block 5 after removal of the soil and with lifting rods in place. Note the underlying bedrock.



Figure 25 - Close-up of the crack in the lower section of Block 5 prior to removal.



Figure 26 - Block 5 in the foreground (still intact) before transportation. The blocks have been chained down to the low loader to prevent them rolling during transportation.



Figure 27 - Block 5 on arrival at the storage area.



Figure 28 - Close-up of the break showing the internal faulting and separation.

11.4 Block 6

When the grooves were first recorded on this block it was assumed from the shape and intactness of the surface that the grooves were on bedrock. It was therefore surprising, to find that it moved fractionally when accidentally nudged by the road grader when it was removing the surrounding rock. Whether or not by accident, or whether the fault was a pre-existing feature, the block had become a floater, and it was therefore only necessary to find a way of removing it. Even as a floater it was estimated that the block weighed in excess of six tonnes and so the crane would be necessary to remove it.

The surrounding soil and rock was removed down to the level at which the crack or fault appeared, and the excavated area was then extended to provide sufficient room for the rock-splitters to be able to drill two holes through the base of the rock for lifting rods. However, while the operation had now become relatively easy compared to the removal of Block 1, it was found that the irregular shape of the block caused a significant imbalance when the block was lifted.

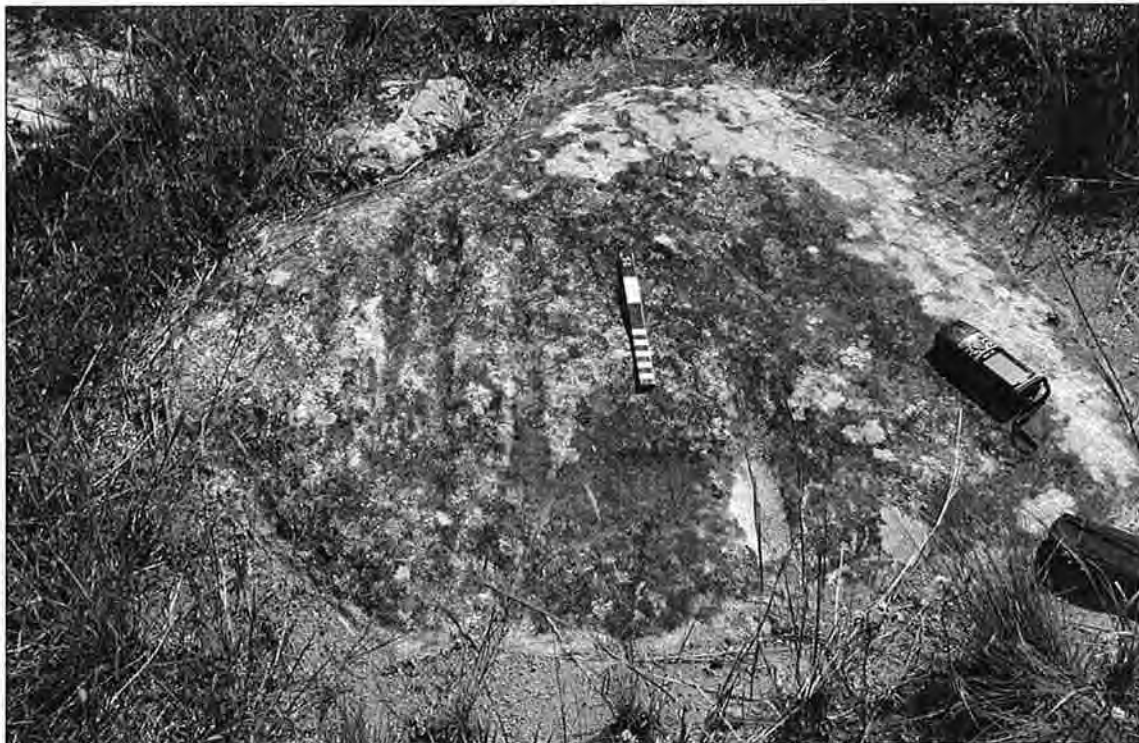


Figure 29 - Block 6 as it appeared when found (scale 25 cm).



Figure 30 - Block 6 after clean-up with the pressure hose.



Figure 31 - Block 6 is exposed. Note the fault plane in the nearest face of the block (scale 1 m).



Figure 32 - Block 6 ready for lifting. Note the line of separation between the block and the bedrock.



Figure 33 - Block 6 being lifted. Note the tyre-strips protecting the block from the chains.



Figure 34 - Block 6 after removal. Note the imbalance caused by the irregular base of the block.

11.5 Block 7

Block 7 appeared to be a floater before clean-up, and that was what it turned out to be.

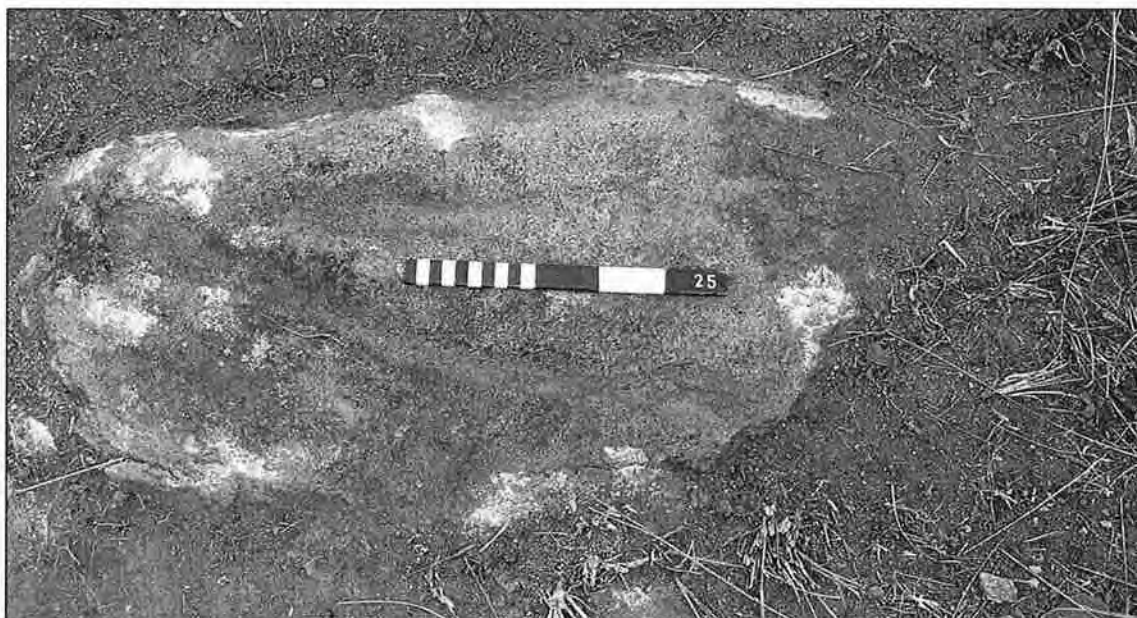


Figure 35 - Block 7 after sweeping (scale 25 cm).

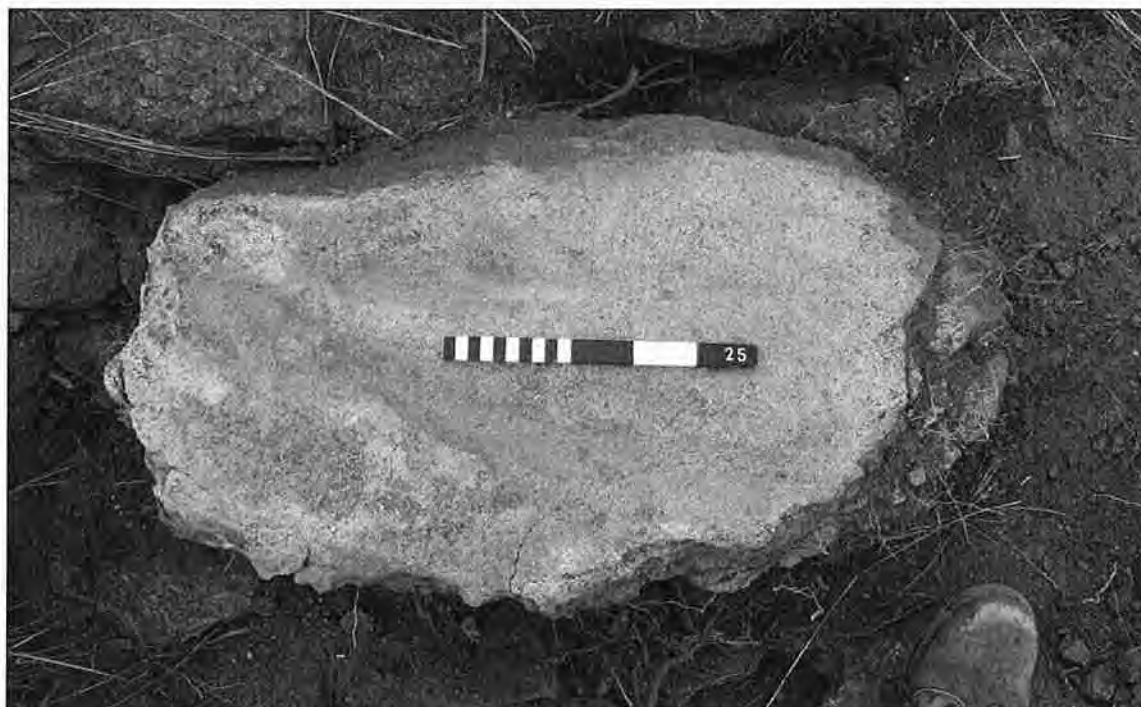


Figure 36 - Block 7 after the pressure hose had been applied (scale 25 cm).

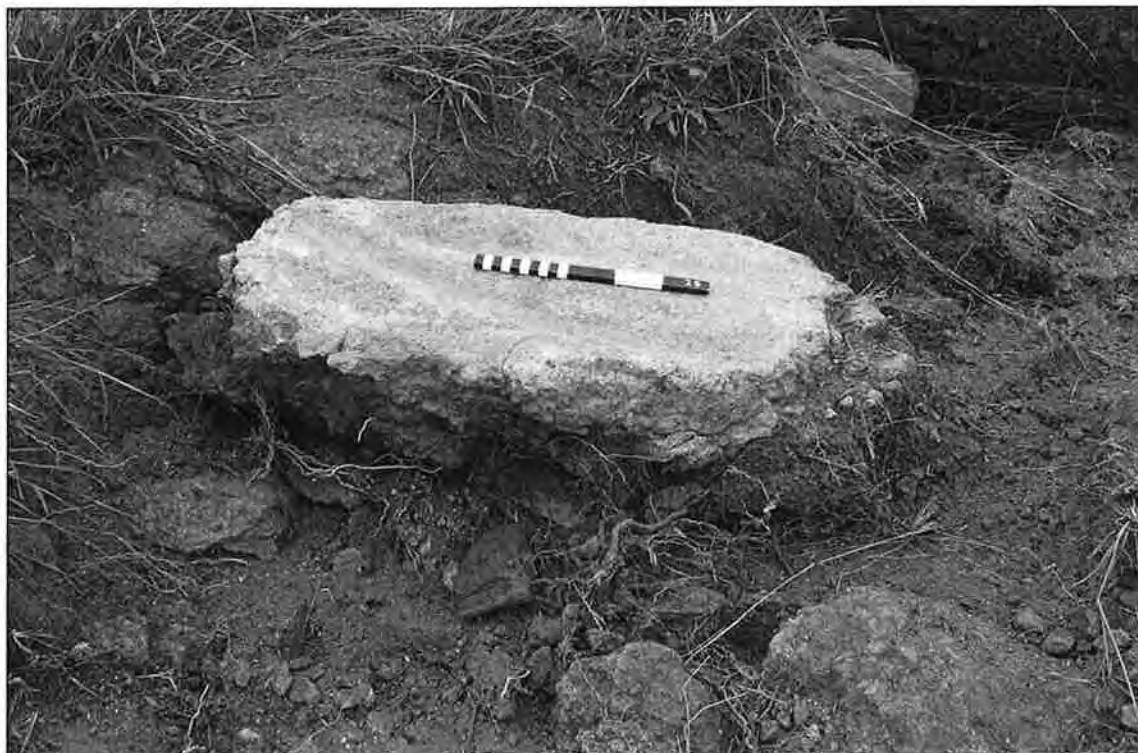


Figure 37 - Block 7 showing the extent to which roots had caused the breakdown of the block (scale 25 cm).

11.6 Block 8

Block 8 was another floater, but despite its small surface area, it was quite thick and required two people to manhandle it into the bucket.

The grooves on this block were particularly interesting as they overlapped longitudinally, and it was surprising that there had been no attempt to begin another groove alongside the other two in what appeared to be a similar surface. As Figures 38 and 39 show the grooves, as with most of the grooves on the other blocks, followed the 'grain' of natural layering and line of outcropping. This would suggest that the people making the grooves found it more effective to grind with the grain rather than across it, as to do the latter would encounter resistant lines of coarser sediments that would catch on the leading edge of the axe as it was pushed across it. This is not usually the case, where grooves are made in the direction best suited to use the surface water, and individual grooves in groups of grooves tend to be arranged around the water supply rather than in line.

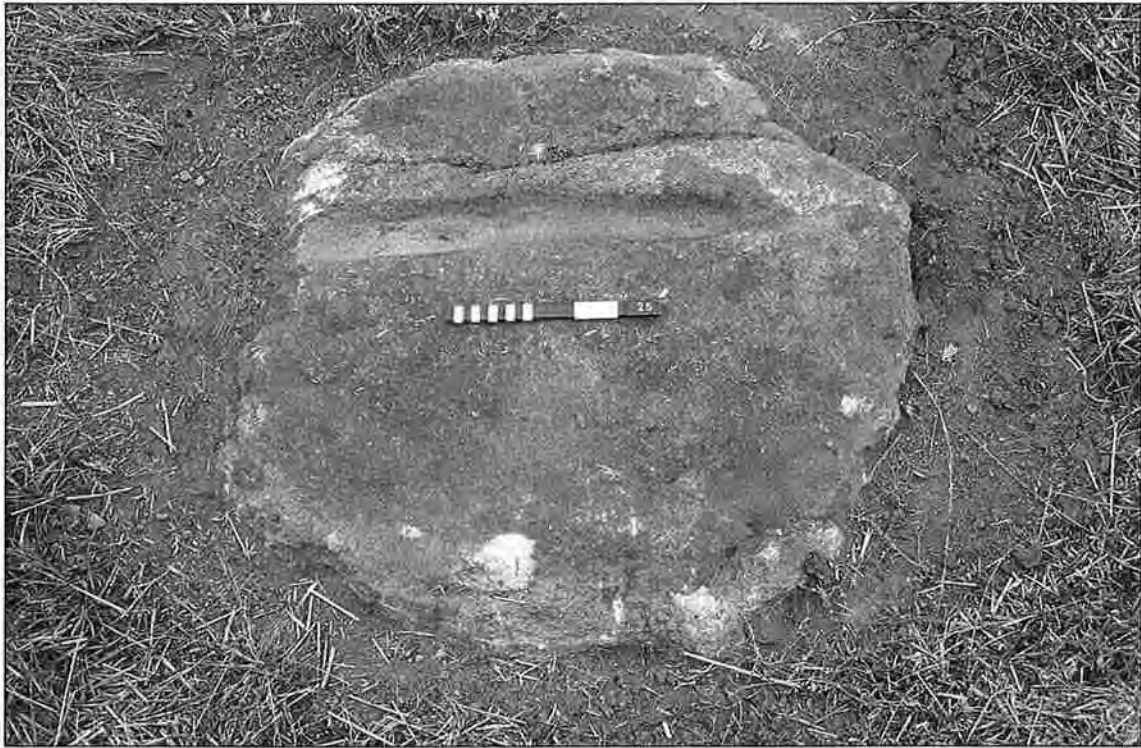


Figure 38 - Block 8 after sweeping (scale 25 cm).



Figure 39 - Block 8 after the pressure hose had been applied (inverted aspect to the previous figure)
(scale 25 cm)

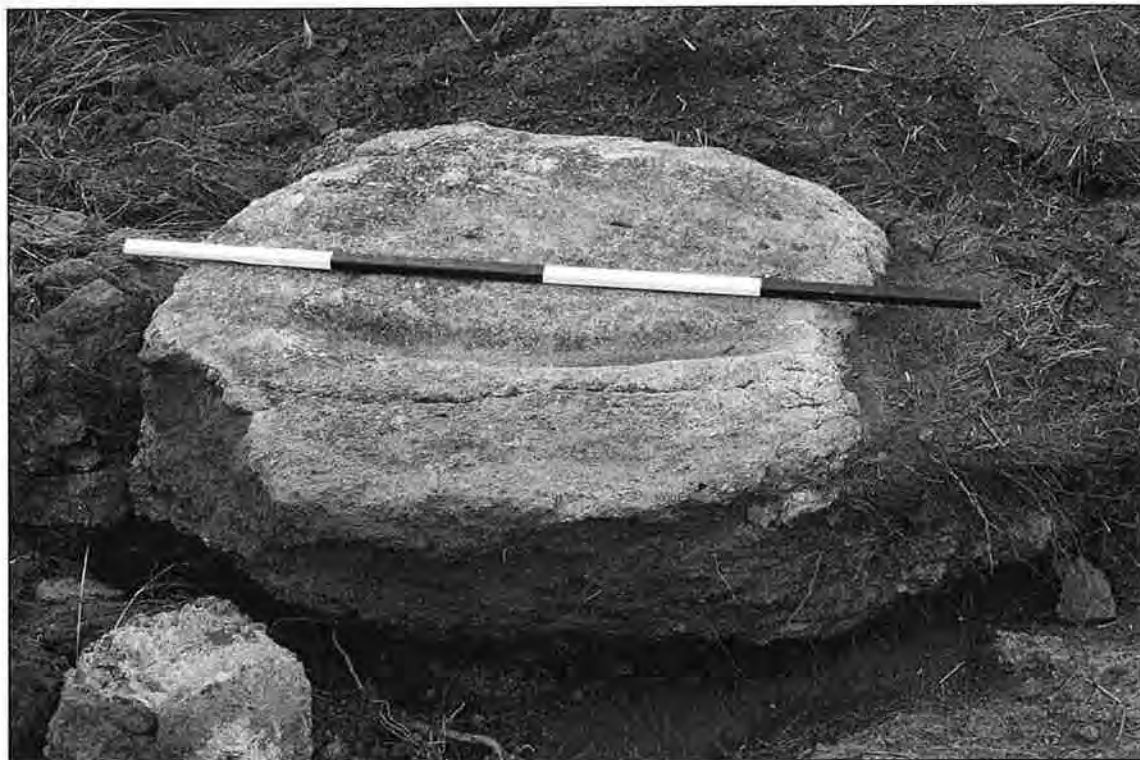


Figure 40 - Side view of Block 8 showing the separation from the bedrock (scale 1 m).



Figure 41 - Block 8 being removed. Note the depth or thickness of the block.

11.7 Block 9

From the surface shape of the block it appeared to be a floater, which it was, but far from being a rock of even thickness the end on which the grooves occurred was quite thick, and the block was much heavier than it had been thought it would be. As with Blocks 2, 3 and 4, one end was squared off where there had been a cross fault, interestingly however there was no corresponding block that would have shared the same fault, which might indicate that the block had become displaced from its depositional context.



Figure 42 - Block 9 prior to recovery (scale 25 cm).



Figure 43 - Block 9 after the pressure hose had been used (scale 25 cm).



Figure 44 - Block 9 exposed (scale 1 m).



Figure 45 - Block 9 is removed. Note the square end where the cross-faulting occurred.

11.8 Block 10

This groove was observed during the early investigation but not found during the pre-relocation search. The groove was very shallow and appeared to have been undeveloped or aborted, and as a consequence was difficult to see.

Unfortunately, a grader that had been brought in to try to clear a road alongside the groove site for vehicular access, ripped out a section of bedrock on which the groove probably occurred, and the groove on Block 10 was later observed in a pile of rocks pushed to the side of the track. Subsequently the fragment of rock with the groove was recovered and placed in storage with the other recovered blocks. It was unfortunate that the only damage to occur to any of the blocks on which grooves occurred was Block 10 and that it should happen as a consequence, not of removing a block, but merely in grading an access track. It was an accident, and no-one was to blame, but ASR as the excavation director accepts responsibility for it occurring.

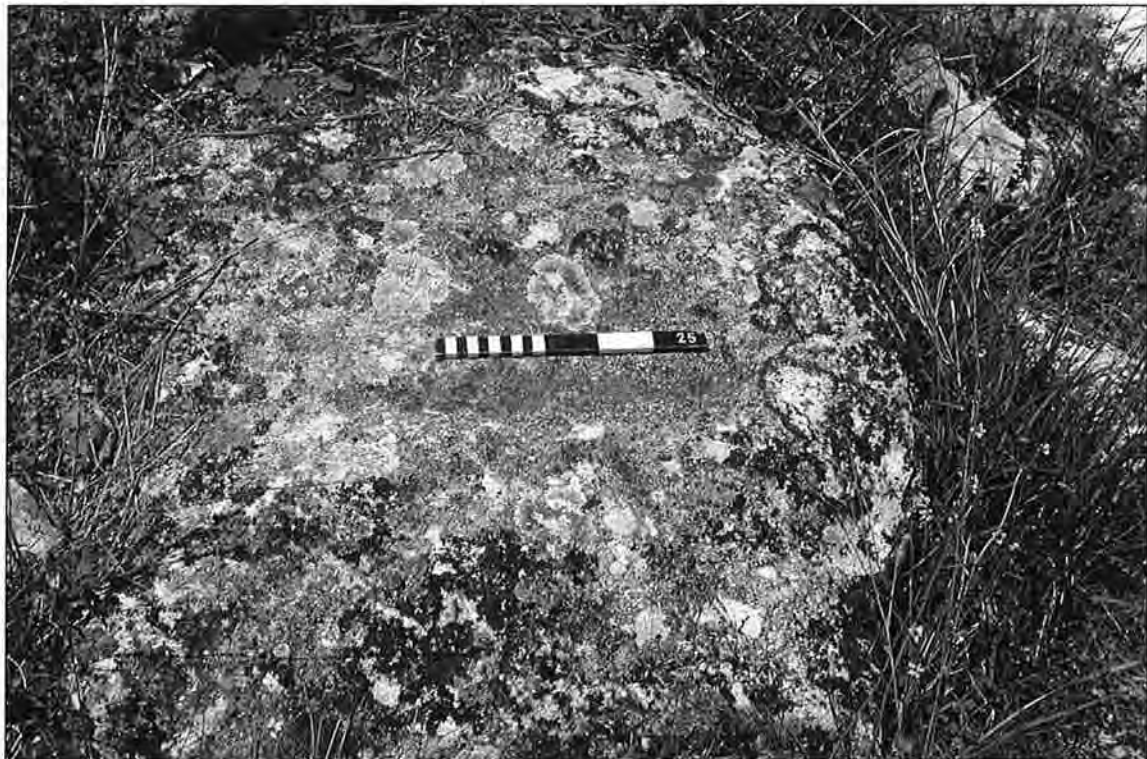


Figure 46 - Block 10 as recorded in 2004 (scale 25 cm).

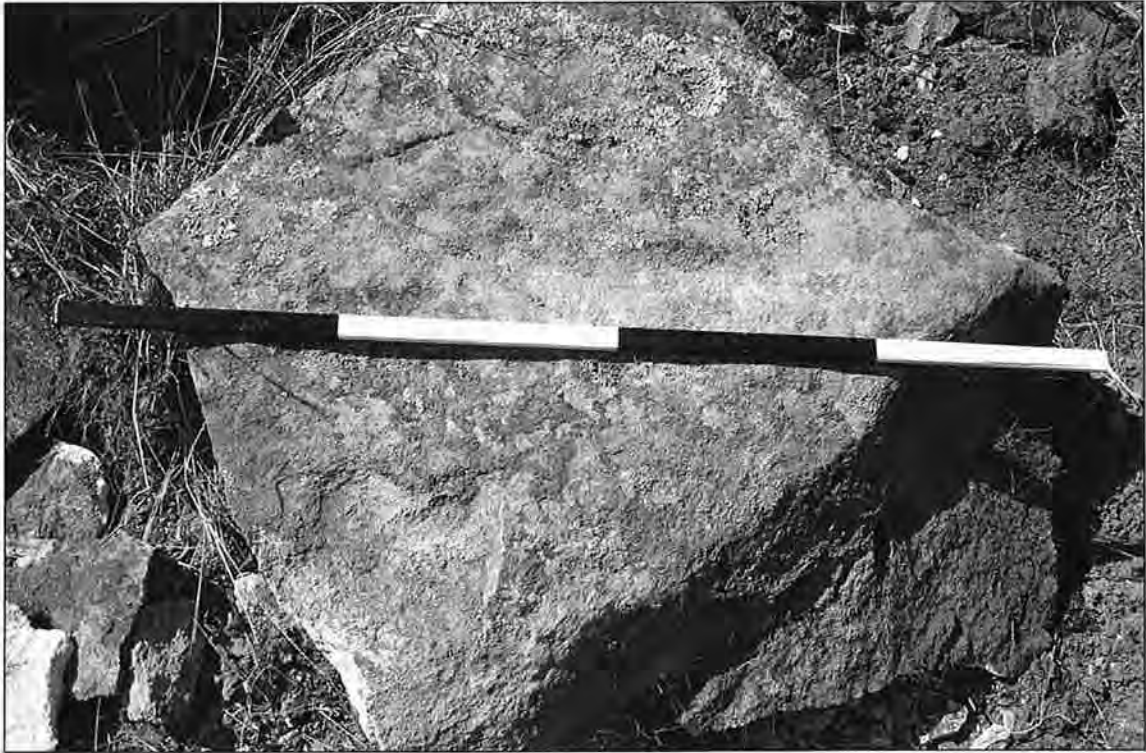


Figure 47 - The remains of Block 10 after its disagreement with the grader. The groove runs above and parallel to the scale (scale 1 m).

12. COMPLETION

On 30th March 2007 the last of the blocks was removed to the storage area. Over the following days more crusher dust was brought in and built-up around the blocks, both to provide stability to the blocks, and some protection from weathering and further deterioration, but primarily to provide a means of maintaining ground moisture around the decomposing sides of the blocks to prevent them drying out and crumbling.

The storage area was then fenced off with fluorescent flagging on three sides, the fourth side being a barbed-wire fenceline.



Figure 48 – Werris Creek Coal Mine viewed from the "Narrawolga" storage area.



Figure 49 – Time to reflect after the last block has been off-loaded.



Figure 50 – Crusher dust has built up around the blocks to retain the ground moisture (photo. Rob Snook)



Figure 51 – Relocation of the blocks has been completed and the area fenced off (photo: Rob Snook).

13. ARCHAEOLOGICAL OBSERVATIONS

When the "Narrawolga" site was first recorded it was estimated that there were in excess of 25 axe-grinding grooves, but once the lichen had been removed from the rock surfaces it was found that there were 43 grooves. This says more about the constraint of lichen on archaeological visibility than it does on the ability of the investigators.

As Figures 29 and 30 of Block 6 show lichen-covered features are far less visible than they might be on lichen-free surfaces. It is possible that if some of the more obvious grooves had not been observed in the initial investigation that some of the less visible grooves might have been overlooked if they had been the only ones there. The recording of the "Narrawolga" site is a good example of how the observed archaeological record is highly dependent upon the archaeological visibility at the time of the investigation.

14. EVALUATION

The consultation process and time that it took to obtain the agreement of the various Aboriginal groups and Consent from DEC was both lengthy, time consuming and at times extremely frustrating, and no doubt, extremely stressful for the Mine Manager and the mine owners – as well as costly to the owners. But the balance sheet should also show that the operation has saved the axe-grinding grooves from potential damage, and freed up rich coal reserves that would otherwise have been lost if the Aboriginal stakeholders had not agreed to the temporary relocation of the "Narrawolga" site.

The operation will hopefully be seen as one that shows that Aboriginal people are prepared to facilitate development as long as their cultural values are respected and that they are consulted in the decision-making and management process. It has also shown that industry acknowledges that Aboriginal cultural values are important to industry players and that they are prepared to seek ways to find management solutions and strategies that are made in good faith, and designed to avoid and/or mitigate impact on sites, places and artefacts of Indigenous cultural significance.

The project may not be the first of its kind, but to date, it has been one of the most successful – although it must be remembered that the project is only half-complete, and that complete success will only be achieved when the axe-grinding grooves are returned to their original setting once the mining has been completed and the "Narrawolga" location rehabilitated and restored to its original character and profile.

Acknowledgements.

ASR would like to thank Nungaroo LALC for its active participation in the consultation process and its open-mindedness in considering the management options that have been adopted in this project, and being pro-active in resolving what has proven to be a sensitive issue. ASR would also like to acknowledge the contributions of the Taylor and Porter families to the consultation process, and for their agreement to the management strategy that has been followed throughout the relocation of the axe-grinding grooves, without which the project could not have been undertaken.

ASR would also like to thank Ray Robinson and the mine owners for their patience and willingness to see the project through, and to do and provide whatever was necessary to achieve the required result. Thanks should also go to Rob Snook, for his friendly cooperation, interest and enthusiasm, and ability to manage an assortment of personnel and equipment, and for always being available to discuss issues as they arose, and most importantly, for always finding solutions.

Also, ASR would like to thank the team of Bruce Garland of 'Outback Sandstone', and Barry Bisby (Manager) and Danny Mitchell of 'B&G Concrete Sawing & Drilling', who between them produced an excellent result in circumstances requiring expertise, finesse and patience.

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APPENDICES

Dear Fay Phil Re

Appendix ii - Section 90 Consent #2588

Applicator date
18/9/2006 ✓
Consent to def
2 yrs
✓ fee paid
No Issue date
No Site
No
New used
30/11/2006 - entered in system
No out of approval?
Approval

SALVAGE & REMOVAL
"Narrawolga" axe-grinding groove site
WERRIS CREEK COAL MINE

57

WERRIS CREEK COAL PTY LTD

Appendix iii – Condition reports

Date ...22/3/07

CONDITION REPORT

No. ..N1/1

“NARRAWOLGA” AXE GRINDING-GROOVE SITE

Block identificationN1.....

No. of grooves 6



Approx. dimensions: L.....cm W.....cm Depthcm

Site condition (before removal)

A solid and robust block with no evidence of active deterioration or decomposition. Drilling and rock-splitting was required to separate the block from the bedrock to which it was attached

Stored condition

No change, although a crack had appeared above one of the lifting rod holes

ArchaeologistJ. APPLETON..... Signature

OrganisationARCHAEOLOGICAL SURVEYS & REPORTS PTY LTD

Date ...20/3/07

CONDITION REPORT

No. ..N2/1

“NARRAWOLGA” AXE GRINDING-GROOVE SITE

Block identificationN2.....

No. of grooves 5



Approx. dimensions: L..... 162 cm W.....72 cm Depthapprox. 20 cm

Site condition (before removal)

A floater with numerous small surface cracks. Generally robust but some intrusive roots to underside.....

Stored condition

No change
.....
.....

ArchaeologistJ. APPLETON..... Signature

OrganisationARCHAEOLOGICAL SURVEYS & REPORTS PTY LTD

Date ...20/3/07

CONDITION REPORT

No. ...N3/1

“NARRAWOLGA” AXE GRINDING-GROOVE SITE

Block identificationN3.....

No. of grooves1



Approx. dimensions: L.....46 cm W.....22 cm Depth15 cm

Site condition (before removal)

Small floater, with active decomposition and breakage to margins. Intrusive roots to underside.....

Stored condition

No change

ArchaeologistJ. APPLETON..... Signature

OrganisationARCHAEOLOGICAL SURVEYS & REPORTS PTY LTD

Date ...20/3/07

CONDITION REPORT

No. ...N4/1

“NARRAWOLGA” AXE GRINDING-GROOVE SITE

Block identificationN4.....

No. of grooves8



Approx. dimensions: L.....193 cm W.....65 cm Depth15 cm

Site condition (before removal)

Floater, generally robust, but with intrusive roots to underside.....

.....
.....

Stored condition

No change

.....
.....

ArchaeologistJ. APPLETON..... Signature

OrganisationARCHAEOLOGICAL SURVEYS & REPORTS PTY LTD

Date ...22/3/07

CONDITION REPORT

No. ...N5/1

“NARRAWOLGA” AXE GRINDING-GROOVE SITE

Block identificationN5.....

No. of grooves6



Approx. dimensions: L.....cm W.....cm Depthcm

Site condition (before removal)

When first recorded this block was visibly actively decomposing around the edges. Once the soil had been removed the block was found to be a floater, with horizontal faulting and with intrusive roots to the underside. A crack was also observed in the lower section

Stored condition

A part of the lower section became detached during transportation, the breakage occurring at the crack observed above. No other damage was observed.....

ArchaeologistJ. APPLETON.....

Signature

OrganisationARCHAEOLOGICAL SURVEYS & REPORTS PTY LTD

Date ...22/3/07

CONDITION REPORT

No. ...N6/1

“NARRAWOLGA” AXE GRINDING-GROOVE SITE

Block identificationN6.....

No. of grooves 8



Approx. dimensions: L.....200 cm W.....185 cm Depth150+ cm

Site condition (before removal)

A very robust block, originally thought to be attached to bedrock, but subsequently found to be detached. Some surfaces around the grooves exhibited small cracks and the surface was 'drummy' to the knuckle

Stored condition

No change
.....
.....

ArchaeologistJ. APPLETON..... Signature

OrganisationARCHAEOLOGICAL SURVEYS & REPORTS PTY LTD

Date20/3/07

CONDITION REPORT

No. ...N7/1

“NARRAWOLGA” AXE GRINDING-GROOVE SITE

Block identificationN7.....

No. of grooves3



Approx. dimensions: L.....67 cm W.....36 cm Depth25 cm

Site condition (before removal)

A floater with actively decomposing margins. Heavy root intrusion to underside

.....
.....

Stored condition

No change

.....
.....

ArchaeologistJ. APPLETON.....

Signature

OrganisationARCHAEOLOGICAL SURVEYS & REPORTS PTY LTD

Date20/3/07

CONDITION REPORT

No. ...N8/1

“NARRAWOLGA” AXE GRINDING-GROOVE SITE

Block identificationN8.....

No. of grooves2



Approx. dimensions: L.....82 cm W.....80 cm Depth60 cm

Site condition (before removal)

A generally robust floater but with active deterioration and decomposition of the margins.
One deep surface crack. Intrusive roots to underside.

.....

Stored condition

No change

.....

.....

ArchaeologistJ. APPLETON.....

Signature

OrganisationARCHAEOLOGICAL SURVEYS & REPORTS PTY LTD

Date ...22/3/07

CONDITION REPORT

No. ...N9/1

“NARRAWOLGA” AXE GRINDING-GROOVE SITE

Block identificationN9.....

No. of grooves3



Approx. dimensions: L.....178 cm W.....102 cm Depth30-50 cm

Site condition (before removal)

A large, robust, deep-bodied floater. No serious active decomposition or deterioration observed.....
.....

Stored condition

No change
.....
.....

ArchaeologistJ. APPLETON.....

Signature

OrganisationARCHAEOLOGICAL SURVEYS & REPORTS PTY LTD

Date ...20/3/07

CONDITION REPORT

No. ...N10/1

"NARRAWOLGA" AXE GRINDING-GROOVE SITE

Block identificationN10.....

No. of grooves1



Approx. dimensions: L.....87 cm W.....87 cm Depth25 cm

Site condition (before removal)

A groove recorded during the original investigation but not found later. The fragment with the groove was later discovered after it had been accidentally removed by a grader.....

Stored condition

No change.....
.....
.....

ArchaeologistJ. APPLETON..... Signature

OrganisationARCHAEOLOGICAL SURVEYS & REPORTS PTY LTD



**WERRIS CREEK COAL
ENVIRONMENTAL
MANAGEMENT SYSTEM**

Document Owner:	Environmental Officer
Revision Period:	3 YEARS
Issue:	FINAL
Last Revision Date:	02/07/2014
Date Printed:	02/07/2014

WHC_PLN_WC_HERITAGE MANAGEMENT PLAN

APPENDIX H – Landskape Pty Ltd, Cultural Heritage Assessment for Werris Creek Coal Mine Life of Mine Project, December 2010



WHITEHAVEN COAL

ABN: 69 107 169 102

Werris Creek Coal Pty Limited

CULTURAL HERITAGE ASSESSMENT

for

Werris Creek Coal Mine Life of Mine Project

Prepared by

Landskape

**Specialist Consultant Studies Compendium
Volume 2, Part 6**

December 2010

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Werris Creek Coal Pty Limited

CULTURAL HERITAGE ASSESSMENT

for

Werris Creek Coal Mine Life of Mine Project

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December 2010

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CONTENTS

	Page
EXECUTIVE SUMMARY	6-9
1. INTRODUCTION	6-13
1.1 PROJECT DESCRIPTION	6-13
1.1.1 Objectives	6-13
1.1.2 Overview of the LOM Project	6-15
1.2 CULTURAL HERITAGE LEGISLATIVE CONTEXT	6-17
1.3 OBJECTIVES OF STUDY	6-17
2. ABORIGINAL SOCIAL AND CULTURAL INFORMATION	6-18
2.1 INTRODUCTION	6-18
2.2 ABORIGINAL COMMUNITY PARTICIPATION	6-18
2.2.1 Identification of Aboriginal Community Groups and Individuals	6-19
2.2.2 Preliminary Aboriginal Involvement	6-20
2.2.3 Aboriginal Involvement Prior to the Field Assessment	6-20
2.2.4 Aboriginal Involvement during the Field Assessment	6-20
2.2.5 Aboriginal Involvement Following the Field Assessment	6-21
2.3 ABORIGINAL SOCIAL AND CULTURAL INFORMATION ABOUT THE LOM PROJECT SITE	6-21
3. LANDSCAPE CONTEXT	6-22
3.1 INTRODUCTION	6-22
3.2 LANDFORMS AND VEGETATION	6-22
3.3 SETTING OF THE PROJECT SITE	6-23
3.3.1 Setting of the Proposed LOM Project Open Cut Extension	6-23
3.3.2 Setting of the Proposed LOM Project Out-of-Pit Overburden Emplacement	6-23
3.3.3 Setting of the Proposed LOM Project Acoustic and Visual Amenity Bund Wall	6-23
3.3.4 Setting of the Proposed LOM Project Rail Turn-around Loop Area	6-23
3.3.5 Setting of the Proposed LOM Project Relocated and Expanded Infrastructure Areas	6-23
3.3.6 Setting of the Proposed LOM Project Northern Site Access Road	6-27
3.3.7 Setting of the Proposed LOM Project Coal Conveyor	6-27
4. CULTURAL HERITAGE CONTEXT	6-27
4.1 ABORIGINAL CULTURAL HERITAGE CONTEXT	6-27
4.1.1 Ethno-Historical Context	6-27
4.1.2 Prehistoric Context	6-28
4.1.3 Types of Aboriginal Cultural Heritage Sites in the Region	6-29
4.1.3.1 Stone Artefact Scatters	6-29
4.1.3.2 Axe-grinding Grooves	6-29
4.1.3.3 Modified Trees	6-29
4.1.3.4 Hearths	6-29
4.1.3.5 Rockshelter Sites	6-30
4.1.3.6 Rock Art Sites	6-30
4.1.3.7 Quarry Sites	6-30
4.1.3.8 Freshwater Shell Middens	6-30
4.1.3.9 Earth Mounds	6-30
4.1.3.10 Stone Arrangements, Ceremonial Rings and Ceremony and Dreaming Sites	6-30
4.1.3.11 Burials	6-31

CONTENTS

	Page
4.1.4 Previous Aboriginal Cultural Heritage Investigations	6-31
4.1.4.1 Previously Recorded Aboriginal Cultural Heritage Sites in the LOM Project Site.....	6-32
4.2 HISTORICAL CULTURAL HERITAGE CONTEXT.....	6-34
4.2.1 Historical Context.....	6-34
4.2.2 Previous Historical Cultural Heritage Investigations	6-38
4.2.3 Types of Historical Cultural Heritage Sites in the Region	6-38
4.2.3.1 Pastoral Sites.....	6-39
4.2.3.2 Urban Sites	6-39
4.2.3.3 Industrial Sites	6-39
4.2.3.4 Transport Sites.....	6-39
4.2.4 Historical Cultural Heritage Sites in the Project Site	6-39
5. CULTURAL HERITAGE FIELD INVESTIGATION	6-40
5.1 CULTURAL HERITAGE SITE PREDICTIVE MODEL	6-40
5.2 FIELD METHODOLOGY	6-41
5.2.1 Logistics	6-41
5.2.2 Survey Methods.....	6-41
5.2.3 Access to Survey Areas and Weather Conditions	6-44
5.3 SURVEY COVERAGE DATA	6-44
5.3.1 Conditions of Visibility.....	6-44
5.3.2 Coverage analysis	6-46
5.4 SURVEY RESULTS	6-46
5.4.1 Aboriginal Cultural Heritage Sites.....	6-46
5.4.2 Historical Cultural Heritage Sites.....	6-47
5.4.2.1 Former Werris Creek Colliery Underground Workings.....	6-48
5.4.2.2 Former Werris Creek Colliery Above-Ground Ruins	6-48
5.4.2.3 Former Werris Creek Colliery Deputy Mine Manager's Residence	6-52
5.4.2.4 Former Werris Creek Colliery Coal Loading Ramp	6-52
6. CULTURAL HERITAGE VALUES.....	6-55
6.1 ABORIGINAL CULTURAL HERITAGE VALUES	6-55
6.1.1 Aboriginal Cultural Landscape.....	6-55
6.1.1.1 Summary of the Archaeological Record.....	6-55
6.1.1.2 Aboriginal Settlement Patterns.....	6-56
6.1.1.3 Aboriginal Subsistence Strategies	6-56
6.1.1.4 Synthesis	6-57
6.2 HISTORICAL CULTURAL HERITAGE VALUES.....	6-57
6.2.1 Historical Cultural Heritage Significance.....	6-57
6.2.1.1 Criterion (a) [Historical Significance].....	6-57
6.2.1.2 Criterion (b) [Historical Association Significance].....	6-57
6.2.1.3 Criterion (c) [Aesthetic Significance]	6-58
6.2.1.4 Criterion (d) [Social Significance]	6-58
6.2.1.5 Criterion (e) [Research Potential].....	6-59
6.2.1.6 Criteria (f) and (g) [Rarity and Representativeness].....	6-59
7. POTENTIAL IMPACTS OF THE LOM PROJECT ON CULTURAL HERITAGE.....	6-59
7.1 POTENTIAL DIRECT IMPACTS	6-59
7.2 POTENTIAL INDIRECT IMPACTS.....	6-60
7.3 CULTURAL HERITAGE POTENTIALLY IMPACTED BY THE WERRIS CREEK COAL MINE LOM PROJECT	6-60
7.4 FLEXIBILITY OF THE WERRIS CREEK COAL MINE LOM PROJECT DESIGN	6-60

CONTENTS

	Page
8. MANAGEMENT STRATEGIES FOR CULTURAL HERITAGE	6-61
8.1 GENERAL RECOMMENDATIONS	6-61
8.1.1 Updated Archaeology and Cultural Heritage Management Plan.....	6-61
8.1.2 Role of the Local Aboriginal Community.....	6-61
8.2 MANAGEMENT OF CULTURAL HERITAGE WITHIN THE LOM PROJECT DISTURBANCE AREAS.....	6-61
8.3 SUMMARY RECOMMENDATIONS.....	6-62
9. REFERENCES.....	6-63
 APPENDICES	
Appendix 1 Letters of Notification	6-69
Appendix 2 Public Notice.....	6-83
Appendix 3 Formal Responses from Aboriginal Stakeholders to Notification	6-87
Appendix 4 Proposed Methodology for Aboriginal Cultural Heritage Assessment.....	6-99
Appendix 5 Formal Responses from Aboriginal Stakeholders to Draft Methodology.....	6-105
Appendix 6 Formal Responses from Aboriginal Stakeholders to Draft Report	6-109
Appendix 7 Image documentation of the Old Colliery Deputy Mine Manager's Residence	6-113
 FIGURES	
Figure 1 Werris Creek Coal Mine Local Setting	6-14
Figure 2 Project Site Layout.....	6-16
Figure 3 Southwestern slopes of "Old Colliery" Hill, proposed for extension of the Open cut Area	6-24
Figure 4 Existing gravel quarry on "Old Colliery" Hill.....	6-24
Figure 5 Northeastern slopes of "Old Colliery" Hill, proposed for Acoustic and Amenity Bund	6-25
Figure 6 Alluvial plain, proposed for Rail Turn-around Loop	6-25
Figure 7 Western foot-slopes of "Old Colliery" Hill, proposed for Site Administration Area.....	6-26
Figure 8 Alluvial plain, proposed for expansion to the Product Coal Storage Area.....	6-26
Figure 9 Previously identified Aboriginal cultural heritage site and previous archaeological survey coverage of the LOM Project Site.	6-33
Figure 10 Head of cable shaft at the Werris Creek Colliery in 1925 (Ware, 1976).....	6-35
Figure 11 The Colliery Shunter with three coal wagons on 3 August 1964 (NSW Rail Transport Museum, 1986).....	6-36
Figure 12 The Colliery Shunter crossing the Werris Creek Quirindi Road on 3 August 1964 (NSW Rail Transport Museum, 1986).....	6-37
Figure 13 Survey team members inspecting the proposed location of the Rail Turn-around Loop.....	6-42
Figure 14 Survey team members inspecting the proposed locations of the extended Open Cut.....	6-42
Figure 15 Archaeological survey coverage of the Project Site and locations of cultural and historical heritage sites	6-43
Figure 16 Moderate levels of ground surface visibility on the foot slopes of "Old Colliery" Hill	6-45
Figure 17 Moderate levels of ground surface visibility on the slopes of "Old Colliery" Hill	6-45
Figure 18 Coal scraper loader at the Werris Creek Colliery <i>circa</i> 1951 (Parry Shire Council, 1990)	6-49
Figure 19 Coal scraper loader <i>circa</i> 1951 with I.H. Thomas at right (Parry Shire Council, 1990)	6-49

CONTENTS

	Page
Figure 20	Concrete boiler chimneystack at the Werris Creek Colliery in <i>circa</i> 1970s (McEvelly <i>et al.</i> , 2004)6-50
Figure 21	Boiler chimneystack in 2004 (ASR, 2004)6-50
Figure 22	Concrete rubble and steel framework from the demolished boiler chimneystack.6-51
Figure 23	Iron rail and timber sleeper from the Werris Creek Colliery light rail.6-51
Figure 24	Former Deputy Mine Manager's Residence for the Werris Creek Colliery.....6-53
Figure 25	Garden at the Former Deputy Mine Manager's Residence taken in the 1960s (photograph courtesy Elizabeth Thomas)6-53
Figure 26	Dora (left) and Elizabeth Thomas at the Former Deputy Mine Manager's Residence in the early 1950s (photograph courtesy Elizabeth Thomas).....6-54
Figure 27	Boot and hand impressions of Deputy Mine Manager's children in concrete slab floor6-54
Figure 28	Werris Creek Colliery coal loading chute6-55

TABLES

Table 1	Previously Identified Aboriginal cultural heritage site within the LOM Project Site.....6-34
Table 2	Historical cultural heritage site near the LOM Project Site.....6-39
Table 3	Visibility conditions at the Project Site6-44
Table 4	Effective Coverage of the Project Site6-46
Table 5	Summary data of historical cultural heritage sites in the LOM Project Site.....6-47
Table 6	Assessment of significance of the historical cultural heritage sites.....6-58

CONVERSIONS

Measures

In this study imperial units for common measurements are used until 1970 when the present metric system was introduced.

1 foot	=	0.305 m
1 chain	=	20.11 m
1 mile	=	1.61 km
1 acre	=	0.405 ha
1 gallon	=	4.545 l
1 ton	=	1.016 t

Monetary Values

Before 1966, Australian currency was expressed in pounds, shillings and pence (£ s d). The following form is used: £2 13s 6d.

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EXECUTIVE SUMMARY

Werris Creek Coal Pty Limited intends to extend life of its Werris Creek Coal Mine within Mining Lease (ML) 1563 and Exploration Licence Areas (ELA) 5993 and 7422. This would be achieved by extending mining operations to the north of the currently approved mine footprint to the extent of the "life of mine" resource in the area (hereafter, the *Life of Mine (LOM) Project*). The LOM Project Site is located to the south of Werris Creek with the open cut mine to extend to within approximately 2.6 km south of Werris Creek. The LOM Project Site is located approximately 11 km north-northwest of Quirindi in central northern New South Wales.

The Werris Creek Coal Mine was originally granted development consent on 18 February 2005 (DA 172-7-2004) and the mining lease (ML1563) was approved on 23 March 2005. On 6 October 2009, the Minister for Planning issued the most recent of five modifications to the development consent, enabling a small extension to the open cut operations.

The potential impacts on Aboriginal and historical cultural heritage associated with the development of the original and most recent extension to the Werris Creek Coal Mine were assessed in the *Environmental Impact Statement (EIS) for the Proposed Werris Creek Coal Mine* and *Statement of Environmental Effects (SEE) for the Proposed Modification to the Werris Creek Coal Mine*, which included cultural heritage assessments prepared by Archaeological Surveys and Reports Pty Limited (ASR) (2004, 2009a, 2009b).

Improved market conditions since the original Werris Creek Coal Mine was approved have made mining of higher strip ratio coal economically viable. As a result, Werris Creek Coal Pty Limited is seeking project approval to extend the approved open cut boundary approximately 1500 m further north within and beyond ML1563. The additional land disturbance associated with the open cut extension would be approximately 141 ha. An increase to the area of Out-of-Pit Overburden Emplacement, construction of a Northern Site Access Road, Rail Turn-around Loop, ROM Coal Conveyor and an Acoustic and Visual Amenity Bund Wall, relocation of the Site Administration and Facilities Area, Coal Processing Area, Precursor Storage Area and Explosives Magazine and enlargement of the Product Coal Storage Area also form part of the LOM Project.

The Proponent, Werris Creek Coal Pty Limited, commissioned Landskape to undertake a cultural heritage assessment of the LOM Project. This report presents an assessment of the cultural heritage related issues for the LOM Project in accordance with the general requirements of the NSW Department of Environment, Climate Change and Water's (DECCW's) *Draft Guidelines for Aboriginal Cultural Heritage Impact Assessment and Community Consultation* and is consistent with the NSW Heritage Office's *NSW Heritage Manual and Assessing Heritage Significance*.

The specific objectives of the cultural heritage assessment were to:

- consult the local Aboriginal community to identify any concerns they may have (consultation with the Aboriginal community followed NSW Department of Environment, Climate Change and Water's [DECCW] *Draft Guidelines For Aboriginal Cultural Heritage Impact Assessment and Community Consultation* [DEC, 2005] and considered the *Interim Community Consultation Requirements for Applicants* [DEC, 2004], *Draft Aboriginal Cultural Heritage Community Consultation Requirements for Proponents* [DECC, 2009] and *Aboriginal Cultural Heritage Community Consultation Requirements for Proponents* [DECCW, 2010]);

- conduct a desktop assessment to delineate areas of known and predicted cultural heritage within the LOM Project Site;
- undertake a stratified archaeological survey of known and predicted cultural heritage identified in the desktop assessment with representatives of the local Aboriginal community;
- record any cultural heritage sites within the Project Site and assess their significance;
- identify the nature and extent of potential impacts of the LOM Project on cultural heritage; and
- devise options in consultation with the community to avoid or mitigate potential impacts of the development on cultural heritage places and items.

One Aboriginal cultural heritage site (the Narrawolga Axe-Grinding Grooves; AHIMS site number 29-2-0005) has previously been identified and re-located from the currently approved mining area (in 2008). The present survey did not encounter any additional items or places of Aboriginal cultural heritage significance in the Project Site.

Historical cultural heritage sites associated with the former Werris Creek Colliery underground coal mine, dating to the 1920s to 1960s, within the Project Site include the former Werris Creek Colliery Underground Workings, Above-ground Ruins, Deputy Mine Manager's Residence and Coal Loading Ramp. These historical features are all located within the disturbance footprint of the LOM Project. They are not of high historical significance, even at a local level, and additional historical heritage assessment or preservation of the sites is not warranted.

The survey shows that, whilst the LOM Project may potentially impact upon cultural heritage sites, the nature of the potential impacts remain largely unchanged from those identified in the EIS and SEE and the general mitigation measures proposed in the EIS and SEE can be implemented to minimise these potential impacts.

Based on the results of this cultural heritage investigation and consultation with representatives of the local Aboriginal community the following recommendations are made.

- The LOM Project progress without additional historical heritage assessment or preservation of historical cultural heritage sites associated with the former Werris Creek Colliery, which are not of high historical significance.
- The Narrawolga Axe-Grinding Grooves (AHIMS site number 29-2-0005) be re-instated to a position as close as is possible to their original location following restoration and rehabilitation of the final landform.
- Werris Creek Coal Pty Limited should continue to involve the registered Aboriginal stakeholders and any other relevant Aboriginal community groups or members in matters pertaining to possible cultural heritage issues associated with the LOM Project.
- The general mitigation strategies detailed in the *Archaeology and Cultural Heritage Management Plan* should continue to be implemented. The Archaeology and Cultural Heritage Management Plan should be updated to reflect the proposed management of the historical cultural heritage sites within the Project Site. The updated Archaeology and Cultural Heritage Management Plan should remain active for the life of the Werris Creek Coal Mine.

- In the unlikely event that human skeletal remains are encountered during the course of the development associated with the LOM Project, all work in that area must cease. Remains must not be handled or otherwise disturbed except to prevent further disturbance. If the remains are thought to be less than 100 years old the Police or the State Coroner's Office (tel: 02 9552 4066) must be notified. If there is reason to suspect that the skeletal remains are more than 100 years old and Aboriginal, the Proponent should contact DECCW's Environmental Line (tel: 131 555) for advice. In the unlikely event that an Aboriginal burial is encountered, strategies for its management would need to be devised with the involvement of the local Aboriginal community.

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1. INTRODUCTION

Werris Creek Coal Pty Limited intends to extend the life of its Werris Creek Coal Mine by up to 20 years to recover the remaining *in situ* coal resource of the Werris Creek coal deposit, located within Mining Lease 1563 and Exploration Licence Areas 5993 and 7422 (hereafter, the *Life of Mine [LOM] Project*). The combined area of the existing Werris Creek Coal Mine and proposed open cut extension (and associated additional infrastructure) is referred to hereafter as the *Project Site*. At its closest point the proposed open cut extension would be approximately 2.6 km south of Werris Creek and 11 km north-northwest of Quirindi in central northern New South Wales (**Figure 1**).

The Proponent, Werris Creek Coal Pty Limited, has commissioned Landskape to undertake a cultural heritage assessment of the Project Site. Dr Matt Cupper, a qualified archaeologist and geoscientist with eleven years experience as a cultural heritage advisor, was Project Archaeologist.

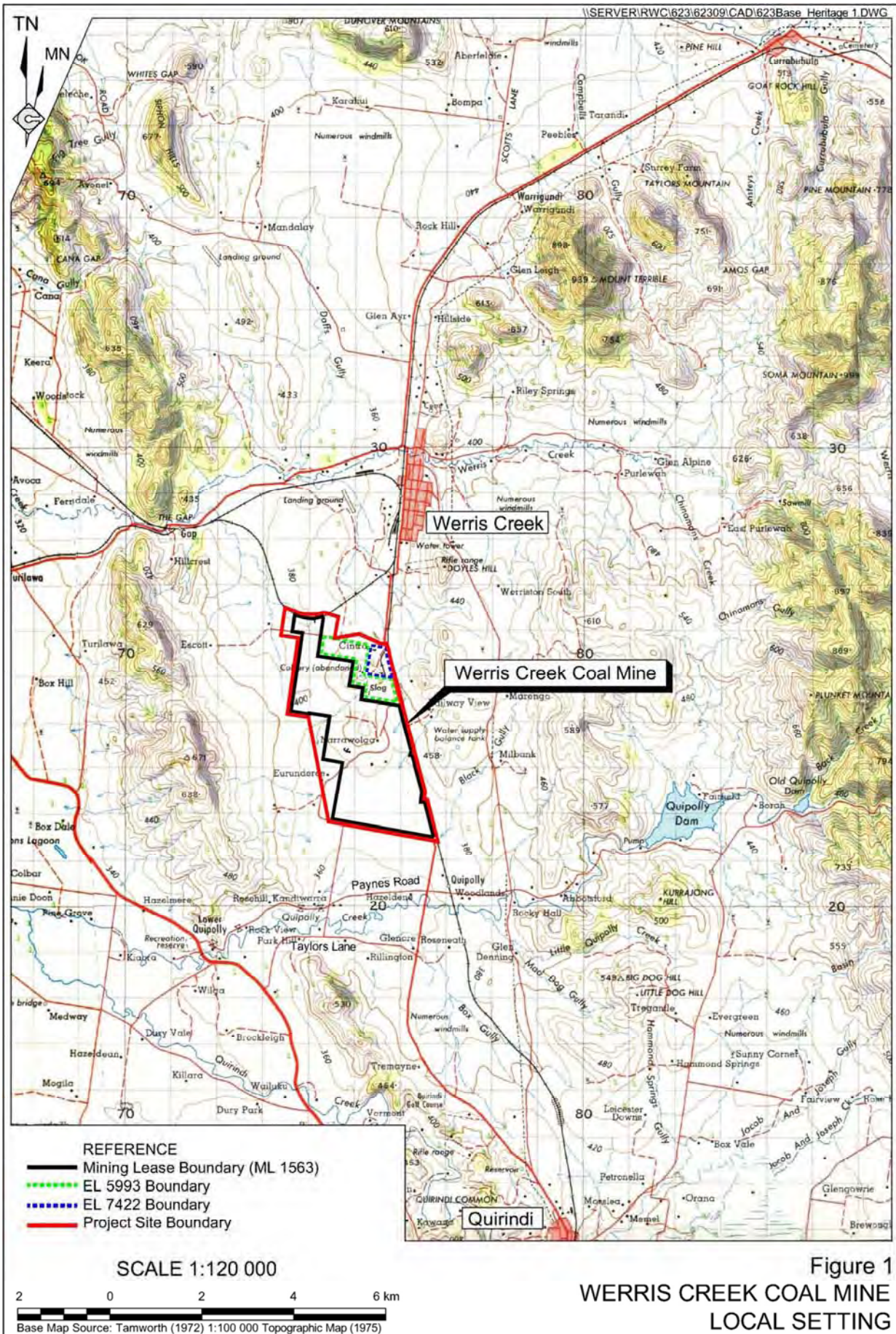
This report presents an assessment of the cultural heritage related issues for the LOM Project in accordance with the general requirements of the NSW Department of Environment, Climate Change and Water's (DECCW) *Draft Guidelines for Aboriginal Cultural Heritage Impact Assessment and Community Consultation* (NSW Department of Environment and Conservation [DEC], 2005) and is consistent with the NSW Heritage Branch's *NSW Heritage Manual* (NSW Heritage Office, 1996) and *Assessing Heritage Significance* (NSW Heritage Office, 2001).

1.1 PROJECT DESCRIPTION

1.1.1 Objectives

The Proponent's objectives for the LOM Project are to:

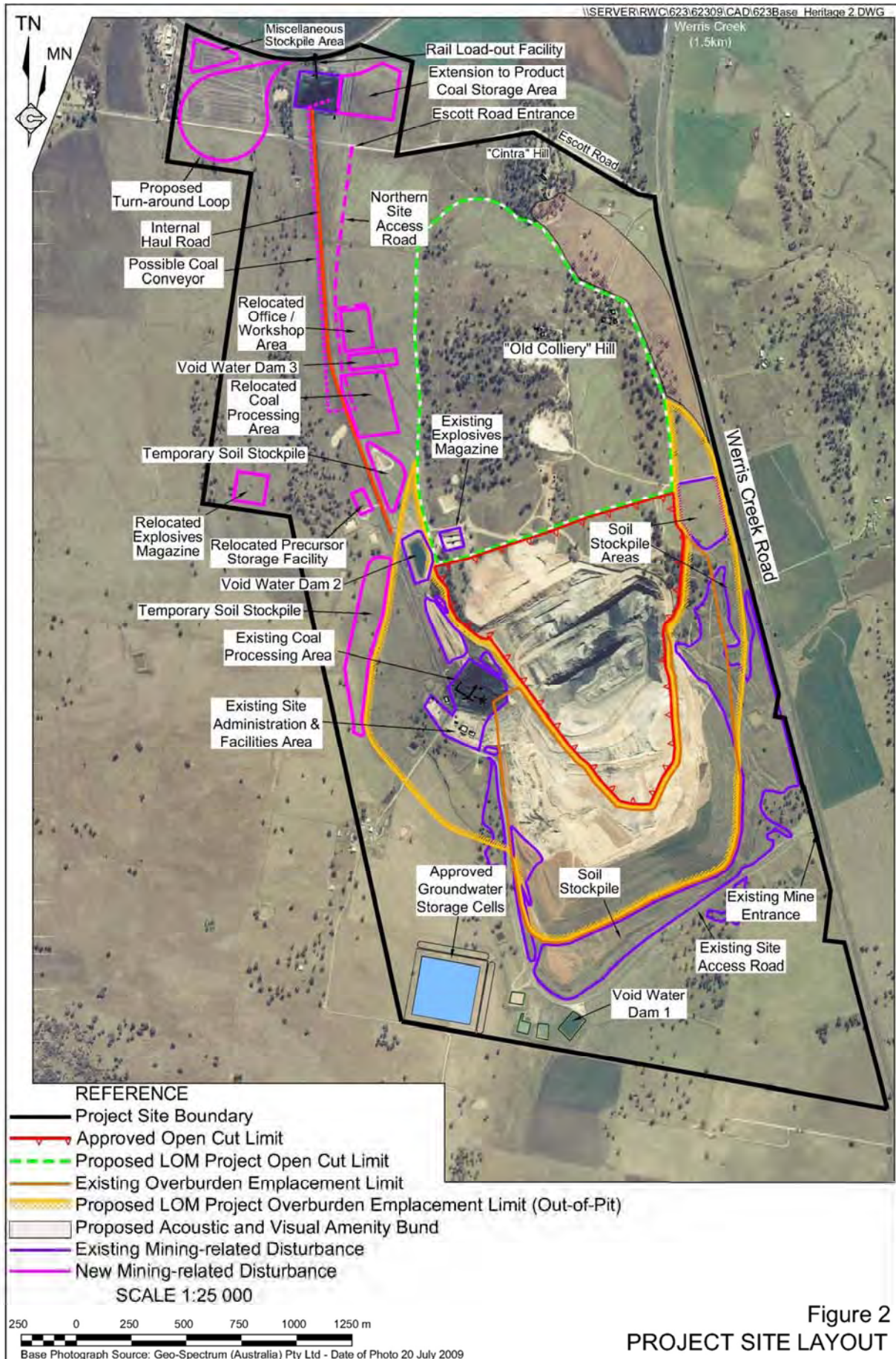
- i) maximise resource recovery and efficiency of mining operations, through the extension of the open cut area in order to recover all available coal resources of the Werris Creek coal measures;
- ii) maintain the stimulus to the local economies of Werris Creek, Quirindi and their surrounding districts through employment opportunities and the supply of services required for the operation of the coalmine;
- iii) create a final landform that is safe, stable and is amenable to a combination of agricultural and native flora/fauna conservation activities;
- iv) modify the existing Biodiversity Offset Strategy for the Werris Creek Coal Mine to compensate for additional disturbance to ecological communities resulting from the LOM Project;
- v) undertake all activities in an environmentally responsible manner, employing a level of control and safeguards that would ensure compliance with appropriate criteria/goals or reasonable community expectations at all times; and
- vi) achieve the above objectives in a cost-effective manner and thereby ensure the ongoing viability of the Werris Creek Coal Mine.



1.1.2 Overview of the LOM Project

The LOM Project would provide for a northerly extension of the Werris Creek Coal Mine, increasing the projected mine life by 20 years, and involve the following activities (the locations of which are shown on **Figure 2**).

- Northerly extension of the approved open cut. The proposed extent of the open cut represents mining of the entire Werris Creek outlier deposit of the Greta Coal Measures.
- Extension of the out-of-pit overburden emplacement. The additional volume of overburden removed from the open cut would be placed over the current footprint of the Coal Processing Area and Site Administration and Facilities Area (out-of-pit overburden emplacement) and extend north over the completed sections of the open cut (In-Pit Emplacement). In order to attenuate noise impacts and screen the operation visually from Werris Creek, the out-of-pit overburden emplacement would extend around the eastern and northeastern perimeter of the open cut. This extension of the out-of-pit overburden emplacement is referred to throughout as the Acoustic and Visual Amenity Bund.
- Relocation of coal processing infrastructure (Coal Processing Area). The primary reason for relocating the Coal Processing Area would be to minimise the haul distance between the open cut and the coal-processing infrastructure. A relocation of the Coal Processing Area would also be required to allow for a westerly extension of the out-of-pit overburden emplacement (to increase storage capacity). The relocated Coal Processing Area would have an increased ROM coal stockpile (ROM Coal Pad) capacity of 200,000 t.
- Increase in coal production up to 2.5 Mtpa of thermal and Pulverised Coal Injection (PCI) coal for the domestic and international markets. To improve operational flexibility, an increase in the approved hours of operation to 24 hours, 7 day per week is also sort.
- An increase in the road transport of coal to domestic markets to 100,000tpa (from 50,000tpa) to meet the needs of local customers for low ash coal.
- Increased storage capacity of the Product Coal Stockpile Area. By extending the pad to the east, the capacity of this stockpile area would be increased to approximately 250,000 t.
- Relocation of the administration and workshop areas (Site Administration and Facilities Area). These would be relocated to enable the capacity of the western out of pit overburden emplacement to be increased.
- Construction of a new entrance to the Project Site off Escott Road. The new "Escott Road Entrance" would provide for more direct access to the relocated coal processing infrastructure, offices and facilities. The use of Escott Road as the primary access point to the Project Site would require the existing Escott Road and the intersection with Werris Creek Road to be upgraded.



- Construction of a second feed point to the Rail Load-out Facility to allow for product separation and reduced inter-product contamination.
- Construction of a Rail Turn-around Loop, which would take off from the Werris Creek Rail Siding to the immediate west of the Rail Load-out Facility.
- Construction of a conveyor to transport coal from the Coal Processing Area to the Product Coal Stockpile Area. This activity would be subject to a further economic feasibility study following approval of the LOM Project.
- Continued dewatering the underground workings of the former Werris Creek Colliery (approved under DA 172-7-2004) to enable open cut mining through part of these workings.
- Construction of a new Void Water Dam for the storage of water which accumulates in the open cut.

While the rehabilitation objectives and methods would remain consistent within those currently implemented at the Werris Creek Coal Mine, the proposed sequence of rehabilitation, and designated land use on the final landform would be modified slightly from that approved by DA 172-7-2004. In addition, the proposed extension of the open cut area and out-of-pit overburden emplacement would increase the area of native vegetation to be cleared. In order to offset this clearing, a modified biodiversity offset strategy has been proposed.

1.2 CULTURAL HERITAGE LEGISLATIVE CONTEXT

Approval for the LOM Project is being sought under Part 3A of the *Environmental Planning and Assessment Act 1979* (EP&A Act). This Act recognizes the need to protect the cultural and natural heritage of NSW and provides for planning before development to determine the likely impact of an activity on the environment. Part 3A of the EP&A Act provides an approval process that is particularly adapted for major projects.

Approvals and legislation that do not apply to Approved Part 3A Projects:

Section 75U of the EP&A Act outlines the authorisations that do not apply to approved Part 3A projects, including those relevant to cultural heritage, viz.:

- division 8 of Part 6, Part 4 and section 139 of the *Heritage Act 1977*; and,
- sections 87 and 90 of the *National Parks and Wildlife Act 1974*.

1.3 OBJECTIVES OF STUDY

The specific objectives of the cultural heritage assessment were to:

- consult the local Aboriginal community to ensure all survey and assessment was undertaken to the satisfaction at the local community and to identify any concerns they may have (consultation with the Aboriginal community followed NSW Department of Environment, Climate Change and Water's [DECCW] *Draft Guidelines For Aboriginal Cultural Heritage Impact Assessment and Community Consultation* [DEC, 2005] and considered the *Interim Community Consultation Requirements for Applicants* [DEC, 2004], *Draft Aboriginal Cultural Heritage Community Consultation Requirements for Proponents* [DECC, 2009] and *Aboriginal Cultural Heritage Community Consultation Requirements for Proponents* [DECCW, 2010]);

- conduct a desktop assessment to delineate areas of known and predicted cultural heritage within the Project Site;
- undertake a stratified archaeological survey of known and predicted cultural heritage identified in the desktop assessment with representatives of the local Aboriginal community;
- record any cultural heritage sites within the Project Site and assess their significance;
- identify the nature and extent of potential impacts of the LOM Project on cultural heritage; and,
- devise options, in consultation with the community, to avoid or mitigate potential impacts of the development on cultural heritage places and items.

Preparation of this report involved collation of relevant archival, archaeological, historical and environmental information and the use of aerial photographs and topographic and geomorphic maps to identify areas likely to contain cultural heritage sites. Archaeological field investigation of the Project Site was undertaken from 9 to 10 June 2010 by Project Archaeologist Matt Cupper with the assistance of the following Aboriginal community representatives: Gordon Nean (Nungaroo Local Aboriginal Land Council [LALC]), Neville Sampson (Tamworth LALC) and Heather Porter and Victor Porter (Gomeri Tribal Nation Secretariat).

2. ABORIGINAL SOCIAL AND CULTURAL INFORMATION

2.1 INTRODUCTION

In accordance with the DECCW's *Draft Guidelines For Aboriginal Cultural Heritage Impact Assessment and Community Consultation* (DEC, 2005) and in consideration of the *Interim Community Consultation Requirements for Applicants* (DEC, 2004), *Draft Aboriginal Cultural Heritage Community Consultation Requirements for Proponents* (DECC, 2009) and *Aboriginal Cultural Heritage Community Consultation Requirements for Proponents* (DECCW, 2010)¹, this assessment has involved the appropriate representatives of the local Aboriginal community and considered their cultural values and concerns. The following sections describe involvement by the Aboriginal community and demonstrate that the input of the affected Aboriginal community has been considered when determining and assessing impacts, developing options, and making final recommendations relevant to Aboriginal cultural heritage outcomes of the LOM Project.

2.2 ABORIGINAL COMMUNITY PARTICIPATION

Aboriginal community consultation for the Aboriginal cultural heritage assessment was conducted:

- before the field assessment to assess preliminary community views and organise a field survey team;

¹ The *Interim Community Consultation Requirements for Applicants* (DEC, 2004) were replaced by the *Aboriginal Cultural Heritage Community Consultation Requirements for Proponents* (DECCW, 2010) on 12 April 2010, after the Aboriginal community consultation process for the LOM Project was initiated on 11 March 2010.

- during the field survey with the Aboriginal team members; and,
- after the field survey to discuss the findings and recommendations for Aboriginal cultural heritage management.

2.2.1 Identification of Aboriginal Community Groups and Individuals

Relevant stakeholders from the Aboriginal community were identified using a process consistent with the *Interim Community Consultation Requirements for Applicants* (DEC, 2004) and also considering the *Draft Aboriginal Cultural Heritage Community Consultation Requirements for Proponents* (DECC, 2009) and *Aboriginal Cultural Heritage Community Consultation Requirements for Proponents* (DECCW, 2010), as follows.

- Written letters of notification were sent to the Nungaroo LALC, Registrar of the NSW *Aboriginal Land Rights Act* 1983, NTS Corp Limited, DECCW, National Native Title Tribunal, Namoi Catchment Management Authority and Liverpool Plains Shire Council (11 March 2010) requesting advice as to local Aboriginal stakeholders (**Appendix 1**).
- Public advertisements were placed in local/regional newsprint media including the *Namoi Valley Independent* and *Northern Daily Leader* (15 March 2010) inviting interested persons/parties to register an interest in the LOM Project (**Appendix 2**).
- Previous involvement in assessments of cultural heritage significance for the Werris Creek Coal Mine (e.g. ASR, 2004; 2008) was considered.

There were nine responses to the written letters of notification and public notices (**Appendix 3**), as follows.

- Corie Taylor registering his interest in the LOM Project by telephone on 15 March 2010.
- Lisa Shipley registering her interest in the LOM Project by e-mail on 19 March 2010.
- Tamworth LALC registering their interest in the LOM Project by e-mail on 22 March 2010.
- Gomeroi Tribal Nation Secretariat registering their interest in the LOM Project by e-mail on 25 March 2010.
- Nungaroo LALC registering their interest in the LOM Project by telephone on 27 May 2010.
- NTS Corp Limited advising that the Gomeroi Tribal Nation Secretariat were appropriate Aboriginal stakeholders to be involved in the LOM Project by e-mail on 25 March 2010.
- Office of the Registrar of the NSW *Aboriginal Land Rights Act* 1983 stating that the development area does not appear to have Registered Aboriginal Owners by letter dated 22 March 2010.
- National Native Title Tribunal stating that the development area does not have native title holders or applicants by letter dated 15 March 2010.
- Liverpool Plains Shire Council advising that the Quirindi Aboriginal Corporation, Walhallow Aboriginal Corporation and Nungaroo LALC were Aboriginal organizations in the Liverpool Plains Shire by letter on 12 March 2010.

The location of the Werris Creek Coal Mine and the nature of the works associated with the LOM Project were explained to the registered Aboriginal stakeholders. Requirements for a cultural heritage assessment were discussed and the registered Aboriginal stakeholders were presented with a proposed methodology for the cultural and archaeological assessment. Input from the registered Aboriginal stakeholders about this study programme for assessing potential impacts on cultural heritage places and items was sought. Representatives of the registered Aboriginal stakeholders participated in the social and cultural study and archaeological field survey and contributed to devising management protocols to avoid or mitigate disturbance to cultural heritage sites.

2.2.2 Preliminary Aboriginal Involvement

Werris Creek Coal Pty Limited has engaged in regular liaison with members of the local Aboriginal community. This was initiated from a whole-of-Project perspective by Werris Creek Coal Pty Limited in 2004 and has been on-going since that time. This has included then Project Archaeologist John Appleton (of ASR) completing an archaeological assessment of the original layout of the Werris Creek Coal Mine with representatives of Nungaroo LALC Shane Allen and Peter Allen in 2004 (ASR, 2004). Representatives of Nungaroo LALC have been involved in an on-going process of monitoring mining activities at the Werris Creek Coal Mine since 2005, including re-location of the Aboriginal cultural heritage site 29-2-0005 (Narrawolga Axe-Grinding Grooves) (ASR, 2008).

2.2.3 Aboriginal Involvement Prior to the Field Assessment

Prior to the field assessment, Project Archaeologist Matt Cupper and Werris Creek Coal Pty Limited Environmental Officer Andrew Wright held telephone discussions with Shane Allen (CEO, Nungaroo LALC), Gordon Nean (Heritage Officer, Nungaroo LALC), Fiona Snape (CEO, Tamworth LALC), Neville Sampson (Heritage Officer, Tamworth LALC), Tori Edwards (Coordinator, Gomeroi Tribal Nation Secretariat), Victor Porter (Representative, Gomeroi Tribal Nation Secretariat), Corie Taylor and Lisa Shipley to explain the proposed works associated with the LOM Project and the planned cultural heritage assessment.

Measures to avoid or mitigate any impacts on cultural heritage places or items were discussed with the registered Aboriginal stakeholders. They were presented with written copies of a proposed methodology for the cultural and archaeological assessment (**Appendix 4**). Opinions of the registered Aboriginal stakeholders about the LOM Project and its potential impacts on cultural heritage were sought and any concerns or queries were addressed (**Appendix 5**).

The registered Aboriginal stakeholders were presented with information regarding the LOM Project. The purpose of the presentation was to provide a detailed presentation of the LOM Project to assist the registered Aboriginal parties to provide relevant information about the cultural significance of Aboriginal cultural heritage items and/or places and the potential for impacts from the project.

2.2.4 Aboriginal Involvement during the Field Assessment

On the recommendation of the registered Aboriginal stakeholders, the following four representatives from the registered Aboriginal stakeholders participated in the field survey conducted from 9 to 10 June 2010:

- Gordon Nean (Heritage Officer, Nungaroo LALC);

- Neville Sampson (Heritage Officer, Tamworth LALC);
- Victor Porter (Representative, Gomeri Tribal Nation Secretariat); and,
- Heather Porter (Representative, Gomeri Tribal Nation Secretariat).

Discussions were held with the representatives of the Aboriginal stakeholders to ascertain their views about the LOM Project and its potential impact on Aboriginal cultural heritage items, places and values.

2.2.5 Aboriginal Involvement Following the Field Assessment

Draft copies of this cultural heritage assessment report were provided for comment to Nungaroo LALC, Tamworth LALC, Gomeri Tribal Nation Secretariat, Corie Taylor and Lisa Shipley on 13 July 2010, consistent with the *Aboriginal Cultural Heritage Community Consultation Requirements for Proponents* (DECCW, 2010). There were three responses to the draft report. Nungaroo LALC and Tamworth LALC advised (by telephone on 31 August 2010 and 13 August 2010, respectively) that they required no changes to the draft report. Gomeri Tribal Nation Secretariat also required no changes to the draft report, recommending (in writing on 29 July 2010) that Aboriginal traditional owners should continue to be involved in the LOM Project (**Appendix 6**).

2.3 ABORIGINAL SOCIAL AND CULTURAL INFORMATION ABOUT THE LOM PROJECT SITE

Aboriginal people of the North West Slopes are concerned about any development that might impact upon Aboriginal heritage and other values on land that is traditionally theirs. All land has high cultural significance for individual Aboriginal people and for the Aboriginal community collectively. It should also be noted that any development upon, or disturbance of land is contrary to principal Aboriginal beliefs regarding land, its values and its inherent cultural significance.

Several of the Aboriginal community representatives had previously visited the Project Site. Peter Allen and Shane Allen, representatives of the Nungaroo LALC, had participated in the original archaeological assessment of the Werris Creek Coal Mine (ASR, 2004). Neville Sampson, representative of the Tamworth LALC had previously visited “Cintra” Hill (see **Figure 1**) at the northern end of the Project Site. Victor Porter, representative of the Gomeri Nation Tribal Secretariat, had previously worked on the “Narrawolga” property, which had encompassed the southern area of the Project Site when it had operated as a sheep station.

Heather Porter, representative of the Gomeri Nation Tribal Secretariat, identified the Project Site as a place that Aboriginal people had occupied in the past. Physical evidence of this past land use was provided by axe-grinding grooves (AHIMS site number 29-2-0005) in a sandstone outcrop towards the southeastern corner of the Project Site. These were re-located from the original disturbance area of the Werris Creek Coal Mine in 2008 and are currently being stored on an adjacent property to the Project Site. The Aboriginal community representatives inspected the axe-grinding grooves during the current study and concurred that they be re-instated to a position as close as possible to their original location following restoration and rehabilitation of the Final Landform.

Neville Sampson, representative of the Tamworth LALC, identified Kurrajong (*Brachychiton populneus*) trees within the Project Site as resource plants that past Aboriginal people could have exploited, but did not object to these trees being removed during development of the LOM Project.

3. LANDSCAPE CONTEXT

3.1 INTRODUCTION

The Project Site is located in a gently undulating terrain between the lowlands of the Liverpool Plains and uplands of the Liverpool Range in the North West Slopes region of central northern NSW (**Figure 1**). The climate is dry subhumid, receiving approximately 675 mm of rainfall per annum (Bureau of Meteorology, 2010).

Geologically, the Project Site is located in the Werrie Basin, which is constrained in the west by the Mooki Thrust and Early Carboniferous (355-320 million year old) Currabubula Formation conglomerates and tuffaceous limestones to the east (Pratt, 1996; Department of Mineral Resources [DMR], 2002). A shallow sea occupied the basin during the Late Carboniferous and Early Permian geological epochs (320 to 280 million years ago). It subsequently filled with sediments from rivers, lakes and extensive peat swamps. The Greta Coal Measures targeted by the Werris Creek Coal Mine comprise pebble and granular conglomerates, sandstones, mudstones and coal, which had their geneses in a fluvial to deltaic environment (Carey, 1937; Pratt, 1996; DMR, 2002).

3.2 LANDFORMS AND VEGETATION

The Project Site comprises low hills and ridges of Early Permian sedimentary and volcanic bedrock, which gently slope down to Quaternary (less than a few million years old) alluvial plains in the north and south. Elevations range from 445 m AHD on the summit of "Old Colliery" Hill (see **Figure 2**) down to 380 m AHD at the Rail Load-out Facility. The summits of the two major hills are conglomerates and sandstones of the Willow Tree Formation (analogous to the Greta Coal Measures; Pratt, 1996; DMR, 2002). The lower slopes have weathered to colluvium and low-lying areas are alluvial channel and overbank deposits of silty clay. The soils of the hills, ridges and slopes are mostly sandy or stony, with tilted sandstone beds outcropping along the eastern and western flanks of "Old Colliery" Hill and remnant ridges of Werrie Basalt to the west. Soils on the alluvial terraces are silty clays.

Most of the Project Site has been previously cleared for pastoralism and agricultural cropping, with a vegetation cover of native and introduced pasture grasses. Box-Gum woodland (including White Box [*Eucalyptus albens*], Yellow Box [*E. melliodora*], Blakely's Red Gum [*E. blakelyi*]) of varying condition remains on the summits and slopes of the hills and along the stony ridges. These areas also contain Tumbledown Red Gum (*E. dealbata*), White Cypress Pine (*Callitris glaucophylla*), Kurrajong, Brigalow (*Acacia harpophylla*) and Rough-barked Apple (*Angophora floribunda*).

Overall, the environment of the Project Site has been extensively modified by past European land use practices. The alluvial plains and hill slopes had been cleared for agricultural cropping and sheep and cattle grazing following European settlement in the second half of the nineteenth century. Even the crests of the hills and ridges, where the soils were too shallow to plough and crop, have been substantially impacted by sheep and cattle grazing. The greatest impact in these areas has been the extensive removal of the original vegetation, soil and subsoil stripping and substantial earthworks during the development of gravel quarries, the former Werris Creek Colliery and the existing Werris Creek Coal Mine.

3.3 SETTING OF THE PROJECT SITE

3.3.1 Setting of the Proposed LOM Project Open Cut Extension

The proposed extension to the open cut area would occupy 141 ha in the centre of the Project Site. This would mainly encompass the summit and slopes of “Old Colliery” Hill between 445 to 400 m AHD. The conglomeratic bedrock of this area has weathered to gravels and cobbles of siltstone with little soil cover. The summit of “Old Colliery” Hill supports Box Gum woodland with isolated stands of predominantly White Box with minor associations of White Cypress Pine, Kurrajong and Brigalow (**Figure 3**). The slopes have been cleared for agriculture, with terraces and earthen contour banks constructed. Large parts of this area have also been impacted by previous earthworks associated gravel quarrying, the former Werris Creek Colliery and the existing Werris Creek Coal Mine (**Figure 4**).

3.3.2 Setting of the Proposed LOM Project Out-of-Pit Overburden Emplacement

The proposed extension to the Out-of-Pit Overburden Emplacement would progressively follow the development of the open cut to the north and add an extra 49 ha to the currently approved overburden emplacement. The area to be impacted by the extension of the overburden emplacement comprises of colluvial foot-slopes of the hills. It has been previously cleared and is now heavily modified, occupied by existing mine infrastructure and an overburden emplacement.

3.3.3 Setting of the Proposed LOM Project Acoustic and Visual Amenity Bund Wall

The proposed Acoustic and Visual Amenity Bund Wall would encompass an area of 22 ha in the northwest of the Project Site. The area proposed to be impacted by the Acoustic and Visual Bund Wall comprises of colluvial foot-slope landforms of “Old Colliery” Hill and “Cintra” Hill. Vegetation in this area has largely been cleared for agriculture, with some remnant White Box trees at higher elevations (**Figure 5**).

3.3.4 Setting of the Proposed LOM Project Rail Turn-around Loop Area

The proposed Rail Turn-around Loop would be 1610 m long and located on the foot-slopes of the weathered basalt ridge to the northwest of ML1563. This area has been cleared for agricultural cropping (**Figure 6**).

3.3.5 Setting of the Proposed LOM Project Relocated and Expanded Infrastructure Areas

The relocated infrastructure areas (Site Administration and Facilities Area [2.6 ha], Coal Processing Area [5.7 ha], Precursor Storage Area [0.6 ha], Product Coal Storage Area [8.7 ha] and Explosives Magazine [1.0 ha]) would be constructed on colluvial foot-slopes to the west and northwest of ML1563. The original woodland in these areas has been previously cleared for agriculture (**Figures 7, 8**).



Figure 3 Southwestern slopes of “Old Colliery” Hill, proposed for extension of the Open cut Area



Figure 4 Existing gravel quarry on “Old Colliery” Hill



Figure 5 Northeastern slopes of “Old Colliery” Hill, proposed for Acoustic and Visual Amenity Bund



Figure 6 Alluvial plain, proposed for Rail Turn-around Loop



Figure 7 Western foot-slopes of “Old Colliery” Hill, proposed for Site Administration and Facilities Area



Figure 8 Alluvial plain, proposed for expansion to the Product Coal Storage Area

3.3.6 Setting of the Proposed LOM Project Northern Site Access Road

A proposed new 780m long access road for the movement of all mine-related traffic between Escott Road and the Coal Processing and Site Administration and Facilities Areas would be constructed on the cleared and cultivated areas to the northwest of ML1563.

3.3.7 Setting of the Proposed LOM Project Coal Conveyor

Following the establishment of the relocated Coal Processing Area, the Proponent may opt to construct a 1.6km long overland conveyor between the Coal Processing Area and Product Coal Stockpile Area. If constructed, the conveyor would be a freestanding structure above ground level on the cleared land to the northwest of ML1563.

4. CULTURAL HERITAGE CONTEXT

4.1 ABORIGINAL CULTURAL HERITAGE CONTEXT

4.1.1 Ethno-Historical Context

Aboriginal people of the Kamilaroi (or *Gamilaraay*) language group occupied the North West Slopes at the time of first contact with Europeans (Mitchell, 1839; Fison and Howitt, 1867; Parker, 1905; Tindale, 1974; Howitt, 1996). This language group comprised people who spoke the sub-dialects *Yuwaalaraay*, *Yuwaaliyaay* (Euahlayi), *Gamilaraay*, *Gawambaraay*, *Wirayaraay* (Wiriwiri) and *Walaraay* (Austin *et al.*, 1980; O'Rourke, 1995, 1997). These tribes shared similar language and kinship systems, notably the division of members into exogamous moieties (two-part social classification) known as *Gubadhin* (Kupathin) and *Dhilbay* (Dilbi) (Frazer, 1994; O'Rourke, 1997).

At the time of first contact with European observers the Kamilaroi were hunter-fisher-gatherers and appear to have had a semi-sedentary lifestyle. Surveyor-General of NSW, Major Thomas Livingstone Mitchell (1839) described the deserted bark shelters of a 'numerous encampment' of Aborigines beside a billabong of the Namoi River near present-day Boggabri some 100 km northwest of the Project Site. On the Gwydir River, 200 km northwest of the Project Site near where Moree is now located, he noted an abandoned village of circular huts with conical roofs made from reeds, grass and boughs. Similarly, colonial botanist Allan Cunningham recorded 14 huts with bark floors and conical roofs on Coxs Creek, approximately 80 km northwest of the Project Site (O'Rourke, 1997).

O'Rourke (1997) estimates that there were at least 60 Kamilaroi clans, with perhaps 160 adult men, women, adolescents and children in each, suggesting a total regional population in central northern NSW of around 10,000 people. Each clan probably resided most of the year at a small number of established, favourable locations within their estate.

The Kamilaroi caught fish including eels, freshwater crayfish, yabbies, tortoises and freshwater mussels in the rivers, creeks and wetlands in the region (Mitchell, 1839; Parker, 1905; O'Rourke, 1997). Watercraft were manufactured from large slabs of bark cut from river red gum trees. Fish were caught using fishing lines and nets made from reed fibre.

Nets were used to catch waterbirds, whose eggs were also collected. Some of the other animals that Aboriginal people of the North West Slopes hunted include kangaroos, wallabies, koalas, possums, emus, echidnas, lizards, snakes and frogs (Mitchell, 1839; Fison and Howitt, 1867; Parker, 1905; O'Rourke, 1997). Plant foods included grass seeds, wild orange, emu apple, melons, tubers, yams and roots (Mitchell, 1839; Parker, 1905; Gott, 1983; O'Rourke, 1997).

Aspects of the initial interaction between Europeans and the Kamilaroi led to violent conflict. Aborigines were shot, poisoned and displaced from their land by pastoral settlers and, in retaliation, cattle, sheep, stockmen and shepherds were speared. Historical sources record a rapid decline in Kamilaroi numbers, caused by dispossession of land and the consequent destruction of habitat and social networks (Mitchell, 1839; Parker, 1905; O'Rourke, 1997). Diseases including smallpox and malnutrition also took their toll (Mitchell, 1839; O'Rourke, 1997).

Within a decade of the first contact many of the Kamilaroi were living adjacent to pastoral homesteads, often working as shepherds or stockmen or engaged in other labouring activities (O'Rourke, 1997). Traditional social networks collapsed. The last Kamilaroi bora ceremony is recorded to have occurred in 1905 on the Namoi River at Wee Waa, approximately 180 km northwest of the Project Site (O'Rourke, 1997). Other social structures, such as marriage laws, were also abandoned.

In 1895 an Aboriginal ('mission') Reserve (AR 28828) was gazetted on a 150-acre allotment of land adjacent to the Mooki River at Caroona, approximately 20 km west of the Project Site. This was expanded to 230 acres in January 1899 (AR 30777). Aboriginal people lived in a number of cottages spread across the reserve and survived by growing crops and grazing dairy cattle and sheep for meat. The Caroona Aboriginal Reserve was revoked in 1962 but the residents were permitted to remain under permissive occupancy until 1973 when the land was transferred to the Aboriginal Lands Trust under the *Aboriginal Act 1973*.

Many of the contemporary Aboriginal people of the North West Slopes live in regional centres such as Tamworth, which has a population of around 3700 Aboriginal people, or some 7 % of the total population (Australian Bureau of Statistics, 2006).

4.1.2 Prehistoric Context

Accounts of Aboriginal land use of the North West Slopes during the nineteenth century provide an insight into possible settlement patterns in the prehistoric period. O'Rourke (1995; 1997), using these historical ethnographies, invoked a subsistence model for the region based on the relationship between occupation of the riverine corridors and drier 'backcountry'. Large populations of people congregated at the rivers during the drier months. In cooler or wetter months, mobile bands dispersed over the plains and adjacent foothills exploiting ephemeral resources (O'Rourke, 1997).

The material record of this occupation is preserved in the archaeological sites of the North West Slopes, most of which probably date to the period since the last Ice Age (after around 18,000 years ago) (Purcell, 2000; 2002). All that remains at many of these sites are flakes of stone debris from the making and resharpening of stone tools. These were made both at Aboriginal open habitation areas (campsites) or special activity areas such as axe-grinding groove sites.

As well as being the sites of manufacture and maintenance of stone implements, open habitation areas usually contain evidence of domestic and other activities such as cooking and food preparation. Campfires or oven hearths are common, marked by charcoal and heat retaining stones or hearthstones. Organic remains consist of marsupial, rodent, bird, lizard, snake and fish bones, eggshell and freshwater mussel shell. Modified trees show where bark may have been removed by Aboriginal people to manufacture canoes, shelters and dishes.

4.1.3 Types of Aboriginal Cultural Heritage Sites in the Region

Based on the results and analytical conclusions of previous archaeological surveys in similar landscape contexts on the North West Slopes, it is possible to predict the types and topographic contexts of Aboriginal cultural heritage sites in the Werris Creek area. The occurrence and survival of archaeological sites is, however, dependent on many factors including micro-topography and the degree of land surface disturbance.

The types of Aboriginal cultural heritage site previously recorded on the North West Slopes are described in Sections 4.1.3.1 to 4.1.3.11.

4.1.3.1 Stone Artefact Scatters

Scatters of stone artefacts exposed at the ground surface are one of the most commonly occurring types of archaeological site in the region. The remains of fire hearths may also be associated with the artefacts. In rare instances, sites that were used over a long period of time may accumulate sediments and become stratified. That is, there may be several layers of occupation buried one on top of another.

Stone artefact scatters are almost invariably located near permanent or semi-permanent water sources. Local topography is also important in that open campsites tend to occur on level, well-drained ground elevated above the local water source. On the North West Slopes they are commonly located on river terraces and along creek-lines and also around the margins of lakes and swamps.

4.1.3.2 Axe-grinding Grooves

These result from Aboriginal people having rubbed the edges of stone axe-heads repeatedly against a soft abrasive rock in order to shape or sharpen them. Grinding grooves are normally located adjacent to creeks where suitable stone for grinding may be present. In most instances, sandstone outcrops provided the most suitable surface for grinding.

4.1.3.3 Modified Trees

Slabs of bark were cut from trees by Aboriginal people and used for a variety of purposes including roofing shelters and constructing canoes, shields and containers. Scars also resulted from the cutting of toeholds for climbing trees to obtain honey or to capture animals such as possums. Some trees were carved, whereby Aboriginal people cut designs through the bark onto the wood beneath. Ethnohistoric records indicate that some carved trees were associated with burials whilst others may have been sacred or totemic sites.

On the North West Slopes, River Red Gums and Box are the most commonly scarred species. Carvings are often on Cypress Pine. The classification of scarred trees as natural, European or Aboriginal is often problematic. However, if the scar is Aboriginal the tree must now be more than ~150 years old.

4.1.3.4 Hearths

Hearths consist of lumps of burnt clay or stone cobble hearthstones. Sometimes ash and charcoal are preserved. Other materials found in hearths include animal bone, freshwater mussel shell, emu eggshell and stone artefacts. Hearths probably represent the remains of cooking ovens, similar to those described in ethnographic accounts by Major Thomas Mitchell (1839). These were lined with baked clay nodules and stone cobbles, possibly to retain heat. Hearths may be isolated or occur in clusters and may be associated with open campsites or middens. They are sometimes located on floodplain terraces of the North West Slopes.

4.1.3.5 Rockshelter Sites

Caves or shelters in cliff lines and beneath boulder overhangs were often used by Aboriginal people as campsites. Because of the confined area in these shelters and because of repeated Aboriginal occupation of such sites, the occupation deposits that they contain are often richer than open campsites and are usually stratified.

Rockshelters will only be found where suitable geological formations are present. They may occur as sandstone overhangs, shelters beneath granite tors or as limestone caves.

4.1.3.6 Rock Art Sites

Rock art consists of paintings, drawings and/or engravings on rock surfaces. In most instances in the wider region, rock art is related to the distribution of rockshelters but it may also be found on freestanding rocks.

4.1.3.7 Quarry Sites

These are locations where Aboriginal people obtained raw material for their stone tools or ochre for their art and decoration. Materials commonly used for making flaked stone tools include chert, silcrete, quartz and quartzite. These materials were obtained from exposed sedimentary formations or picked up as loose rock on the surface. Stone quarries may also be associated with volcanic rock outcrops, which provided the raw material for ground stone tools such as stone axes.

4.1.3.8 Freshwater Shell Middens

Shell middens are deposits of shell and other food remains accumulated by Aboriginal people as food refuse. In inland NSW these middens typically comprise shells of the freshwater lacustrine mussel *Velesunio ambiguus* or the freshwater riverine mussel *Alathyria jacksoni*. Freshwater middens are most frequently found as thin layers or small patches of shell and often contain stone or bone artefacts and evidence of cooking. Such sites are relatively common along the watercourses of the North West Slopes and their associated lakes and other wetlands.

4.1.3.9 Earth Mounds

Earth mounds may have been used by Aboriginal people as cooking ovens or as campsites. Originally they appear to have ranged from 3 to 35 m in diameter and from 0.5 to 2 m in height. Today, however, they may be difficult to recognize because of the effects of ploughing, grazing and burrowing rabbits. Earth oven material, stone artefacts, food refuse and the remains of hut foundations have been exposed in excavated earth mounds.

4.1.3.10 Stone Arrangements, Ceremonial Rings and Ceremony and Dreaming Sites

Stone arrangements range from cairns or piles of rock to more elaborate arrangements such as stone circles or standing slabs of rock held upright by stones around the base. Some stone arrangements were used in ceremonial activities whilst others may represent sacred or totemic sites. Other features associated with the spiritual aspects of Aboriginal life are those now called 'ceremony and dreaming' sites. These can be either stone arrangements or natural features such as rock outcrops, waterholes or mountains, which may be associated with initiation ceremonies or the activities of ancestral creators.

4.1.3.11 Burials

Aboriginal burial grounds may consist of a single interment or a suite of burials. In the drier parts of the Murray-Darling Basin skeletal material is regularly found eroding from sand deposits (Bonhomme 1990, Hope 1993) but in the higher North West Slopes burial sites are rarely found because conditions for the preservation of bone are poor. Knowledge of Aboriginal burial grounds is best sought from local Aboriginal communities.

4.1.4 Previous Aboriginal Cultural Heritage Investigations

An understanding of the Aboriginal archaeology of the North West Slopes has begun to emerge based on a number of previous studies, including some in and near the Project Site. Studies by Balme (1986) and Purcell (2000, 2002) are among the most wide-ranging and provide a summary of the regional archaeological record. In short, surface scatters of flaked stone artefacts are the most common site type. These stone assemblages are dominated by flakes and flaked pieces mostly struck from quartz, chert, silcrete, quartzite and fine-grained sedimentary rocks (Balme, 1986; Purcell, 2000, 2002). Eucalypt trees with scars possibly made by Aboriginal people are also well represented on the North West Slopes. Other site types include axe-head grinding grooves, stone quarries, earthen features including mounds and hearths, stone arrangements and ceremonial rings. The highest density of sites on the North West Slopes is along the Namoi, Mooki and Peel Rivers (Purcell, 2000, 2002). Purcell (2000, 2002) found that Aboriginal occupation of the North West Slopes was focussed within floodplain terrace landforms. Sites were an average distance of about 400 m from watercourses (Purcell, 2000, 2002).

The Werris Creek area has been the focus of a number of systematic archaeological studies in recent years. Of relevance to this study are those by archaeologists Jo McDonald (1998), Patrick Gaynor (2002), John Appleton (ASR, 2004) and archaeologists from environmental consultancy Umwelt (2010). These field studies document the distribution of Aboriginal archaeological sites on the alluvial plains and bedrock hills either side of the Mooki River and make predictions about site distribution based on observations of the landforms of the LOM Project Site.

McDonald (1998) archaeologically investigated the route of a proposed natural gas pipeline between Tamworth and Dubbo, which traversed an area of Werris Creek north of the LOM Project Site. She found that sites were generally associated with more permanent watercourses, including the Mooki River, with most sites within 50 m of a stream course (McDonald, 1998).

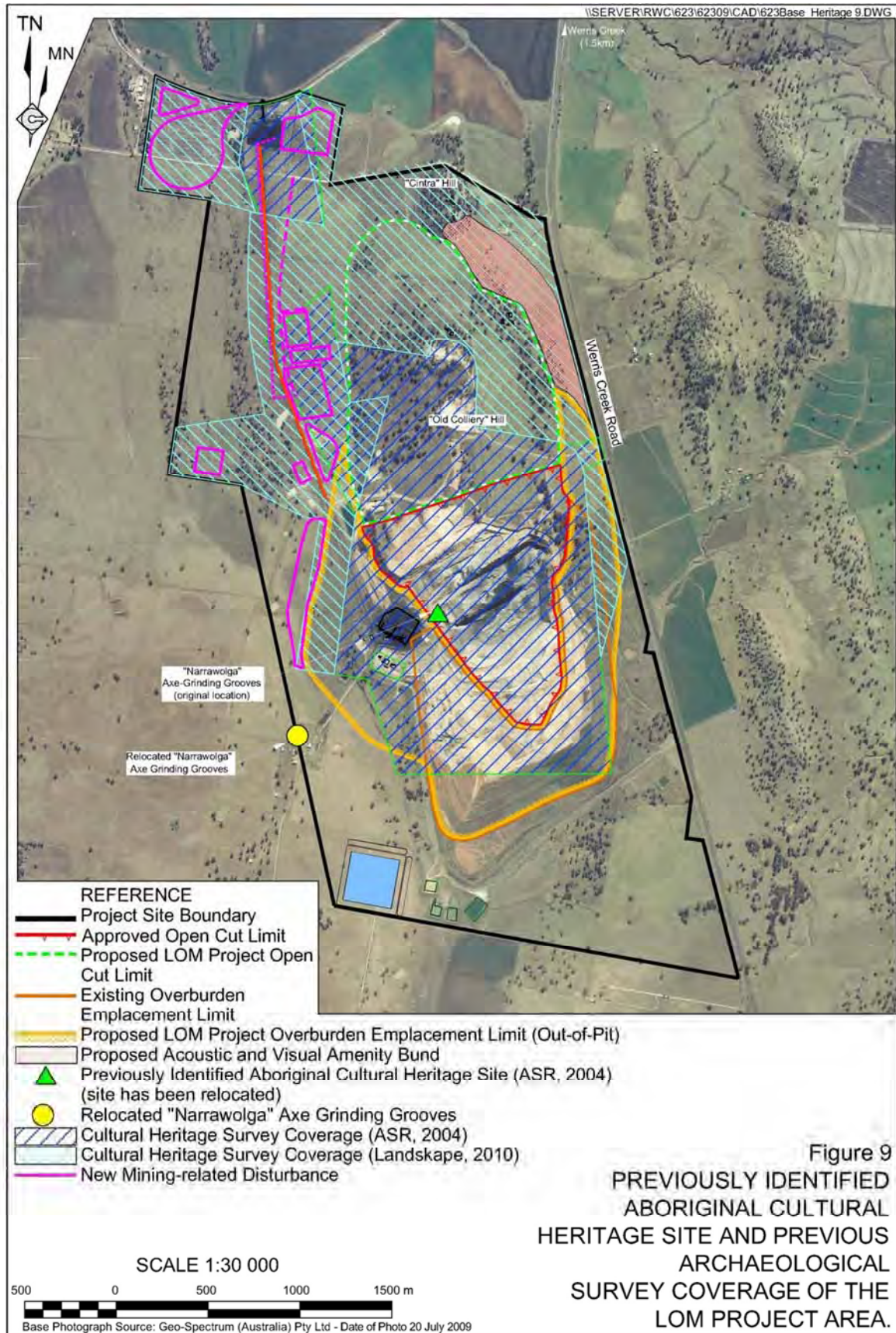
Gaynor (2002) completed an archaeological survey of the Doona State Forest and a travelling stock route near Caroon, approximately 20 km west of the LOM Project Site. He identified 21 modified trees and two sites with axe-grinding grooves (Gaynor, 2002).

Archaeologists from environmental consultancy Umwelt (2010) have conducted a number of cultural heritage assessments around Caroon for a proposed BHP Billiton coal mine. They identified three modified trees, two stone artefact scatters and four isolated finds of stone artefacts and twelve locations with axe-grinding grooves. Two of the scarred trees were on the floodplain of the Mooki River and the other was located near Quirindi Creek (Umwelt, 2010). The stone artefact scatters, comprising a small number (14 and 7) of artefacts, were also on the floodplain of the Mooki River, as were most of the isolated occurrences of stone artefacts. Artefacts are primarily flakes of a range of lithologies including chert and rhyolite. The axe-grinding grooves were on sandstone outcrops in the ranges of the Doona State Forest and Nicholas Ridge (Umwelt, 2010).

The most recent archaeological investigations pertinent to the LOM Project Site is Appleton's (ASR, 2004) assessment of the original layout for the Werris Creek Coal Mine. Appleton estimated that he archaeologically surveyed approximately 679 ha within ML1563, including most of the proposed disturbance areas of the Werris Creek Coal Mine proposal (ASR, 2004; **Figure 9**). He re-identified an axe-grinding groove site (Aboriginal Heritage Information Management System [AHIMS] site number 29-2-0005) south of "Old Colliery" Hill. This site, which had originally been recorded in 1964, comprised at least 25 axe-grinding grooves on a number of sandstone outcrops encompassing an area of approximately 90 m x 35 m.

Previously Recorded Aboriginal Cultural Heritage Sites in the LOM Project Site

According to the DECCW AHIMS site database, three Aboriginal archaeological sites have previously been recorded within approximately 5 km of the Project Site. These include stone artefact scatters at The Gap and Escott, respectively some 3 km northwest and 1.5 km west of the Project Site. The cultural heritage assessment for the EIS conducted by ASR (2004) also re-identified one site within ML1563. This was an axe-grinding groove site, AHIMS site number 29-2-0005 (Narrawolga Axe-Grinding Grooves) (**Table 1** and **Figure 9**). It comprised at least 25 grooves on several sandstone slabs and encompassed an area of approximately 90 m x 35 m south of "Old Colliery" Hill.



An Aboriginal Heritage Impact Permit (AHIP) under Section 90 of the *National Parks and Wildlife Act 1974* was issued to Werris Creek Coal Pty Limited to remove the axe-grinding groove site (AHIMS site number 29-2-0005) because it was within an area to be impacted by the currently approved open cut area (ASR, 2008). The sandstone surfaces bearing the axe-grinding grooves were re-located from the site under the supervision of archaeologist Appleton and representatives of the Nungaroo LALC. They are presently stored on an adjacent property and will be re-instated to a position as close as is possible to their original location following restoration and rehabilitation of the final landform.

Table 1
Previously Identified Aboriginal cultural heritage site within the LOM Project Site.

AHIMS Site Number	Name	Type	Location GDA94 mE (Zone 56)	Location GDA94 mN (Zone 56)
29-2-0005	Narrawolga Axe-Grinding Grooves	Axe-grinding grooves	275235	6523675

4.2 HISTORICAL CULTURAL HERITAGE CONTEXT

4.2.1 Historical Context

The first European to visit the North West Slopes was explorer and Surveyor-General of NSW Lieutenant John Joseph William Molesworth Oxley during his 1818 expedition of the Macquarie River (Durrant, 1994; Johnson, 2001). The Liverpool Range was the northern boundary of Governor Darling's designated Location, beyond which it was illegal to transgress. Colonial Botanist Allan Cunningham found a route over the Liverpool Range in 1823, with his Pandora's Pass allowing pastoralists to press beyond the Limits of Location and settle the Liverpool Plains (Mahaffey, 1980; 1982; Durrant, 1994).

By the late 1820s a number of cattlemen including Benjamin Singleton had established squatting runs on the North West Slopes (Mahaffey, 1980; 1982; Durrant, 1994). John Single and John McDonald drove sheep and cattle over the Liverpool Range in 1829, becoming the first settlers in the Weia Weia (Werris) Creek valley. McDonald took up the northern side of the creek, naming it Weia Weia (Werries) Creek Station, with Single's Summer Hill Station to the south encompassing the Project Site (Mahaffey, 1982). When Surveyor-General Major Thomas Livingstone Mitchell passed through the region in December 1831 he stayed at George and Andrew Loders' Cuerindi (Quirindi) station 20 km south of the Project Site (Mitchell, 1839; Mahaffey, 1980; 1982; Hobden, 1979; 1981; Durrant, 1994). Mitchell (1839) saw cattle north of Quirindi, presumably belonging to Single, and crossed Werris Creek at the place now occupied by Werris Creek township.

In 1836 Governor Bourke legalized squatting, allocating grazing rights for an annual £10 licence fee and Single was granted the Summer Hill depasturage lease in 1837 (Mahaffey, 1982). Single's pastoral run encompassing the Project Site was estimated to be 10,000 acres in size and to support 3000 cattle according to the Government Gazette of 1848 (NSW Government, 1848). Mitchell's (1839) route had been adopted as the preferred thoroughfare through the region and became known as the Great Northern Road. A permanent waterhole on Werris Creek was a popular roadside stop for pastoralists and others traversing the road, so that Single established an inn there (Ware, 1976; Mahaffey, 1982).

When the railway line from Sydney was constructed over the Liverpool Range in 1876, the Great Northern Road was selected for its route across the plains (Ware, 1976). The Great Northern Line was installed adjacent to the Project Site in 1877 when the railway was extended from Murrurundi to Tamworth. Werris Creek was chosen as the rail junction for the northwest and western branch lines (Ware, 1976). The town of Werris Creek was established at this time to accommodate the 500 rail workers constructing the line, the first settlement in NSW developed exclusively to service the railways (Ware, 1976).

The railway began operating in 1878 and Werris Creek's importance grew as junction changing point and maintenance centre (Ware, 1976). A substantial brick station was erected in 1880, which was enlarged in 1925. With the completion of the northwest and western lines, a large number of rail workers were housed in Werris Creek to staff and service the trains that regularly passed through the region and the town's population peaked at 2500 (Ware, 1976).

In 1924, Preston Iron Coal and Coke Mining Company Limited drilled for coal within Lot 115 Parish of Grenfell on the eastern slopes of "Old Colliery" Hill within the Project Site (Andrew and Currey, nd). Two coal seams were encountered and mining engineer and surveyor Henry Jenkin Thomas, part owner of Preston, was granted authority to sink four exploratory shafts on a 614-acre parcel in 1925. Tunnelling started later that year, the 28-31° inclining shaft striking coal within a few feet (Andrew and Currey, nd). On 5 November 1925, Tamworth's 'Northern Daily Leader' newspaper reported: *'In the mine one mile south of Werris Creek good coal has been passed through but not in sufficient quantities to be of commercial value. Prospecting is continuing by means of a tunnel'* (cited in Ware, 1976) (**Figure 10**).

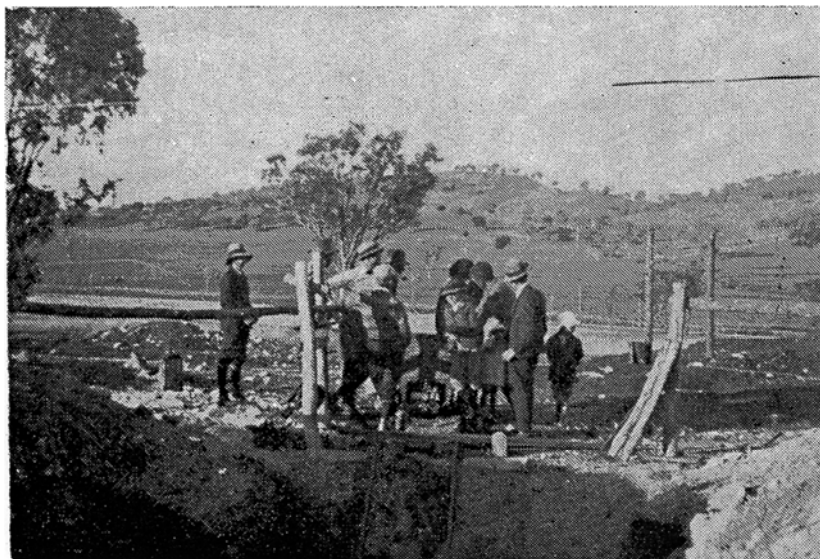


Figure 10 Head of cable shaft at the Werris Creek Colliery in 1925 (Ware, 1976)

On 7 December 1925 Preston was granted a mining lease over an area of 108 acres and by the end of that year the tunnel had been extended to a depth of 180 feet, where the coal seam was 7 foot thick (Andrew and Currey, nd). On 5 February 1926, the 'Northern Daily Leader' (cited in Ware, 1976) noted: 'The shaft or drive is now down between 300-400 feet and they are in a good seam ten feet thick'. Coal was extracted from the Tunnel (lower) Seam and the Black (upper) Seam (Pratt, 1996). The Department of Mines Annual Report for 1925 lists the colliery as working with two men underground (Andrew and Currey, nd). Operations were overseen by Deputy Mine Manager Thomas Pokoney (Ware, 1976; I.H. Thomas *pers. comm.*, 17 June 2010).

On 6 July 1926, the mining lease was expanded to 667 acres and by 1928 the Department of Mines Annual Report lists thirteen men working at the mine; six underground and seven on the surface (Andrew and Currey, nd). The coal had a high calorific value with low ash and was especially suited to powering locomotive engines (I.H. Thomas *pers. comm.*, 17 June 2010). The mine was also ideally situated near the rail hub of Werris Creek. Initially the mined coal was transported to Werris Creek using a 6-ton Garrett steam truck via the Werris Creek Quirindi Road, but in 1929 work began on a branch line from the colliery to the adjacent State railway (I.H. Thomas *pers. comm.*, 17 June 2010). The Werris Creek Colliery Rail Branch, spanning a distance of some 41 chains, came into operation on 15 November 1929 (Andrew and Currey, nd). Transporting coal by rail allowed production to increase to about 20,000 tons per annum.

Coal was extracted using the 'bord and pillar' method of mining (Andrew and Currey, nd; I.H. Thomas *pers. comm.*, 17 June 2010). In the late 1920s, '30s and early '40s, the coalface was blown using explosive charges inserted into hand-drilled holes. Miners would then use shovels to load the broken coal into wooden skips that held approximately 1 ton. Each miner typically loaded 40 tons of coal per shift. Horses would tow the skips along a light, narrow gauge rail to the base of the shaft, where they would be hauled to the surface in groups of six skips (Andrew and Currey, nd; I.H. Thomas *pers. comm.*, 17 June 2010).

The surface of the colliery comprised an elevated platform of rubble surrounding the shaft (Andrew and Currey, nd; I.H. Thomas *pers. comm.*, 17 June 2010). There was a single winch driven by a steam engine. The water tube boilers used to generate the steam were fired by coal from the mine. Each skip had to be weighed at the surface because the miners were engaged under contract (Andrew and Currey, nd; I.H. Thomas *pers. comm.*, 17 June 2010).

The skips were then allowed to run down a rail under gravity to a skip tumbler and screen. The small coal passed through the screen into a coal box elevated above the railway branch line, from where it could be dropped into rail wagons of 10-ton capacity. The large coal flowed over the screen and down a chute into rail wagons (Andrew and Currey, nd; J.M. Gatgens *pers. comm.* 10 June 2010; I.H. Thomas *pers. comm.*, 17 June 2010).

The small coal was used by the Tamworth Electrical Power station and the large coal by the NSW Government Railway Department (Andrew and Currey, nd; I.H. Thomas *pers. comm.*, 17 June 2010). A locomotive known as the Colliery Shunter hauled the wagons (**Figures 11, 12**). Although it was capable of towing 30 wagons, such capacities were restricted by the short run-around and empty wagon loops at the colliery.



Figure 11 The Colliery Shunter with three coal wagons on 3 August 1964 (NSW Rail Transport Museum, 1986)



Figure 12 The Colliery Shunter crossing the Werris Creek Quirindi Road on 3 August 1964 (NSW Rail Transport Museum, 1986)

Mining operations were partly mechanized in 1949 when electric-driven scraper loaders were introduced underground to load skips (Andrew and Currey, nd; I.H. Thomas *pers. comm.*, 17 June 2010). Four replacement boilers were installed inside a new boiler house with a concrete chimney in the late 1940s (Parry Shire Council, 1990; J.M. Gatgens *pers. comm.* 10 June 2010; I.H. Thomas *pers. comm.*, 17 June 2010). The colliery was connected to the regional electricity grid, replacing the original steam-driven DC generator. Compressed air drills replaced the original hand-boring equipment.

The fortunes of the former Werris Creek Colliery were tied to the relative importance of the railways. Completion of the North Coast Railway Line in 1930 saw some of the inland rail traffic diverted. However, during World War II (1939-1945), military rail transport, for example to the Tamworth RAAF base, increased the demand for coal (D.J. Koops *pers. comm.*, 7 June 2010; I.H. Thomas *pers. comm.*, 17 June 2010). Similarly, an expansion of agricultural cropping in the area following the 1957 subdivision of Werris Creek pastoral station led to establishment of a wheat storage terminal at Werris Creek and the town became a major base for grain transportation. The colliery consistently produced over 20,000 tons of coal annually until the early 1950s (Andrew and Currey, nd).

The amount of rail maintenance and marshalling at Werris Creek declined over the second half of the twentieth century. However, it was the gradual replacement of steam locomotives by diesel-powered engines from the 1950s that sealed the fate of the former Werris Creek Colliery (Andrew and Currey, nd; Pratt, 1996). During the 1960s annual coal production at the mine dropped to about 11,000 tons (Andrew and Currey, nd). There were few steam locomotives operating in NSW by the late 1960s, although they were not entirely phased out until 1973. It was at this time that operations at the colliery were wound-up, with much of the mine infrastructure removed and sold for its scrap metal content (J.M. Gatgens *pers. comm.* 10 June 2010; I.H. Thomas *pers. comm.*, 17 June 2010). Andrew and Currey (nd) estimate that over 1 million tons of coal was recovered over the life of the former Werris Creek Colliery, with 330,000 tons mined between 1941 and 1963 (Pratt, 1996).

The coal resource was re-assessed in the early twenty-first century. An exploration licence covering an area of 531 ha was granted to Creek Resources Pty Limited in September 2002. Drilling commenced in 2003 and open cut mining was approved for the Werris Creek Coal Mine in February 2005. Werris Creek Coal Mine is mined using truck and excavator currently approved to produce up to 2.0 million tonnes per annum as raw coal for the export market. The coal is transported directly by rail from Werris Creek to the Port of Newcastle. Around 80 people are presently employed at the mine.

4.2.2 Previous Historical Cultural Heritage Investigations

There has been little historical archaeological investigation of the Werris Creek area. Halliday (2005) assessed the historical cultural heritage of the Liverpool Shire. During this survey he identified the boiler chimneystack of the former Werris Creek Colliery within the Project Site as being of high local significance. He recommended that it be added to the Liverpool Shire Heritage Inventory. Appleton (ASR, 2004) surveyed the area for the original layout of the Werris Creek Coal Mine. The only feature of possible historical interest he encountered was an abandoned coal loading chute and ramp associated with the former Werris Creek Colliery (ASR, 2004).

4.2.3 Types of Historical Cultural Heritage Sites in the Region

The types of historical heritage sites that occur on the North West Slopes are described in Sections 4.2.3.1 to 4.2.3.4.

4.2.3.1 Pastoral Sites

Historical heritage sites in the farming regions of the North West Slopes mostly relate to the arrival of European graziers and associated industries from the second half of the nineteenth century. Old homesteads and associated structures such as work sheds, shearing sheds and labourer's quarters are examples of historical heritage sites that may be encountered. Less conspicuous sites include survey markers, particularly those blazed on Eucalypt and Cypress Pine trees, which are also of historical interest.

4.2.3.2 Urban Sites

Towns on the North West Slopes contain historically significant commercial, public and residential buildings from the nineteenth and early twentieth centuries. Examples include municipal halls, churches, libraries, schools and courthouses. Parks, gardens and cemeteries including the monuments, grave markers and other structures they contain also have historical significance.

4.2.3.3 Industrial Sites

Historical industrial features are not abundant in the region, but include abandoned mining sites and sawmills. Such sites may contain old sheds and abandoned machinery including steam engines and boilers.

4.2.3.4 Transport Sites

Small bridges made from River Red Gum timber or stone cobbles may occur in the region. Railway sites comprise stations and sidings, rail track, stabling yards and water towers and hydrants. Historical mileage markers and navigation markers may also be encountered.

4.2.4 Historical Cultural Heritage Sites in the Project Site

The NSW State Heritage Inventory contains items listed by the Heritage Council under the Heritage Act. The Parry Local Environmental Plan (LEP) also lists historical heritage sites within the Parry Shire, precursor to the current Liverpool Plains Shire, the local government area in which the Project Site is located (Parry Shire, 1987).

The historical heritage site closest to the Project Site previously registered on the NSW Heritage database is Werris Creek Railway Station and Yard (State Heritage Register Database Number 5012287) (**Table 2**). This structure is located on the Great Northern Railway in Single Street, Werris Creek, approximately 3 km north of the Project Site (NSW Heritage Branch, 2010). The Werris Creek Railway Precinct is also listed on the Parry LEP (LEP Database Number 4806177).

Table 2
Historical cultural heritage site near the LOM Project Site

Heritage Inventory Number	Description	Location GDA94 mE (Zone 56)	Location GDA94 mN (Zone 56)	Distance from LOM Project Site
5012287	Werris Creek Railway Station and Yard	276113	6529220	3 km north

5. CULTURAL HERITAGE FIELD INVESTIGATION

In accordance with the *Standards for Archaeological Practice in Aboriginal Heritage Management* (NPWS, 1997) and the *NSW Heritage Manual* (NSW Heritage Office, 1996), an archaeological design and survey methodology was prepared as a key component of the cultural heritage field assessment. Details of the archaeological design and survey methodology are presented in the following sections.

5.1 CULTURAL HERITAGE SITE PREDICTIVE MODEL

Previous archaeological studies indicate that the most frequently recorded Aboriginal cultural heritage places on the North West Slopes are open occupation areas represented by scatters of stone artefacts and culturally modified trees (NSW AHIMS site database). Burials, earthen features including mounds and hearths and stone features including stone quarries, ceremonial rings, axe-grinding grooves, rockshelters and rock art sites are also represented in the archaeological record.

The potential for encountering Aboriginal cultural heritage in the Project Site is substantially mitigated by the high degree of previous disturbance. For example, the extent of tree clearance from past agricultural land use reduces the probability of encountering scarred and carved trees. Similarly, modification of the original land surface during past agricultural land use, quarrying and mining could have destroyed earthen features such as mounds and stone features such as arrangements and ceremonial rings, had they previously existed in this area. Stone artefacts, alternatively, are more likely to survive in the soil.

Based on past observations of archaeological site types and their distribution and landscape setting, the following predictive model of Aboriginal cultural heritage site locations for the activity can be proposed.

- **Trees scarred or carved by Aboriginal people** may occur wherever mature Eucalypt and Cypress Pine trees grow. However, given the extent of vegetation clearance the probability of encountering culturally modified trees is not particularly high.
- **Stone artefact scatters and isolated finds** of stone artefacts are possible over the entire Project Site, but their density is likely to be low. This is because stone artefact scatters are typically found on well-drained, level ground within 200 m of water sources, but creeks and wetlands are absent from the Project Site.
- **Burial sites** are unlikely, given that the region's acidic soils are not suited to preserving bone and other organic material.
- **Freshwater shell middens** will similarly not occur because they are rarely found more than 100 m from permanent water sources.
- **Earthen features** including **mounds, ovens and hearths, stone arrangements and ceremonial rings** are normally restricted to level ground, the former usually adjacent to water sources. They are unlikely to be encountered because previous land disturbance such as earthworks associated with quarrying and mining activities, grading roads and fencelines and ploughed cultivation during agricultural cropping is likely to have destroyed earthen and stone features, had these site types originally occurred in the Project Site.

- Some sites dependent upon the presence of rock formations such as **rockshelters** and **rock art sites** are also improbable because the sedimentary bedrock in the low hills and ridges of the Project Site does not contain caves or overhangs. It is also not suited to **quarrying**, but Aboriginal people may have collected pebbles and cobbles from colluvial and alluvial deposits for stone artefact knapping. However, **axe-grinding grooves** are possible on sandstone surfaces, so such outcrops in the Project Site were targeted for particular attention during the survey.

While predictive studies such as this can be expected to identify areas in which sites associated with economic or subsistence activities may be present, notably open habitation areas, other sites may fall outside such a predictive framework. For example, places associated with spiritual aspects of traditional Aboriginal society such as ceremony and dreaming sites are often located at topographically distinct or unique features, which cannot be identified from an examination of maps or other records. For this reason it was essential that local Aboriginal communities be consulted so that sites of significance to them can be identified.

Any historical heritage sites in the Project Site were anticipated to most likely relate to early pastoral activities of the last half of the nineteenth century or the first half of the twentieth century and coal mining activities associated with the former Werris Creek Colliery (of 1920s to 1960s). Site types that have the potential to occur include ruins of mine structures, discarded mining and farming machinery and blazed survey marks.

5.2 FIELD METHODOLOGY

5.2.1 Logistics

Fieldwork was undertaken from 9 to 10 June 2010 by Project Archaeologist Matt Cupper with the assistance of the following Aboriginal community representatives: Gordon Nean (Nungaroo Local Aboriginal Land Council [LALC]), Neville Sampson (Tamworth LALC) and Heather Porter and Victor Porter (Gomerioi Tribal Nation Secretariat).

These Aboriginal community representatives were involved on a rotational basis, such that each day the fieldwork team comprised the Project Archaeologist and one to three Aboriginal community representatives.

Werris Creek Coal Pty Limited Environmental Officer Andrew Wright was also present during the investigation to facilitate the field survey and explain the LOM Project components to the Aboriginal community representatives.

5.2.2 Survey Methods

The entire area of the proposed disturbance footprint of the LOM Project were inspected on foot by the Project Archaeologist and Aboriginal community representatives (**Figures 13, 14, 15**). The field team examined the ground surface for any archaeological traces such as stone artefacts, axe-grinding grooves, hearths, hearthstones, shells, bones and mounds. All mature trees in the areas of proposed disturbance were inspected for scarring or carving by Aboriginal people.

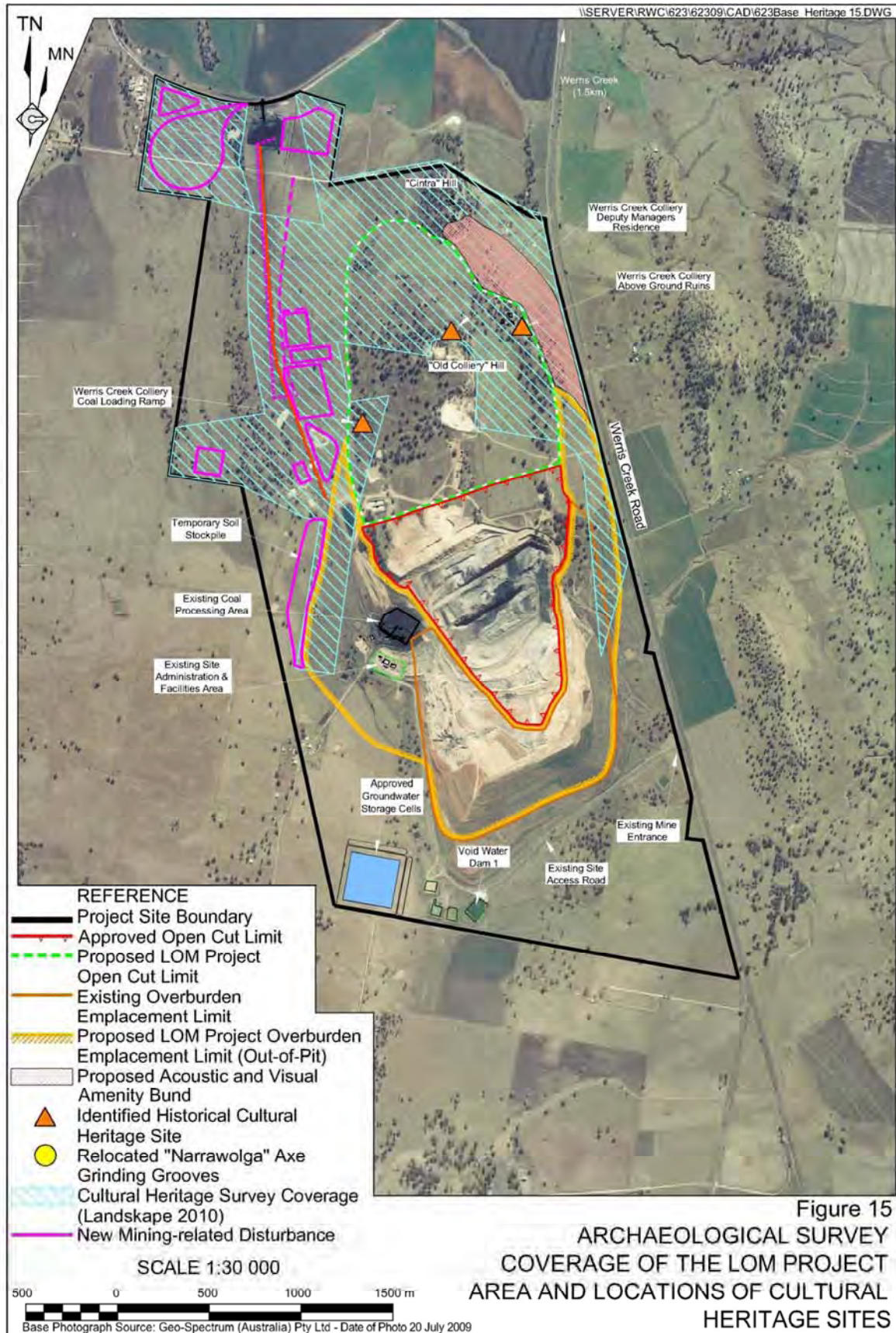
Particular attention was paid to areas with high ground surface visibility such as along stock and vehicle tracks and in scalds, gullies and other eroded areas.



Figure 13 Survey team members inspecting the proposed location of the Rail Turn-around Loop



Figure 14 Survey team members inspecting the proposed locations of the extended Open Cut



The team members walked abreast across the surveyed areas in a series of closely spaced transects. These were evenly distributed over the areas of proposed disturbance and approximately 20 m apart. Due to the general openness of the landscape it was usually possible to identify likely site locations from at least 20 m and deviate from the transects to make closer inspections.

5.2.3 Access to Survey Areas and Weather Conditions

Access was available to all of the areas of development with the exception of those already covered by spoil. Weather conditions during the survey were fine.

5.3 SURVEY COVERAGE DATA

5.3.1 Conditions of Visibility

Conditions of ground surface visibility affect how many sites are located. Visibility may also skew the results of a survey. If, for example, conditions of ground surface visibility vary dramatically between different environments, then this would be reflected in the numbers of sites reported for each area. The area with the best visibility may be reported as having the most sites (because they are visible on the ground) while another area with less visibility but perhaps more sites would be reported as having very little occupation. It is important therefore to consider the nature of ground surface visibility as part of any archaeological investigation.

Conditions of ground surface visibility were typically around 5% to 20 % (Table 3, Figures 16, 17). Although grass and herbaceous plant growth was moderate, areas of the ground surface were exposed by erosion by scalding and gullying and stock and vehicular traffic.

Table 3
Visibility Conditions At The Project Site

Survey Unit	Landforms	Vegetation	Exposures	Visibility (%)	Survey Method
Open Cut Extension	Upper Hill Slope, Hill Crest	White Box, Kurrajong, White Cypress Pine, grasses	Scalds, animal tracks, vehicle tracks, gullies	10	Pedestrian
Out-of-Pit Overburden Emplacement Extension	Lower Hill Slope, Alluvial Plain	White Box, Kurrajong, White Cypress Pine, grasses	Scalds, animal tracks, vehicle tracks	10	Pedestrian
Acoustic and Visual Amenity Bund	Lower Hill Slope	White Box, Grasses	Scalds, animal tracks, vehicle tracks, gullies	20	Pedestrian
Product Coal Storage Area	Alluvial Terrace	Grasses	Scalds, animal tracks, vehicle tracks	5	Pedestrian
Coal Processing Area	Alluvial Terrace, Lower Hill Slope	Grasses	Scalds, animal tracks, vehicle tracks	5	Pedestrian
Administration and Facilities Area	Alluvial Terrace, Lower Hill Slope	Grasses	Scalds, animal tracks, vehicle tracks	5	Pedestrian
Explosives Magazine	Lower Hill Slope	Grasses	Scalds, animal tracks, vehicle tracks	10	Pedestrian
Precursor Storage Area	Alluvial Plain, Lower Hill Slope	Grasses	Scalds, animal tracks, vehicle tracks	20	Pedestrian
Turn-around Rail Loop	Alluvial Plain, Lower Hill Slope	Grasses	Scalds, animal tracks, vehicle tracks	10	Pedestrian
Northern Access Road	Alluvial Plain, Lower Hill Slope	Grasses	Scalds, animal tracks, vehicle tracks	5	Pedestrian
ROM Coal Conveyor	Alluvial Plain, Lower Hill Slope	Grasses	Scalds, animal tracks, vehicle tracks	5	Pedestrian



Figure 16 Moderate levels of ground surface visibility on the foot slopes of “Old Colliery” Hill



Figure 17 Moderate levels of ground surface visibility on the slopes of “Old Colliery” Hill

5.3.2 Coverage analysis

Coverage analysis is a useful measurement to allow cultural resource managers to assess surveys from adjacent areas and it also allows some meaningful calculation of the actual sample size surveyed. The *actual* or *effective* area surveyed by a study depends on the conditions of ground surface visibility. Conditions of surface visibility are affected by vegetation cover, geomorphic processes such as sedimentation and erosion rates, and the abundance of natural rock that may obscure the remains of cultural activities.

Approximately 18 % of the surface areas of the areas of development of the Project Site were inspected on foot (**Table 4**). This is considered to be a relatively high coverage and was a result of the intensive nature of the survey and the generally fair conditions of surface visibility.

Table 4
Effective Coverage of the Project Site

Survey Unit	Area (ha)	Visibility (%)	Coverage		Effective Coverage		Sites
			(ha)	(% area)	(ha)	(%)	
Open Cut Extension	141	10	24	17	2.4	1.7	4
Out-of-Pit Overburden Emplacement Extension	49	10	6	12.2	0.6	1.2	-
Acoustic and Visual Amenity Bund	22	20	6	27.3	1.2	5.5	-
Product Coal Storage Area	8.7	5	2	23.0	0.1	1.2	-
Coal Processing Area	5.7	5	1	17.5	0.05	0.9	-
Administration and Facilities Area	2.6	5	1	38.5	0.05	1.9	-
Explosives Magazine	1.0	10	0.4	40	0.04	4.0	-
Precursor Storage Area	0.6	20	0.4	66.7	0.08	13.3	-
Turn-around Rail Loop	12.6	10	2	15.9	0.2	1.6	-
Northern Access Road	1.6	5	1	62.5	0.05	3.1	-
ROM Coal Conveyor	2.2	5	1	45.5	0.05	2.3	-
Total	248.7	-	44.8	18.1	4.8	2.0	4

5.4 SURVEY RESULTS

5.4.1 Aboriginal Cultural Heritage Sites

The Narrawolga Axe-Grinding Grooves [AHIMS site number 29-2-0005] were re-located from the currently approved open cut area in 2008. No additional Aboriginal archaeological sites were identified within the Project Site. This negative result does not mean that Aboriginal people did not use these areas to some extent during the past, or that ground surface visibility was inadequate. Rather is attributable to the degree of land surface modification that has occurred since European settlement, as such past disturbance associated with pastoralism, agriculture, gravel quarrying and coal mining may have obliterated any archaeological sites, had they occurred previously.

Previous tree clearing and land levelling could have destroyed earthen features such as mounds and hearths and stone arrangements including ceremonial rings. Shell middens were not encountered because most occur within 100 m of sources of permanent freshwater, absent from the Project Site. Aboriginal stone quarry sites and other stone features such as rock shelters and rock art sites are also definitely not represented in the Project Site as suitable rock outcrop is lacking.

None of the old growth trees present in the areas of proposed disturbance bore any evidence of having had bark or wood removed or carved by Aboriginal people. Additionally, none of the sandstone outcrops exhibited evidence of axe-grinding grooves.

The Project Site does not contain culturally sensitive landforms such as lunettes or source-bordering sand dunes where subsurface Aboriginal cultural deposits (e.g. burials) have been recorded previously. They are located in areas where there is no risk to any identified cultural heritage and the potential for uncovering any previously unidentified cultural heritage is also very low. The sediments of the Project Site had been well enough exposed by prior earthworks and cultivation, vehicular and stock traffic and water erosion to determine that no archaeological material was present on the surface nor is likely to be buried beneath the soil.

5.4.2 Historical Cultural Heritage Sites

Historical features of the former Werris Creek Colliery are located in the areas of proposed disturbance within the Project Site.

These historical cultural heritage sites are all located in the proposed LOM Project Open Cut Area and include:

- Former Werris Creek Colliery Underground Workings;
- Former Werris Creek Colliery Above-Ground Ruins;
- Former Werris Creek Colliery Deputy Mine Manager's Residence; and,
- Former Werris Creek Colliery Coal Loading Ramp.

A summary of the historical cultural heritage sites is contained in **Table 5** and their locations are shown on the map in **Figure 15**. More detailed descriptions are provided by sections 5.4.2.1 to 5.4.2.4.

Table 5
Summary data of historical cultural heritage sites in the LOM Project Site.

Historical Cultural Heritage Site Name	Location	GDA94 mE (Zone 56)	GDA94 mN (Zone 56)
Former Werris Creek Colliery Underground Workings	South slope "Old Colliery" Hill	275678	6525237
Former Werris Creek Colliery Above-Ground Ruins	East slope "Old Colliery" Hill	275678	6525237
Former Werris Creek Colliery Deputy Mine Manager's Residence	Summit "Old Colliery" Hill	275292	6525213
Former Werris Creek Colliery Coal Loading Ramp	Southwest slope "Old Colliery" Hill	274809	6524705

5.4.2.1 Former Werris Creek Colliery Underground Workings

The former Werris Creek Colliery Underground Workings are located up to 30 or 40 m beneath the surface of “Old Colliery” Hill.

Coal was extracted from two seams, the Tunnel (lower) Seam and Black (upper) Seam using the ‘bord and pillar’ method of mining (Andrew and Currey, nd; I.H. Thomas *pers. comm.*, 17 June 2010). From 1925 to the early 1940s the coal was hand loaded by shovel into wooden skips. After 1949, electric-driven scraper loaders were used underground to load steel skips (**Figures 18, 19**; Andrew and Currey, nd; I.H. Thomas *pers. comm.*, 17 June 2010). Four miners operated the coal scraper loaders, while two miners operated a smaller scraper loader to construct a parallel air tunnel (J.M. Gatgens *pers. comm.* 10 June 2010). The coal and airway tunnels were between 8 and 16 foot high and shored with Cypress Pine props. Horses towed the skips along light, narrow gauge rails in the coal tunnel to the base of the cable shaft, where they were be hauled to the surface (Andrew and Currey, nd; I.H. Thomas *pers. comm.*, 17 June 2010).

After operations at the colliery ceased in the late 1960s, much of the mine infrastructure underground (e.g. scraper-loaders, skips, electric winches and pumps) was removed (J.M. Gatgens *pers. comm.* 10 June 2010; I.H. Thomas *pers. comm.*, 17 June 2010). The tunnels and shafts are likely to be flooded and extensively collapsed.

5.4.2.2 Former Werris Creek Colliery Above-Ground Ruins

The former above-ground works of the colliery surrounding the cable shaft now comprise an elevated platform of rubble on the eastern slopes of “Old Colliery” Hill. This area originally contained the cable winch, two steam boiler houses (*circa* 1925 and late 1940s - the most recent with a concrete chimneystack) (**Figures 20, 21**), skip rail tracks, skip tumbler, coal screen, coal box, coal chute and railway branch line, with run-around and empty wagon loops (Andrew and Currey, nd; Parry Shire Council, 1990; J.M. Gatgens *pers. comm.* 10 June 2010; I.H. Thomas *pers. comm.*, 17 June 2010).

Most of the machinery (e.g. three Babcock and Wilcock boilers, Galloway boiler, cable winch) was dismantled for scrap when the mine was decommissioned in the late 1960s (J.M. Gatgens *pers. comm.* 10 June 2010; I.H. Thomas *pers. comm.*, 17 June 2010). A fire in the late 1970s destroyed most of the remaining structures (G.E. Marquett *pers. comm.* 1 June 2010).

Appleton (ASR, 2004) photographed the boiler chimneystack during his cultural heritage assessment for the original layout of the Werris Creek Coal Mine in 2004, but was unable to inspect it. The stack was still standing in 2005 when Halliday (2005) assessed it as being of high local significance and recommended that it be added to the Liverpool Shire Heritage Inventory. The stack was demolished with Liverpool Plains Shire Council consent in March 2010 because it was structurally unstable (DA 26/2010).

All that now remains at the site is rubble from the poured concrete boiler chimneystack and its twisted and rusted framework (**Figure 22**). Iron rails and old River Red Gum sleepers from the skip rail tracks are also evident (**Figure 23**).

The former Deputy Mine Manager’s Residence associated with the former Werris Creek Colliery is located near the summit of “Old Colliery” Hill. It comprises a double-fronted weatherboard dwelling with single gable and hipped corrugated iron roof, surrounded on all sides by verandas, which have been enclosed to form additional rooms (**Figure 24**). Garden trees and shrubs and several outbuildings including a tool shed with attached motor vehicle garage and toilet surround the dwelling (**Figure 25**). More images of this site are provided in **Appendix 7**.

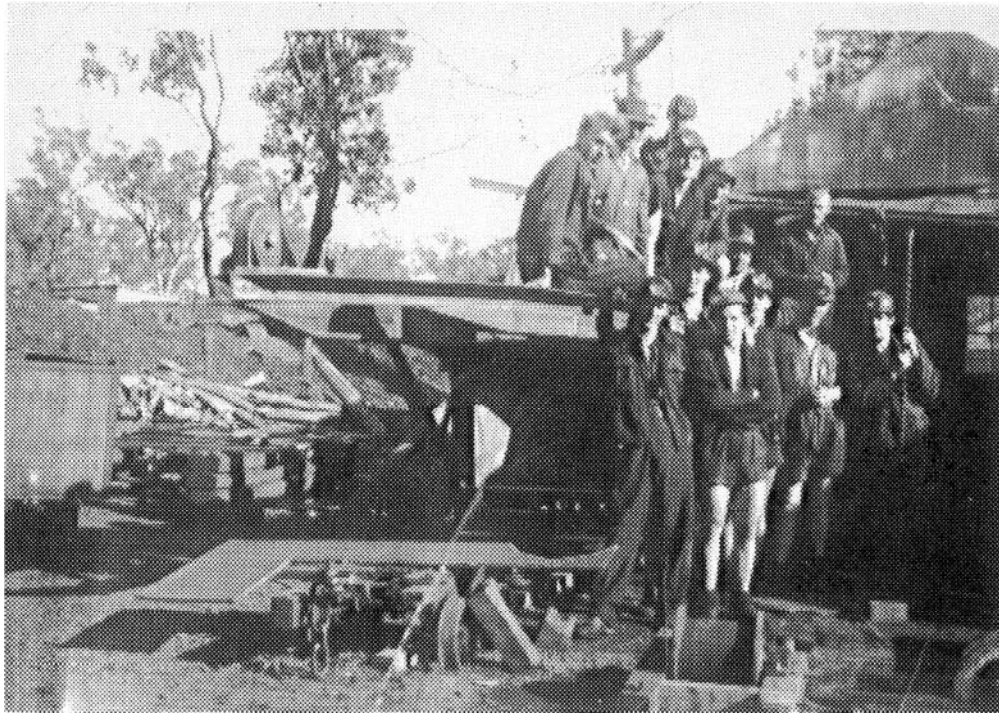


Figure 18 Coal scraper loader at the Werris Creek Colliery *circa* 1951 (Parry Shire Council, 1990)



Figure 19 Coal scraper loader *circa* 1951 with I.H. Thomas at right (Parry Shire Council, 1990)



Figure 20 Concrete boiler chimneystack at the Werris Creek Colliery in *circa* 1970s (McEvilly *et al.*, 2004)



Figure 21 Boiler chimneystack in 2004 (ASR, 2004)



Figure 22 Concrete rubble and steel framework from the demolished boiler chimneystack.



Figure 23 Iron rail and timber sleeper from the Werris Creek Colliery light rail.

5.4.2.3 Former Werris Creek Colliery Deputy Mine Manager's Residence

The Deputy Mine Manager's Residence was constructed near the former Werris Creek Colliery in *circa* 1925 on the eastern mid-slopes of "Old Colliery" Hill (D.J. Koops *pers. comm.*, 15 June 2010; I.H. Thomas *pers. comm.*, 17 June 2010). It was moved nearer the summit of the hill to its present location to avoid the dust from the colliery by then-Deputy Mine Manager Ivor Haig ('Doc') Thomas after he married in June 1940. There, Doc Thomas lived with his wife Clare Jean Macdonald Thomas (née Ewbank) and daughters Dora (born 1941) and Elizabeth (born 1943) (D.J. Koops *pers. comm.*, 15 June 2010; I.H. Thomas *pers. comm.*, 17 June 2010; E. Thomas *pers. comm.*, 16 August 2010) (**Figure 26**).

Doc Thomas had first worked at the mine in 1933, aged 16, weighing loaded coal skips at the surface to determine the contract miners' daily tallies of shifted coal (D.J. Koops *pers. comm.*, 15 June 2010; I.H. Thomas *pers. comm.*, 17 June 2010). Doc Thomas' father, Henry Jenkin Thomas, was part owner of Preston Iron Coal and Coke Mining Company Limited and its mining engineer and surveyor. He encouraged his son Doc Thomas to learn all the facets of coal mining. Following training as a mining engineer at the Rathmines School of Mines, Newcastle, NSW, Doc Thomas returned to the Werris Creek Colliery as its Deputy Mine Manager in 1940. He held this position until the mine was closed in the late 1960s and also became the mine's sole-owner following buy-outs of three other partners (I.H. Thomas *pers. comm.*, 17 June 2010; E. Thomas *pers. comm.*, 16 August 2010).

Doc and Jean Thomas lived at the Deputy Mine Manager's Residence until the former Werris Creek Colliery closed in the late 1960s (Dora and Elizabeth having left home for university), at which time they moved into Werris Creek, where Doc Thomas operated the news agency. Dora and her husband Rolf Koops moved into the former Deputy Mine Manager's Residence in 1973, where they lived until 1979 (D.J. Koops *pers. comm.*, 15 June 2010). The dwelling and the surrounding 1-acre of land were sold to Gordon and Pauline Marquett in 1980. Gordon and Pauline Marquett sold the property to Werris Creek Coal Pty Limited and moved out in 2008 (G.E. Marquett *pers. comm.*, 1 June 2010; P.A. Marquett *pers. comm.*, 1 June 2010).

The core of the Deputy Mine Manager's Residence is the original *circa* 1925 double-fronted weatherboard dwelling with single gable and hipped corrugated iron roof. This structure would have originally comprised four rooms; two either side of a central passage. Verandas were added when the residence was moved to its current location in *circa* 1940, at which time the back veranda was enclosed to form a kitchen, dining room, laundry and bathroom. The side and front verandas were subsequently enclosed with fly screens and glass windows to form additional living rooms. The tool shed with attached motor vehicle garage was erected in the early 1940s. The concrete slab floor of the shed was inscribed 'Dora Thomas 6 years' and 'Elizabeth Thomas 4 years' and impressed with Dora's and Elizabeth's hand and boot prints in 1947 (**Figure 27**). Gordon and Pauline Marquett added a carport in the 1980s.

5.4.2.4 Former Werris Creek Colliery Coal Loading Ramp

A coal loading ramp and chute is located on the southwestern slopes of "Old Colliery" Hill (**Figure 28**). Appleton (ASR, 2004) recorded this feature during the cultural heritage assessment for the original layout of the Werris Creek Coal Mine. The ramp and chute were associated with an exploratory shaft sunk by Doc Thomas in the western section of the former Werris Creek Colliery in the early 1950s (J.M. Gatgens *pers. comm.* 10 June 2010; I.H. Thomas *pers. comm.*, 17 June 2010). Lacking a second ventilation shaft, air for this entrance was funneled down a pipe constructed from 44-gallon fuel drums. The ramp was constructed from the natural slope using stone rubble and the steel chute suspended by steel cables from the branches of nearby Eucalypt trees. The ramp and chute were used to load coal onto road trucks. The western shaft only operated briefly before being abandoned (I.H. Thomas *pers. comm.*, 17 June 2010).



Figure 24 Former Deputy Mine Manager's Residence for the Werris Creek Colliery



Figure 25 Garden at the Former Deputy Mine Manager's Residence taken in the 1960s (photograph courtesy Elizabeth Thomas)



Figure 26 Dora (left) and Elizabeth Thomas at the Former Deputy Mine Manager's Residence in the early 1950s (photograph courtesy Elizabeth Thomas)



Figure 27 Boot and hand impressions of Deputy Mine Manager's children in concrete slab floor



Figure 28 Werris Creek Colliery coal loading chute

6. CULTURAL HERITAGE VALUES

6.1 ABORIGINAL CULTURAL HERITAGE VALUES

6.1.1 Aboriginal Cultural Landscape

Scientific information collected from the Aboriginal archaeological site (Narrawolga Axe-Grinding Grooves [AHIMS site number 29-2-0005]) previously re-located from the approved open cut area, combined with social and cultural information provided by the Aboriginal community stakeholders and ethno-historical sources, allows interpretation of the Aboriginal cultural landscape of the Project Site, provided in the following sections.

6.1.1.1 Summary of the Archaeological Record

The material culture of past Aboriginal occupants of the Project Site consisted of a small, non-stratified open site, comprising at least 25 axe-grinding grooves on sandstone outcrops south of “Old Colliery” Hill (AHIMS site number 29-2-0005). Aboriginal people rubbed stone axe blanks or worn or chipped stone axes against sandstone surfaces to sharpen them, with the abrasion creating grooves in the outcrops (McCarthy, 1976). The Narrawolga Axe-Grinding Grooves (AHIMS site number 29-2-0005) were re-identified by ASR (2004) during an archaeological survey of the original layout of the Werris Creek Coal Mine and have subsequently been re-located from the currently approved Open Cut Area (ASR, 2008).

6.1.1.2 Aboriginal Settlement Patterns

The locations of freshwater sources are likely to have been the main controlling factor of Aboriginal occupation of the Project Site. Humans carry out most of their activities close to freshwater, rarely straying far from reliable water sources (see Gould, 1969, 1980; Allen, 1974; Jochim, 1976; Mitchell, 1990; McNiven, 1998). They also prefer larger or more persistent water sources to smaller, ephemeral water bodies. As well as the obvious abundance of aquatic resources including fish at large, permanent water sources, mammals such as macropods and waterbirds that were hunted for protein, skins, eggs and feathers are also limited by water availability.

No ephemeral streams or wetlands occur in the Project Site. The nearest stream is Quipolly Creek, approximately 1.5 km south, with Werris Creek also located some 3 km north of the Project Site. However, axe-grinding grooves, which for example were re-located from sandstone outcrops south of "Old Colliery" Hill (AHIMS site number 29-2-0005), are usually found close to water. This is because when abrading axe-heads Aboriginal people often sprinkled water on the sandstone to make it more abrasive and to reduce dust (ASR, 2004). It is possible that past Aboriginal people of the Project Site used water that had pooled on sandstone surfaces following rain.

6.1.1.3 Aboriginal Subsistence Strategies

Hunter-fisher-gatherers obtain the resources necessary for life by foraging and collecting subsistence strategies. Foragers gather food as it is encountered, regularly moving between resource zones and rarely storing food (Binford, 1980, 1989). Collectors, alternatively, adopt a logistical strategy for procuring resources. They often rely on stores of food and may maintain base camps, with smaller groups dispersing to collect resources. Foraging and collecting are two end-members of a subsistence continuum, with most hunter-fisher-gatherer societies engaging in a combination of both strategies (Yellen, 1977; Binford, 1980, 1989; Renfrew and Bahn, 1991).

Sites occupied by hunter-fisher-gatherer people may reflect these strategies (Binford, 1980; Foley, 1981). For example, base camps were generally occupied for long periods of the year and were used for a range of domestic and industrial activities. Alternatively, base camps may have been intensively used for part of the year, acting as congregative focal points. Temporary field camps were dispersive sites, created when groups charged with carrying out a specific task journeyed beyond the daily foraging radius.

The frequency of site occupation can sometimes be determined from their contents and structure. Residential base campsites, occupied over relatively long periods of time, tend to have a more complex structure than short-term campsites. Base camps may contain evidence of a wide variety of activities associated with daily habitation. Short-term sites were probably only occupied for a specific reason, such as to collect a particular resource. These usually display evidence of being occupied only once or twice, and are often smaller, with fewer and less diverse archaeological remains.

It is probable that the Aborigines who occupied the Project Site were hunter-fisher-gatherers employing both foraging and collecting subsistence strategies. These people would have dispersed from the riverine corridors of the Mooki River and Werris and Quipolly Creeks to exploit ephemeral food and plant resources of the hilly hinterland and manufacture stone axes at the Narrawolga Axe-Grinding Grooves (AHIMS site number 29-2-0005) during favourable climatic conditions, as invoked in the subsistence model of O'Rourke (1997). Only small areas were investigated in a heterogeneous landscape, but it is probable that the archaeological record reflects the occupation of the hill country by small, mobile bands.

The archaeology of the Project Site probably derives from a temporary site used by small groups during periods of seasonal dispersal. The small number of grooves, along with the absence of clear evidence of domestic archaeological components such as stone artefacts and hearths, and probable absence of reliable sources of water, suggest that Aboriginal people only visited the cultural heritage place for brief periods.

6.1.1.4 Synthesis

Aboriginal people probably occupied the Project Site following the end of the last Ice Age some 18,000 years ago. The Aboriginal archaeological record of the Project Site could be late Holocene (less than a few thousand years) in age. The lack of reliable sources of water in the hills would have made the Project Site unattractive for prolonged or regular habitation.

Aboriginal people from small, mobile groups that probably seasonally journeyed into the hill country from the rivers and streams of the Mooki and surrounding valleys to forage for food, lithic and other resources may have periodically used the Narrawolga Axe-Grinding Grooves (AHIMS site number 29-2-0005).

6.2 HISTORICAL CULTURAL HERITAGE VALUES

6.2.1 Historical Cultural Heritage Significance

The assessment of historic heritage significance has been undertaken using the NSW Heritage Branch's assessment criteria detailed in *Assessing Heritage Significance* (NSW Heritage Office, 2001). The NSW criteria cover the generic *Australian ICOMOS Charter for the Conservation of Places of Cultural Significance* (Burra Charter) values of historic, aesthetic, scientific and social significance (see Marquis-Kyle and Walker, 1992; Pearson and Sullivan, 1995), but express the values in a more detailed form to maintain consistency and facilitate comparison of assessments across jurisdictions.

A summary of the significance assessments of the historical heritage sites is presented in **Table 6**.

6.2.1.1 Criterion (a) [Historical Significance]

Importance in the course, or pattern of the cultural history of NSW's cultural or natural history, or the cultural or natural history of the local area;

Most of the features associated with the former Werris Creek Colliery meet this criterion at the moderate level. They are significant in the local history of Werris Creek, being associated with development of the coal mining industry, rail transport and broader society, but are not of state or national importance.

6.2.1.2 Criterion (b) [Historical Association Significance]

Strong or special association with the life or works of a person, or group of persons, of importance in NSW's cultural or natural history, or the cultural or natural history of the local area;

Table 6
Assessment of significance of the historical cultural heritage sites

Site Name	Significance						
	Criterion (a)	Criterion (b)	Criterion (c)	Criterion (d)	Criterion (e)	Criterion (f)	Criterion (g)
Former Werris Creek Colliery Underground Workings	Local (Moderate)	Local (Moderate)	na	Local (Moderate)	Local (Low)	Local (Moderate)	Local (Moderate)
Former Werris Creek Colliery Above-ground Ruins	Local (Moderate)	Local (Moderate)	na	Local (Moderate)	Local (Low)	Local (Moderate)	Local (Moderate)
Former Werris Creek Colliery Deputy Mine Manager's Residence	Local (Moderate)	Local (Moderate)	Local (Moderate)	Local (Moderate)	Local (Moderate)	Local (Low)	Local (Low)
Former Werris Creek Colliery Coal Loading Ramp	Local (Low)	Local (Low)	Local (Low)	Local (Low)	Local (Low)	Local (Moderate)	Local (Moderate)

The sites have low to moderate local significance according to this criterion. Original owners and former employees of the former Werris Creek Colliery and occupants of the former Werris Creek Deputy Mine Manager's Residence live in the Werris Creek area or wider North West Slopes region or are known in local histories and to members of the local and regional community. Members of the Thomas family, most notably Henry Jenkin Thomas and Ivor Haig ('Doc') Thomas, had a long association with coal mining in NSW, including at Werris Creek and the Hunter Valley.

6.2.1.3 Criterion (c) [Aesthetic Significance]

Importance in demonstrating aesthetic characteristics and/or a high degree of creative or technical achievement in NSW or the local area;

The former underground workings of the former Werris Creek Colliery and ruins of the above-ground works have negligible aesthetic values because they are very subdued features in the landscape, and do not meet the thresholds for inclusion at either local or State level. The former Werris Creek Deputy Mine Manager's Residence has a moderate local aesthetic rating. Aesthetic qualities of the former Werris Creek Colliery Coal Loading Ramp are low.

6.2.1.4 Criterion (d) [Social Significance]

Has strong or special association with a particular community or cultural group in NSW or the local area for social, cultural or spiritual reasons;

The social significance of a site is based on whether it has a strong or special association with a particular community or cultural group at a local, regional, state or national level for social, cultural or spiritual reasons.

Historical features associated with the former Werris Creek Colliery generally have moderate local social significance to residents of Werris Creek and the wider community who formerly worked or lived at the site, or have family members and acquaintances who formerly worked or lived at the site.

6.2.1.5 Criterion (e) [Research Potential]

Potential to yield information that will contribute to an understanding of NSW's cultural or natural history, or the cultural or natural history of the local area;

The former Werris Creek Deputy Mine Manager's Residence has moderate technical and research significance. The remains of domestic activities from the middle of the twentieth century may be preserved at the site. The potential for other historical features of the former Werris Creek Colliery to provide information about the history of the coal mining in the local area or NSW is limited, due to their generally poor state of preservation.

6.2.1.6 Criteria (f) and (g) [Rarity and Representativeness]

Possesses uncommon, rare or endangered aspects of NSW's cultural or natural history, or the cultural or natural history on the local area;

Important in demonstrating the principal characteristics of a class of place of NSW's cultural or natural places or environments, or the local areas cultural or natural environments

Mining sites from the middle of the twentieth century are not particularly abundant in the Werris Creek area or North West Slopes regions. However, the former Werris Creek Colliery is a very poorly preserved example of such site type. Dwellings from the 1920s similar to the former Werris Creek Deputy Mine Manager's Residence are common in Werris Creek and the wider region.

7. POTENTIAL IMPACTS OF THE LOM PROJECT ON CULTURAL HERITAGE

The LOM Project could potentially directly and indirectly impact upon the historical cultural heritage sites of the former Werris Creek Colliery. Potential negative direct and indirect impacts may result from the proposed extension to the open cut area and could include the destruction of the sites via earthmoving or indirect physical affects (e.g. dust deposition) or aesthetic affects.

7.1 POTENTIAL DIRECT IMPACTS

The LOM Project mining operations would disturb the current land surface and could directly impact cultural heritage associated with the affected landforms and its landscape context.

Such impacts on cultural heritage values typically fall into three categories:

- the loss of information which could otherwise be gained by conducting research today;
- the loss of the cultural heritage resource for future research using methods and addressing questions not available today; and,
- the permanent loss of the physical record.

These impacts can usually be mitigated to various degrees, depending on the nature and significance of the cultural heritage. Where sites are of low significance, their destruction may have little consequence. This could be due to the lack of useful information that could be gained from research, or the availability of many equivalent and alternative sites for study.

Sites with greater significance may be the subject of cultural heritage investigation prior to their disturbance. This allows for the salvage of information, and the recovery of a sample of artefactual materials according to current methods and research priorities. Sites and site groupings that are common elsewhere may not require the same degree of salvage attention as those which are rare, of high significance, and subject to active deterioration.

Salvage investigations can provide for the discovery of new knowledge about the past human occupation and land use of an area. Despite the loss of physical evidence involved, the information gained can in turn aid the interpretation and better management of the remaining cultural heritage resource.

7.2 POTENTIAL INDIRECT IMPACTS

In areas where the proposed works for the LOM Project would not involve significant earthmoving, impacts may be limited to minor surface disturbance, limited disturbance of the associated substrates or landforms and no significant alteration of the landscape context.

Potential indirect impacts to cultural heritage sites could include.

- deposition of dust generated by mining;
- damage from blasting and vibration from operations and potential instability as a result of open pit operations and layout;
- accidental disturbance by peripheral activities; and
- inappropriate visitation including the unauthorized removal of cultural heritage objects.

7.3 CULTURAL HERITAGE POTENTIALLY IMPACTED BY THE WERRIS CREEK COAL MINE LOM PROJECT

Historical features associated with the former Werris Creek Colliery are located in the proposed extension to the open cut area and could be subject to direct and indirect disturbance during the life of the Werris Creek Coal Mine. These sites are the former Werris Creek Colliery Underground Workings, Above-ground Ruins, Deputy Mine Manager's Residence and Coal Loading Ramp and are not of high historical significance, even at a local level.

7.4 FLEXIBILITY OF THE WERRIS CREEK COAL MINE LOM PROJECT DESIGN

The locations of the proposed mine components associated with the LOM Project are currently within their optimum design locations. In particular, the location of the proposed extension of the open cut area is currently within its optimum design location, offering limited opportunity to avoid the historical cultural heritage sites within this area.

8. MANAGEMENT STRATEGIES FOR CULTURAL HERITAGE

This section presents proposed strategies for the management of cultural heritage values within the Project Site that may be subject to direct impacts by the LOM Project.

8.1 GENERAL RECOMMENDATIONS

8.1.1 Updated Archaeology and Cultural Heritage Management Plan

The optimal means of co-ordinating and implementing the proposed management strategies is to integrate them into a single programme and document in the form of an update to the *Archaeology and Cultural Heritage Management Plan for the Werris Creek Coal Mine* (Werris Creek Coal Pty Limited, 2005) already implemented for the Werris Creek Coal Mine. The Archaeology and Cultural Heritage Management Plan was developed in consultation with the local Aboriginal community in 2005 (Werris Creek Coal Pty Limited, 2005). The Archaeology and Cultural Heritage Management Plan would be updated to reflect the proposed management of the cultural heritage sites within the Project Site. The updated Archaeology and Cultural Heritage Management Plan would cover all relevant actions and requirements to be conducted at the Werris Creek Coal Mine. The updated Archaeology and Cultural Heritage Management Plan would remain active for the life of the Werris Creek Coal Mine and define the tasks, scope and conduct of all cultural heritage management activities.

8.1.2 Role of the Local Aboriginal Community

Werris Creek Coal Pty Limited is committed to involving the local Aboriginal community as an integral participant in the management of Aboriginal cultural heritage values at the Werris Creek Coal Mine. The strategies outlined in this report have incorporated the views of community representatives and the Archaeology and Cultural Heritage Management Plan was drafted in consultation with the local Aboriginal community.

In particular, the re-instatement of the Narrawolga Axe-Grinding Grooves (AHIMS site number 29-2-0005) to a position as close as possible to their original location following restoration and rehabilitation of the Final Landform would occur with the invited participation of local Aboriginal community representatives.

8.2 MANAGEMENT OF CULTURAL HERITAGE WITHIN THE LOM PROJECT DISTURBANCE AREAS

The location of the proposed extension to the Open Cut Area, which would disturb historical cultural heritage sites associated with the former Werris Creek Colliery, is relatively inflexible. Engineering constraints mean that this mine component cannot be relocated away from the cultural heritage sites to avoid disturbance. Additionally, any such relocation would not remove threats to the sites from indirect disturbance.

This assessment has concluded that the former Werris Creek Colliery Underground Workings, Above-ground Ruins, Deputy Mine Manager's Residence and Coal Loading Ramp are not of high historical significance. Additional historical heritage assessment or preservation of the sites is not warranted.

8.3 SUMMARY RECOMMENDATIONS

Based on the results of this cultural heritage assessment and consultation with representatives of the local Aboriginal community, the following recommendations are made.

- The proposed extension to the open cut area progress without additional historical heritage assessment or preservation of historical cultural heritage sites associated with former Werris Creek Colliery, which are not of high historical significance.
- The Narrawolga Axe-Grinding Grooves (AHIMS site number 29-2-0005) be re-instated to a position as close as is possible to their original location following restoration and rehabilitation of the Final Landform.
- Werris Creek Coal Pty Limited should continue to involve the registered Aboriginal stakeholders and any other relevant Aboriginal community groups or members in matters pertaining to the project.
- The general mitigation strategies detailed in the *Archaeology and Cultural Heritage Management Plan* should be implemented. The Archaeology and Cultural Heritage Management Plan should be updated to reflect the proposed management of the historical cultural heritage sites within the Project Site. The updated Archaeology and Cultural Heritage Management Plan should remain active for the life of the Werris Creek Coal Mine.
- If human skeletal remains are encountered during the course of the proposed developments all work in that area must cease. Remains must not be handled or otherwise disturbed except to prevent further disturbance. If the remains are thought to be less than 100 years old the Police or the State Coroner's Office (tel: 02 9552 4066) must be notified. If there is reason to suspect that the skeletal remains are more than 100 years old and Aboriginal, the proponent should contact DECCW's Environmental Line (tel: 131 555) for advice. In the unlikely event that an Aboriginal burial is encountered, strategies for its management would need to be devised with the involvement of the local Aboriginal community.

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