WHITEHAVEN COAL

Narrabri Coal Operations Pty Ltd

ABN: 15 129 850 139

Narrabri Coal Mine
Stage 2 Longwall Project

Non-Indigenous Heritage Assessment

Prepared by:

Archaeological Surveys & Reports Pty Ltd

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Stage 2 Longwall Project

Non-Indigenous Heritage Assessment

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EXECUTIVE SUMMARY

This assessment was performed for R.W. Corkery & Co. Pty Limited (RWC) on behalf of Narrabri Coal Operations Pty Ltd (NCOPL). NCOPL has contracted R.W. Corkery & Co. Pty Limited (RWC) to prepare an *Environmental Assessment* to support its application for project approval for Narrabri Coal Mine Stage 2 Longwall Project (the "Longwall Project") as a Major Project under Part 3A "Major Projects" of the *Environmental Planning & Assessment Act 1979* (EP& A Act). NCOPL is a joint venture between Narrabri Coal Pty Ltd, Upper Horn Investments (Australia) Pty Ltd, J-Power, EDF Trading and a Korean consortium consisting of Daewoo and Kores. Narrabri Coal Pty Ltd is a 100% subsidiary Company of Whitehaven Coal Limited, which is a publicly listed Company.

The Narrabri Coal Mine is approximately 30km south-southeast of Narrabri and 10km north-northwest of Baan Baa, on the north-western slopes of the Northern Tablelands in New South Wales. Approval for the Narrabri Coal Mine (Stage 1) (Project Approval (PA) 05_0102) was granted by the Minister for Planning on 13 November 2008 following a previous archaeological investigation of the Mine Site Pit Top Area by Australian Archaeological Survey Consultants Pty Ltd (AASC, 2007), prepared to support an Environmental Assessment and project application for the Narrabri Coal Mine.

In this report, the Mine Site corresponds with ML 1609 and the Mining Area corresponds with the total area overlying and corresponding with the proposed 26 longwall panels to be mined over the projected life of 27 years of the mine.

RWC engaged Archaeological Surveys & Reports Pty Ltd (ASR) to undertake an assessment of the non-Indigenous ("European") structures and relics within the Mine Site and a pipeline corridor to the Mine Site to identify sites and/or places of heritage significance and to provide recommendations, to manage all archaeological sites identified.

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1 INTRODUCTION

This investigation was performed for R.W. Corkery & Co. Pty Limited (RWC) on behalf of Narrabri Coal Operations Pty Ltd (NCOPL). NCOPL has contracted R.W. Corkery & Co. Pty Limited (RWC) to prepare an *Environmental Assessment* to support its application for project approval to increase production at the Narrabri Coal Mine through the introduction of longwall mining (the "Longwall Project") under Part 3A of the *Environmental Planning and Assessment Act 1979* (EP&A Act). NCOPL is a joint venture between Narrabri Coal Pty Ltd (70%), Upper Horn Investments (Australia) Pty Ltd (7.5%), J-Power (7.5%), EDF Trading (7.5%), a Korean consortium consisting of Daewoo (5%) and Kores (2.5%). Narrabri Coal Pty Ltd is a 100% subsidiary Company of Whitehaven Coal Limited, which is a publicly listed Company. The Narrabri Coal Mine is approximately 30km south-southeast of Narrabri and 10km north-northwest of Baan Baa, on the north-western slopes of the Northern Tablelands in New South Wales (see **Figure 1**).

Approval for the Narrabri Coal Mine (Stage 1) (Project Approval (PA) 05_0102) was granted by the Minister for Planning on 13 November 2008 following a previous archaeological investigation of the Mine Site Pit Top Area by Australian Archaeological Survey Consultants Pty Ltd (AASC, 2007), prepared to support an Environmental Assessment and project application for the Narrabri Coal Mine. PA 05_0102 approves the mining (by continuous miner) and rail transport of up to 2.5 million tonnes of ROM coal per year for a period of 21 years from the granting of a mining lease. The Pit Top Area (of 757ha) encompasses all surface infrastructure except for the disturbance associated with mine ventilation and gas drainage. The Pit Top Area includes the site access road, the rail loop, the ROM and product coal pads, coal handling and preparation facilities (including a coal preparation plant), initial ventilation shaft area, reject emplacement area, brine storage ponds, box cut and drift portals, and all surface building and service infrastructure.

1.1 Background and Scope

NCOPL proposes to convert the approved Stage 1 Narrabri Coal Mine from a continuous miner operation (with an approved annual production rate of 2.5Mtpa) to a longwall mining operation with a maximum annual production rate of 8Mtpa. **Figures 2** and **3** identifies the critical surface and underground components of the proposed longwall mining operation, differentiating between those activities or infrastructure already approved for the Stage 1 operations and those proposed for the Stage 2, longwall operations.

Figure 2 displays the location of the area to be mined by longwall mining methods, referred throughout this report as the "Mining Area". The Mining Area has been divided into 26 panels referred to as Longwall Panels 1 to 26. Detailed assessment of heritage (both Indigenous and Non Indigenous) initially focussed on the first seven longwall panels (Longwall Panels 1 to 7) with further survey subsequently undertaken over the remaining panels (Longwall Panels 8 to 26).

The Mine Site corresponds with Mining Lease (ML) 1609 and covers an area of 5,210ha. It is noted that with the exception of the brine storage ponds, all of the additional Pit Top Area disturbance identified on **Figure 3**, along with the initial Ventilation Shaft Area, occurs within an area surveyed and assessed by AASC (2007).

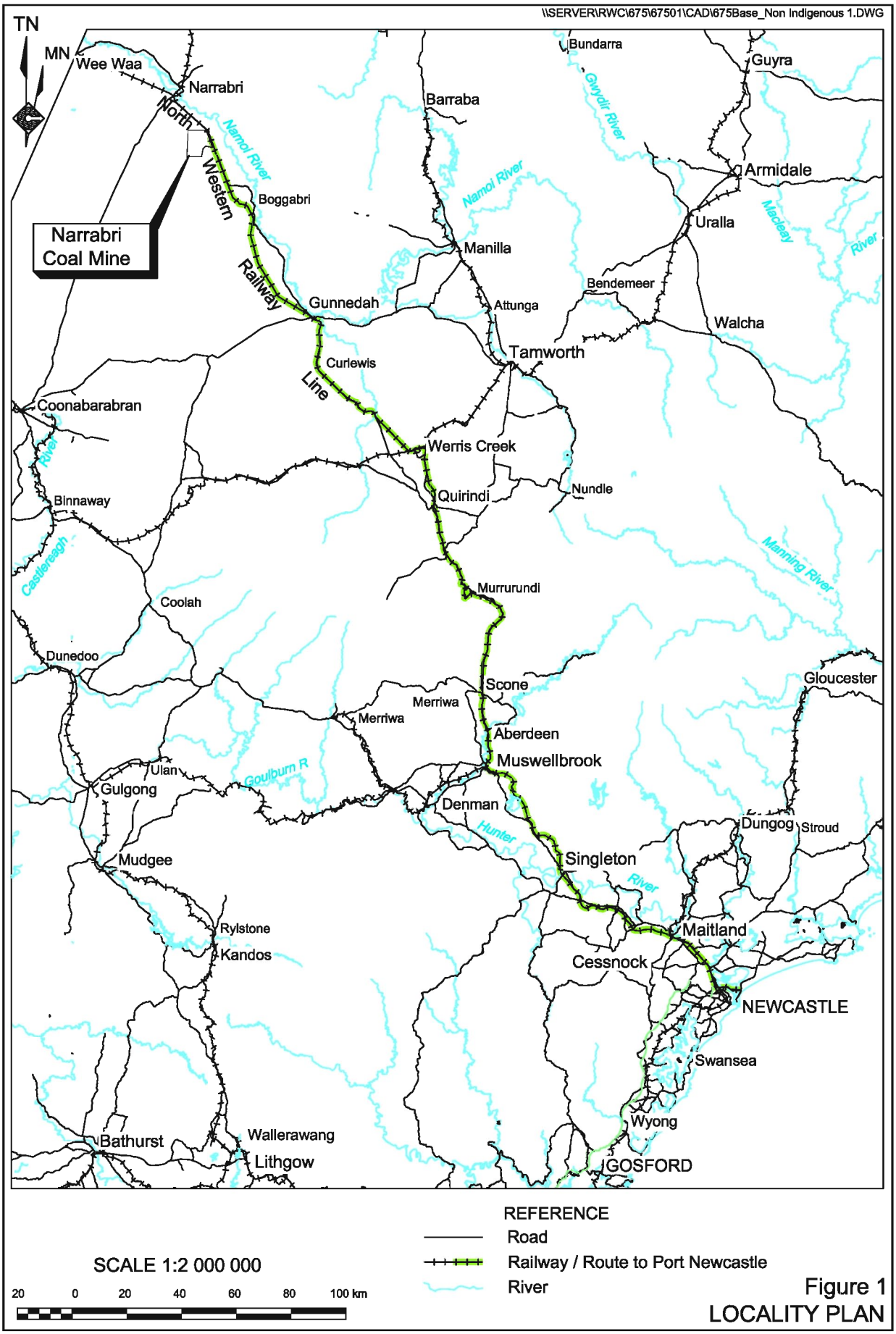


Figure 1
LOCALITY PLAN

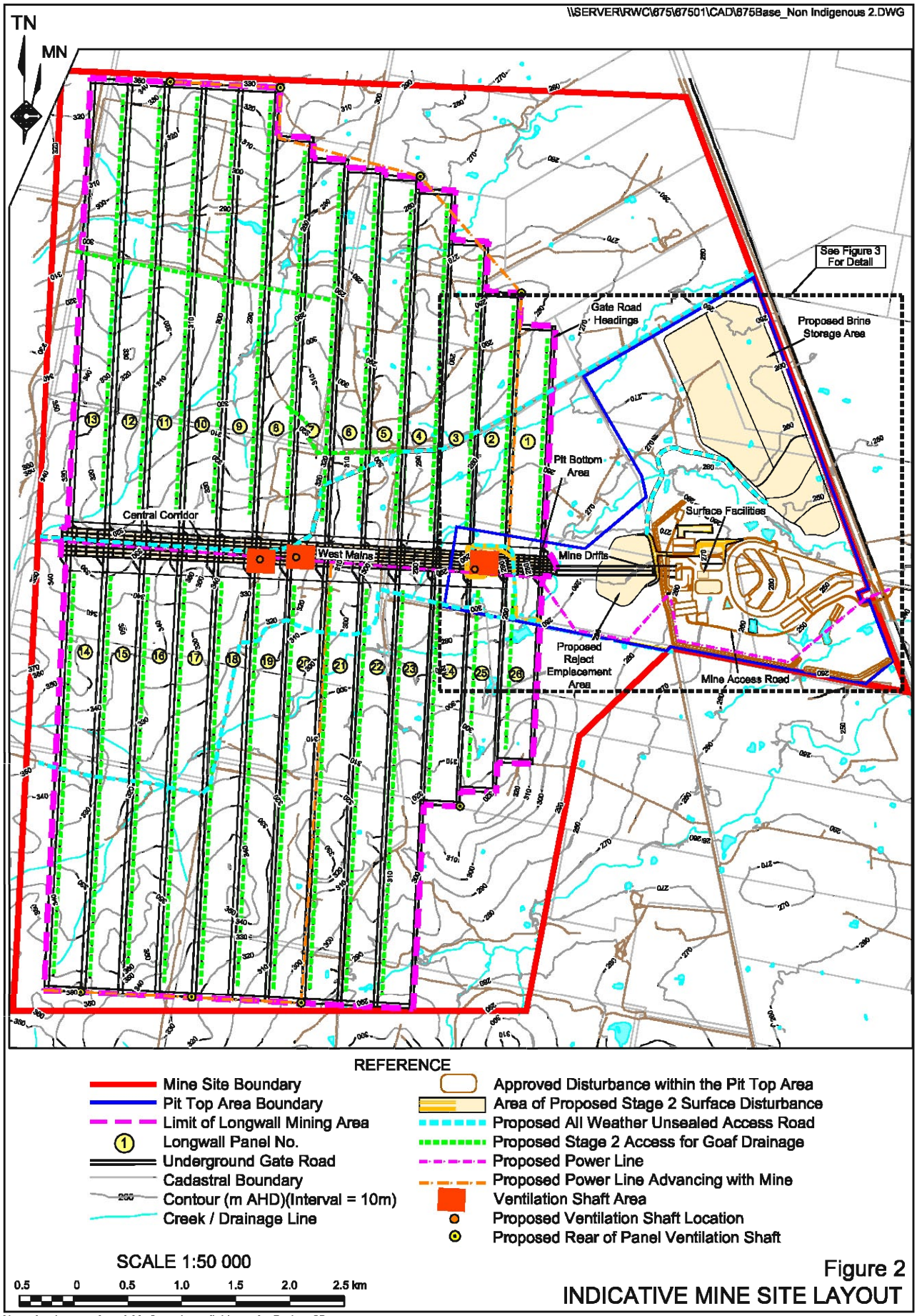
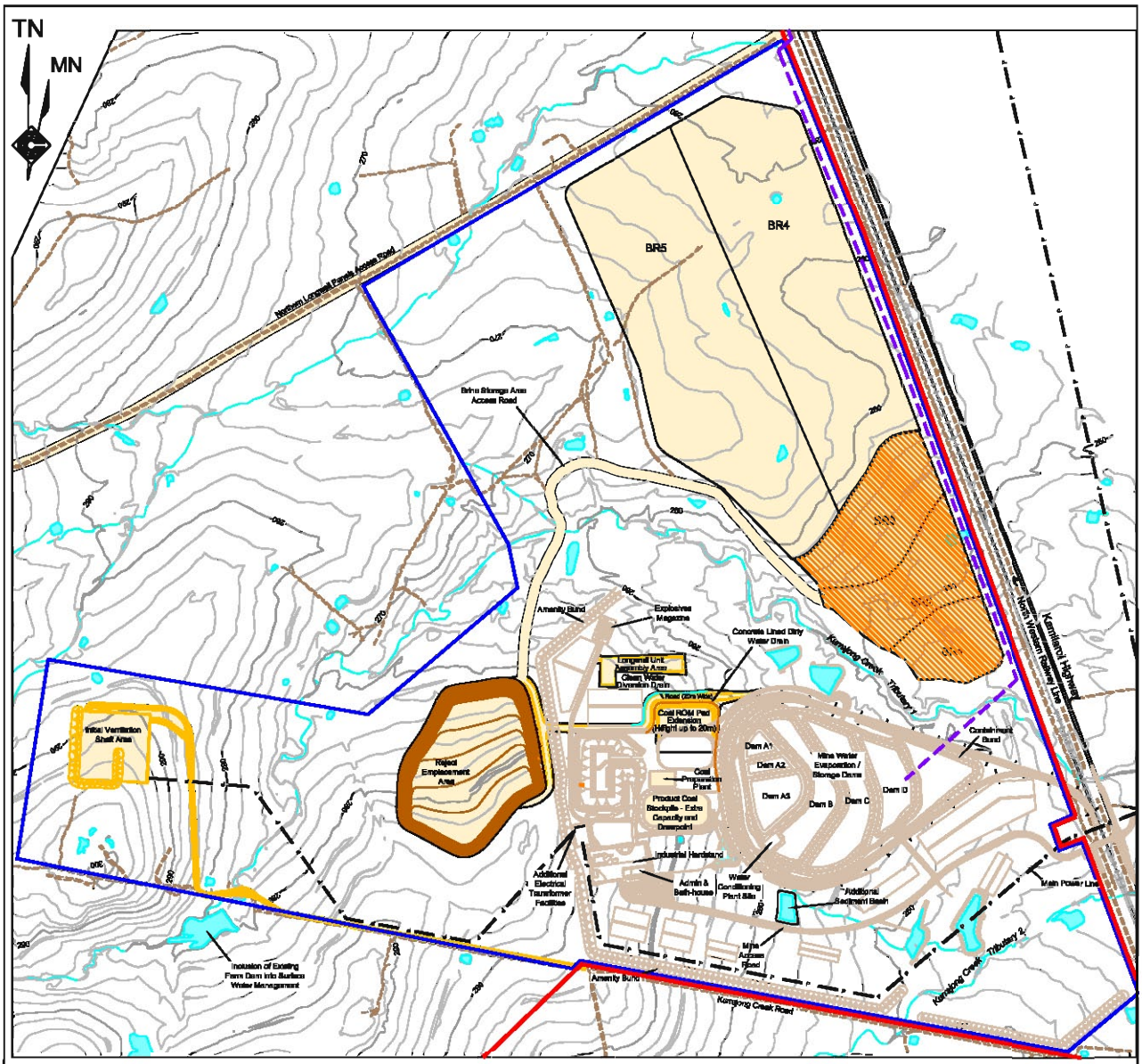


Figure 2
INDICATIVE MINE SITE LAYOUT

Note: A colour version of this figure is available on the Project CD



REFERENCE
- Mine Site Boundary*1
- Pit Top Area Boundary
- 260 Contour (m AHD)(Interval = 2m)
- Creek / Drainage Line
- Sealed Road
- Unsealed Road / Track
- Approved Disturbance within the Pit Top Area
- Area of Proposed Longwall Project Surface Disturbance
- Initial Brine Storage Pond*2
- Power Line
- Water Pipeline Route

Notes: 1. Modified from Stage 1 Boundary

2. Initial 3 Brine Storage Ponds (40ha) provide for sufficient Brine Storage for base case (most likely) groundwater in-flow (and therefore brine generation) predictions.

SCALE 1:25 000

250 0 250 500 750 1000 1250 m

Figure 3
PIT TOP AREA LONGWALL PROJECT COMPONENTS

Note: A colour version of this figure is available on the Project CD

The Longwall Project requires additional surface disturbance beyond the areas surveyed by AASC (2007). These areas, which are identified on **Figure 2**, include the following.

- Ventilation Shaft Areas. Sites for the construction and operation of ventilation fans. The current mine design has provided for up to four intake or exhaust fan sites above the West Mains of the underground mine and rear of panel exhaust sites every three to four longwall panels. Each Ventilation Shaft Area would cover an area of up to approximately 5ha.
- Gas Pre-drainage Sites. Sites from where medium radius drill holes are bored from surface into and along the coal seam and intersected by a gas pumping well to drain the gas contained within the coal seam prior to mining. The combined area of disturbance associated with each pre-drainage site would be approximately 3.5ha and there would be either two or three pre-drainage sites over each longwall panel (depending on the length of the panel).
- Goaf Gas Drainage Sites. Gas concentrating in the goaf of the underground workings would be removed via a vacuum pump attached to the top of a cased 250mm internal diameter borehole. The boreholes would be drilled from surface, at roughly 200m intervals and would therefore require the creation of a drill pad of approximately 50m x 50m dimensions.
- Access Roads and Service Corridors. A road and service corridor of approximately 10m in width would be constructed along the tailgate side of each longwall panel along the alignment of the goaf gas drainage sites.
- Power Line Corridor. A corridor of approximately 30m wide would be required for the construction of powerlines to service the ventilation fans.

Following a review of the dewatering requirements of the Longwall Project, NCOPL advised that a Brine Storage Area of up to 160ha in area could be required to store the waste water (brine) produced by the reverse osmosis treatment of this water (see **Figure 3**). In addition, a pipeline would be required to transfer and discharge the surplus fresh water (raffinate) produced by the reverse osmosis treatment of this water (see **Figure 4**). The scope of the archaeological investigations was subsequently extended to include a detailed archaeological investigation of the designated Brine Storage Area and proposed water pipeline route between the mine and the Namoi River.

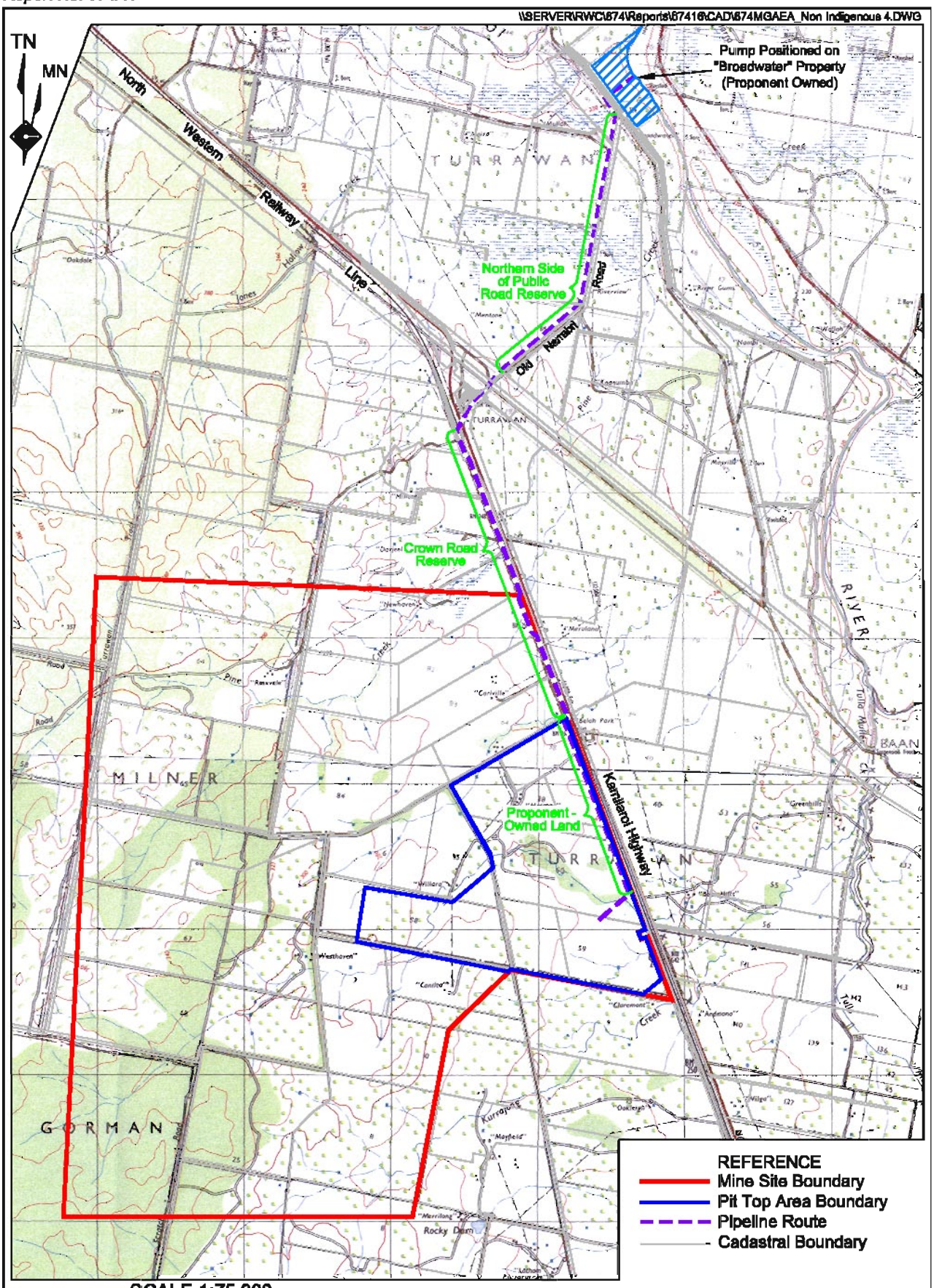
1.2 Scope, Objectives and Report Format

1.2.1 Scope

The scope of works was for ASR to undertake an investigation of the Mining Area, the additional disturbance areas of the Pit Top Area and the proposed water pipeline route between the Mine Site and the Namoi River to identify any sites and relics of non-indigenous heritage significance that might be present within the Survey Areas. The results of the investigation were to be presented in a report, which was to include an assessment of the significance of any cultural relics or places identified, an appraisal of the options and opportunities arising from the discoveries, and clear recommendations for the management of those cultural resources.

1.2.2 Report Objectives

The objectives of this report are to describe the investigation of the various survey areas and to record the archaeological relics and sites that were identified. Further, the report documents the recommendations as to the future management of the site identified during the investigation. Finally, the report includes a statement as to the recommendations for the future development of Narrabri Coal Mine.



Note: A colour version of this figure is available on the Project CD

Figure 4
NAMOI RIVER - MINE SITE PIPELINE ROUTE

1.2.3 Report Format

The report is presented in the following format:

i Executive summary
ii Contents
1. Introduction
2. The Environmental Context
3. The Searches
4. The Surveys
5. The Results
6. Assessing Heritage Significance
7. Statement of Heritage Significance
8. Recommendations.

1.3 THE MINE SITE, MINING AREA AND SURVEY AREAS

The Narrabri Coal Mine is located approximately 30km south-southeast of Narrabri and 10km north-northwest of Baan Baa, on the north-western slopes of the Northern Tablelands in New South Wales. In this report the Mine Site corresponds with ML 1609, the Mining Area corresponds with the total area overlying and corresponding with the proposed 26 longwall panels to be mined over the projected 27 year life of the mine.

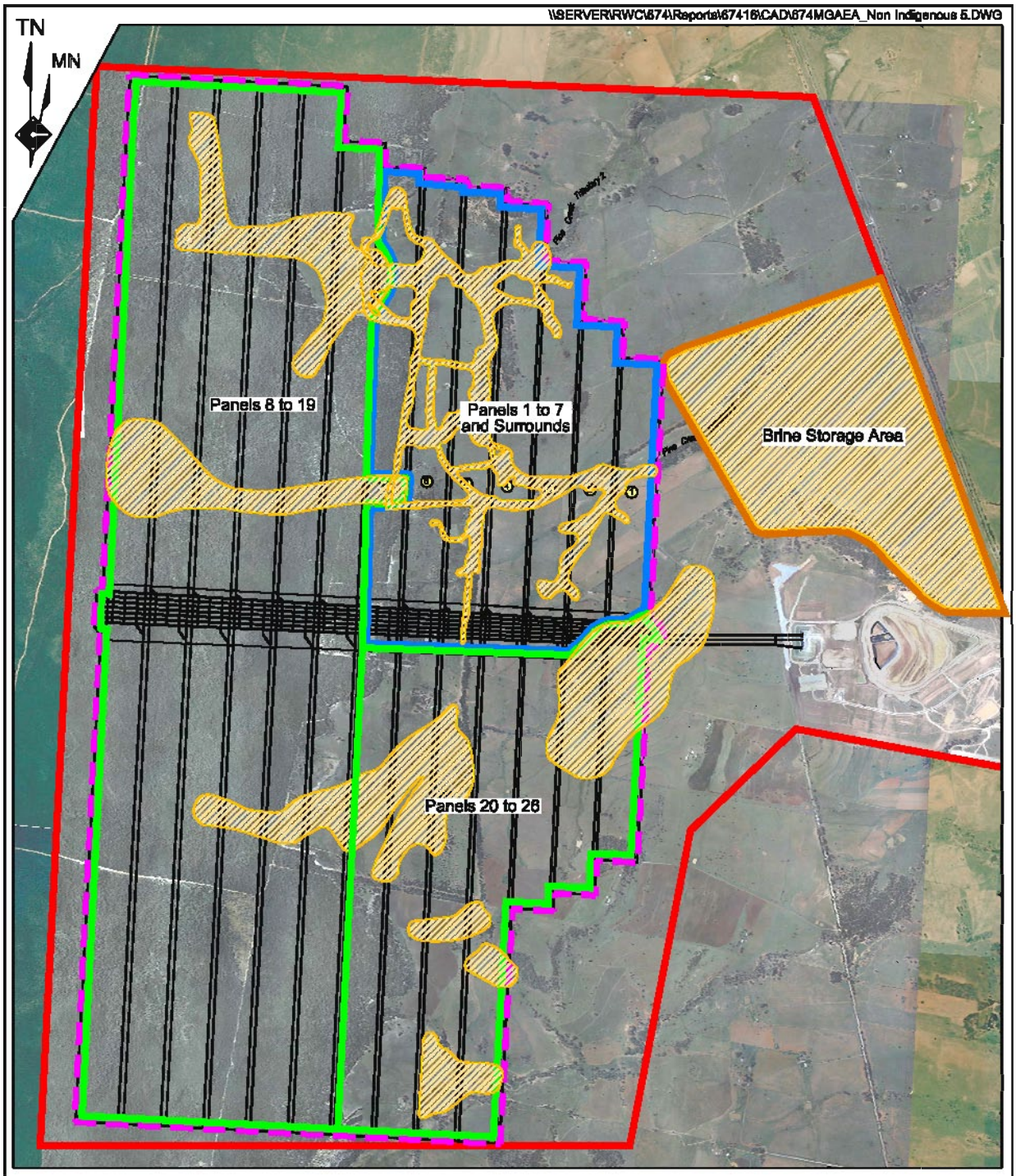
The Mining Area occurs over a number of properties, the majority of which are owned by NCOPL. As noted previously, survey was initially undertaken concurrently with an Indigenous heritage survey over Longwall Panels 1 to 7 and surrounds. Subsequently, the remainder of the Mining Area was surveyed, along with the proposed areas of disturbance associated with the Brine Storage Area and water pipeline route (also concurrently with the Indigenous heritage survey). **Figure 5** identifies the survey areas (with the Longwall Panel 8 to 26 survey area sub-divided further on the basis of landform and vegetation type).

1.4 POTENTIAL IMPACTS OF THE LONGWALL PROJECT

Two sources of potential impact to the archaeological and cultural record have been identified as being associated with the proposed Longwall Project, namely:

- clearing associated with drilling and operation of ventilation, pre-drainage and goaf gas drainage sites (and associated access and power line corridor construction); and
- surface subsidence resultant from the longwall mining method.

Both effects are complex and technical but for the purposes of this review they have been reduced to simple issues.



REFERENCE

- Pit Top Area Boundary
- Underground Mining Area
- Underground Workings
- ① Longwall Panel Number
- Panels 1 to 7 Survey Area
- Panels 8 to 26 Reconnaissance Survey Area
- Brine Storage Survey Area
- Field Survey Area

Note: Water Pipeline Route Survey Area as shown on Figure 4

SCALE 1:50 000

0.5 0 0.5 1.0 1.5 2.0 2.5 km

Base Map Source: Geo-spectrum (Australia) Pty Ltd

Figure 5
THE SURVEY AREA

Note: A colour version of this figure is available on the Project CD

Construction and Operation of Gas Drainage Sites and Ventilation Shaft Areas

Tests conducted by GeoGas Pty Ltd established that gas composition within the mine varies considerably (RWC, 2009). As a consequence, it will be necessary to install a comprehensive mine ventilation system to manage seam gas generated within the mine and to provide a safe working environment for the mine's workforce. To achieve this outcome, gas within the coal seam will have to be pre-drained, gas accumulating within the collapsed goaf of each completed longwall panel removed and the mine ventilated.

Gas pre-drainage would require a number of medium radius drilling Surface to In-seam (SIS) boreholes to be drilled (across the width of each longwall panel) into and then along the length of the coal seam. An area of approximately 80m x 80m would be required for each SIS Borehole Drill Site (0.64ha), however, as with other surface drilling sites, mature trees and other vegetation would be retained where practicable within each site. At the extremity of each set of SIS boreholes, a vertical pump well would be constructed to intersect each SIS borehole. The current pre-drainage arrangement provides for seven pump wells at each Gas Production Site, requiring an area of approximately 2.9ha. On the basis that three Pre-Drainage Sites would be required for Longwall Panels (LW) 3 to 24, and two would be required for LW1, LW2, LW25 and LW26, the total area of disturbance would be up to 259ha (66.5ha of which would be incurred within the Panels 1 to 7 Survey Area).

A conceptual goaf drainage design has 250mm internal diameter cased boreholes located about 30m off the tailgate corner of the active goaf at approximately 200m intervals. To provide access for the drilling rigs and vehicles, as well as pipelines and other services, a corridor of 10m would be required between each goaf gas drainage hole. Up to 400 goaf gas drainage sites would be required over the Mining Area, requiring surface disturbance of up to 100ha.

Ventilation shafts of up to 6m in diameter would be constructed to provide for air intake to or ventilation from the underground workings. The preferred construction technique is as blind bores, ie. bored from the surface into the underground workings to depths of between approximately 170m and 320m below surface. The technique involves the drilling of the shaft to the coal seam prior to the development of the roadways in the coal with these roadways intersection the shafts after their final completion. The construction area for each Ventilation Shaft Area would be of maximum dimensions 200m x 250m (5.0ha). The location and number of surface ventilation locations is based on a conservative assessment of ventilation requirements and is therefore likely to provide for more ventilation capacity then may be required, ie. the number of surface ventilation points, and therefore area of surface disturbance is unlikely to exceed that illustrated on **Figure 2**. **Figure 2** provides for ventilation from the West Mains from Maingates 2, 7 and 8, and rear of panels LW2, LW5, LW9, LW12, LW14, LW19 and LW21. Therefore, on the basis that each of the West Mains ventilation shaft area would disturb up to 5.0ha, and the rear of panel ventilation up to 0.25ha, up to 17.0ha of the Mine Site would be disturbed to accommodate the ventilation requirements of the Longwall Project over the life of the mine.

It is worthy of note that the estimated areas of disturbance provided for represents a maximum area of disturbance. NCOPL would reduce, or consolidate areas of disturbance associated with other activities (eg. access roads).

There is a potential for any archaeological contexts occurring within the footprint of any of the impacts described above, to be severely impacted upon.

Subsidence

NCOPL engaged Ditton Geotechnical Services Pty Ltd (DGS, 2009) to predict and report on the potential impacts from subsidence from longwall mining. In summary, DGS (2009) predicts that while subsidence would occur to varying degrees across the Mine Site the maximum predicted subsidence of 1.6m would occur towards the eastern section of the Mining Area, and up to 2.4m would occur in the western section (DGS, 2009).

The impacts from subsidence are likely to be two-fold: firstly there is the likelihood of differential lowering of the ground surface over large areas; and secondly there is the likelihood that cracking may occur both along the margins of the subsidence, above the line of longwall panels, and within the area of subsidence from differing degrees of subsidence. As a subsequent result of the cracking, further impacts may be caused if material is required to be transported to the location of the cracking to fill and repair the cracks.

The vertical displacement of an archaeological site from subsidence is unlikely to result in damage or alteration to most archaeological sites unless the site is a standing structure, however, any lateral displacement caused by variable subsidence across a site might have significant impact on the integrity of the site and cause displacement of relics within the assemblage. Any lateral movement or migration of drainage lines and creek resulting from variable subsidence also has the potential to impact on any standing structures along the creek banks that might be undermined by a change in channel profile.

In this instance, the frequency and location of gas drainage and ventilation infrastructure is dictated by a requirement to maintain the safety of the underground mine, ie. the coal seam gas poses an extremely high risk to the safety of mine personnel if not removed, and to effectively remove the gas and ventilate the mine requires the specific placement of boreholes for gas drainage or ventilation purposes. As a consequence it may not be possible to avoid impacting upon some sites, in which case it will be necessary to fully record those particular sites and where possible, to remove them to a more secure place.

2 THE ENVIRONMENTAL CONTEXT

To provide a basis of information on the environmental context for any structures or relics occurring within the Mining Area, it is necessary to briefly consider those factors that might contribute to the nature of, character or location of a structure or relic of heritage significance.

2.1 General Geology and Topography

The Mine Site is located within the Permo-Triassic Gunnedah Basin, which forms the central part of the north-south elongate Sydney-Gunnedah-Bowen Basin System. The Mining Area is located near to the northern and western boundaries of the Gunnedah Basin and the eastern margin of the Surat Basin, a sub-basin of the larger Great Artesian Basin (RWC, 2009).

The rocks of the Mine Site generally strike north-south and dip gently to the west. Minor variations to the north-south strike may be the result of variable thickness and compaction of the sedimentary units being draped over the faulted and uneven surface on the underlying Boggabri Volcanics. Undifferentiated Quaternary alluvial gravel, sand, silt and clay overly the Jurassic and Triassic sediments (RWC, 2009) associated with the Namoi River.

The two formations of most relevance to the current archaeological investigation are the Pilliga Sandstone and the Purlawaugh Formation. The Pilliga Sandstone outcrops over the western half of the Mining Area. It consists of medium bedded, cross-bedded, well sorted fine to coarse grained quartz sandstone. The Purlawaugh Formation outcrops over the majority of the eastern half of the Mining Area, and consists of thinly bedded, generally fine grained, silty lithic sandstone, siltstone and minor claystone (RWC, 2009).

Elevations in the Panels 1 to 7 Survey Area descend from 330m AHD in the Pilliga in the south-western corner, and 300m AHD on the rise in the north-western corner, down to 276m AHD in the creek bed of Pine Creek 2 on the western boundary and 266m AHD where Pine Creek 2 crosses the eastern boundary (of longwall panel 1). In the south-eastern corner (of longwall panel 1) Pine Creek 1 descends to 272m AHD.

2.2 Vegetation

An ecological survey and assessment of the Mine Site and pipeline route corridor completed by Ecotone Ecological Consultants (2009) identified six natural or predominantly natural vegetation community types and one artificial vegetation community type occur within the Study Area as follows.

Natural Communities

1. Brown Bloodwood / Pilliga Grey Box / Red Ironbark Sandstone Slopes and Ridgetop Woodland
2. Inland Grey Box / Bimble Box / Blakely's Red Gum Lower Flats and Floodplain Woodland
3. River She Oak / Belah / Inland Grey Box Riparian Forest
4. White Cypress Forest
5. River Red Gum Riparian Open Forest / Woodland
6. Weeping Myall Woodland

Artificial Community

7. Cleared open pasture with or without scattered native trees or cultivated cropland or gardens

Community 1 (locally referred to as Pilliga Scrub) generally occupies the western part of the Mine Site, whilst Communities 2, 3 and 4 occur in the eastern part of the Mine Site. Community 5 is the largest single community in area, and makes up the balance of the eastern part of the Mine Site.

Panels 1 to 7 Survey Area

Within the Panels 1 to 7 Survey Area, with the exception of the remnant woodland on the rise at the northern end (Community 2), the natural communities consists primarily of riparian ribbon-like woodland along the Buffer Zones and upper Bank Zones of both creeks (Community 3). Vegetation in these areas comprise a mixture of River Oak (*Casuarina cunninghamiana*), White Cedar (*Melia azedarach*), Rough-barked Apple (*Angophora floribunda*), White Box (*Eucalyptus albens*) – particularly along the upper reaches of Pine Creek 1, River Red Gum (*E. Camaldulensis*), Yellow Box (*E. Melliodora*), White Ribbon Gum (*E. Viminalis*), Western Rosewood, (*Alectryon oleifolius*), and minor Kurrajong (*Brachychiton populneus*). *Acacia sp*. dominate the understorey, which includes River Bottlebrush (*Callistemon sieberi*), and Blackthorn (*Bursaria spinosa*).

Cypress pine regrowth has recolonised the cleared upper slopes below the Pilliga boundary fence, and in some cropped areas along the upper drainage depressions of both creeks.

Panels 8 to 19 Survey Area

Panels LW8 to LW19 occur in Pilliga Forest (Community 1). Pilliga Forest typically contains Cypress Pine (*Callitris* spp.), and Casuarinas, while Eucalypts dominate the canopy throughout the forest.

Panels 20 to 26 Survey Area

LW20 to LW26 occur on cleared pasture land (Community 7) all but for ribbons of riparian vegetation (Community 3) along the creek banks, and for stands of Cypress Pine that have colonised a high knoll in the northern ends of LW25 and LW26 (Community 4).

Brine Storage Pond Survey Area

With the exception of a small patch of the remnant woodland on a small rise to the immediate north of Kurrajong Creek Tributary 1 (Community 3), the vegetation of the Brine Storage Area is cleared paddocks with occasional and isolated mature trees (Community 7). Riparian ribbon-like woodland (Community 3) occurs along the banks of Kurrajong Creek Tributary 1 to the south of the Brine Storage Area and remnant woodland with the road easement to the east of the Brine Storage Area.

Water Pipeline Route Survey Area

The vegetation of the water pipeline route varies between remnant woodland dominated by Grey Box and Cypress Pine (Community 3), small patches of Weeping Myall community (Community 5), a small patch of River Red Gum Riparian Woodland (Community 6) and cleared areas dominated by exotic pasture and weeds (Community 7).

2.3 Water Resources

It should be noted that the depiction of drainage lines in blue on **Figure 5** is not indicative of the water they contain. In fact, it is reasonable to conclude that all drainage lines indicated in blue where there is not a riparian strip of woodland, are merely shallow drainage depressions, barely visible in the field other than as shallow swales.

As described in Section 3.1, the Panels 1 to 7 Survey Area is bisected by the two major tributaries of Pine Creek, referred to in this report as Pine Creek 2 and Pine Creek 1. In effect, neither creek line retains water and any surface run-off is rapidly discharged downstream. However, it was observed during the investigation that took place after recent rain, that a minor waterhole had filled upstream of the tessellated platform in the minor tributary of Pine Creek 2, and that there was a second small water hole, probably created by wild pigs, in a tributary of Pine Creek 1. Similarly, no reliable water source was observed in the investigation of the Panels 8 to 19, nor Panels 20 to 26 Survey Areas.

The Brine Storage Area occurs adjacent to Kurrajong Tributary 1, however, it is unlikely that the creek ever contained potable water except for a few hours after a heavy downpour.

The Water Pipeline Route follows road easements, none of which cross a reliable water source. The Namoi River at the eastern end of the route would have been a reliable source, although the water would have required filtering before it could be drunk.

2.4 Previous Impacts

Panels 1 to 7 Survey Area

As the aerial photograph in **Figure 4** shows, and as referred to in Section 3.2, the vast majority of the Survey Area has been cleared for pasture. However, the impact has not stopped there, as continuous grazing of poor grasses in an area of low rainfall has resulted in the active degradation and erosion of most if not all exposed surface deposits.

Other impacts have been caused by property tracks, dams, and active gullying in what were once only drainage depressions. Grazing along the creek banks has also caused massive gullying of the creek banks, bank-slumping, and significant wash outs, particularly along the southern bank of the upper reaches of Pine Creek 2, and a minor tributary of Pine Creek 1.

The fragility of the soils is also evident in several collapsed dam walls along Pine Creek 1 and the gullying of the drainage channel into one of the dams, and in the gullying of creek banks and extensive wash-out areas. Although a number of contour banks have been constructed across the slopes of the paddocks they have only served to channel the run-off into more concentrated and destructive drainage courses.

Panels 8 to 19 Survey Area

There have been only limited impacts in the Pilliga Forest in the Panels 8 to 19 Survey Area, most of which have been caused in the construction of dams, or in clearing access tracks to the dams and to fence-lines, however, it was clear from the tree stumps and the relatively open areas, particularly above LW9 to LW12 that there has been extensive tree-felling or logging in the past. And in the absence of tree toppings it would appear that the trees were felled for something other than fence-posts and strainer posts. Nor is it likely that the trees were felled for firewood. Similar logging has taken place above LW14 to LW17.

The presence of the dams might suggest that the logging was to open up the forest for pasture improvement, but there was no evidence of piles of ash of partly burnt logs that there would have been if the logging was merely to remove trees. It would seem more likely that the logging was to provide timber to the sawmill described later in this report.

Panels 20 to 26 Survey Area

Most of the vegetation in the Panels 20 to 26 Survey Area has been cleared for pasture, and in some places, such as on the crest of the rise above LW21 and LW22, the paddocks had been recently disc-ploughed to improve pasture growth. Similarly, above LW23 and LW24 had been disc-ploughed not quite so recently and were under new growth at the time of the survey.

Brine Storage Area Survey

The Brine Storage Area has been cleared for pasture. Currently impacts are occurring as scalding on the flat bottom of the basin, and bank-slumping and slope-wash around the rim. Unfortunately contour banking above the rim does not follow the natural contour, dipping slightly towards the east. As a consequence instead of the contour banking retaining the run-off to stimulate grass growth, the effect has been to channel the water to the eastern ends of the banks where the concentrated mass of water has discharged down-slope causing extensive gullying and scouring.

Water Pipeline Route Survey Area

For the most part, the proposed water pipeline route utilises either the road easement or the railway maintenance track. The road is a metalled surface with deep side drains and as a consequence the banks to either side are artefacts of drain shaping with battered slopes of 3m to 4m wide. The railway maintenance track at the higher elevations occurs on sandy deposits which have been graded to various depths but seldom more than 5cm to 10cm deep. At lower elevations the deposits are less sandy and grading has been mostly only to level the track.

East of Turrawan, Old Narrabri Road is sealed with deep side gutters, the outer batters of which have impacted on the natural profile for up to 10m to either side of the road. Between Old Narrabri Road and the Namoi River (on the "Broadwater" property), the land has been cleared and linear features marking subsurface irrigation pipes attest to the paddocks having once been used for crops, although currently the paddocks are carrying stock.

3 METHODS

3.1 Desktop Assessment

The following registers were searched for any reference to significant sites or structures within the survey areas on 24th August 2009.

- National Trust:

  No sites were listed for the Mine Site or along the water pipeline route.
- Heritage Council:

  No sites were listed for the Mine Site or along the water pipeline route.
- Narrabri Local Environment Plan 1992:

  No sites were listed for the Mine Site or along the water pipeline route.

3.2 Field Surveys

The investigation to record structures, places or relics of heritage significance was undertaken concurrently with a comprehensive survey of the survey areas for sites of Non –Indigenous cultural significance over 17 days during May to July 2009 (Appleton, 2009).

3.3 Site Recording

A comprehensive photographic record was made of the only structure of interest. To limit the size of this report, only a selection of the record is included in **Appendix i.** Dimensional details of the site were recorded using a 3m tape measure, a 5m tape measure, a 50m tape measure, 1m and 25cm scale bars and a compass.

4 RESULTS

As noted in Section 3.1, no items of heritage significance are identified for the survey areas on the various registers.

The only item of interest observed within the survey areas was a defunct sawmill (although for the reasons provided in Section 5, the site was assessed to be of no heritage significance). The sawmill occurs on the northern bank of "Pine Creek Tributary 1", inside the eastern boundary fenceline on Lot 152, DP 816020 (see **Figure 6**).

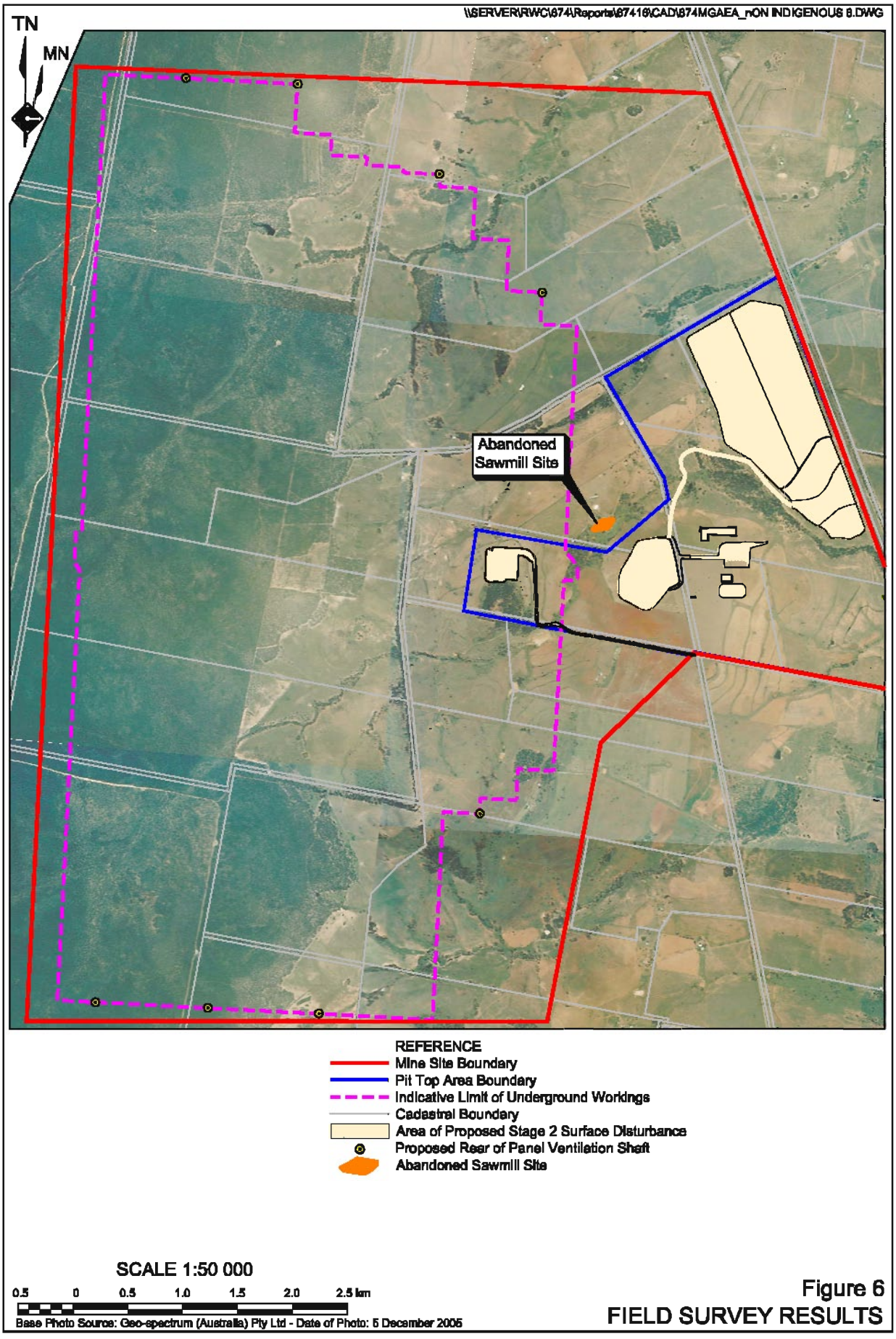


Figure 6
FIELD SURVEY RESULTS

As an Adjunct Senior Lecturer in archaeology at the University of New England (UNE) Appleton is well aware of the educational benefits of recording such a site, particularly as the UNE's summer school field project for external students is to excavate a sawmill site with no standing structures on the "Newholme" property in Armidale. While there is no evidence that the two mills were similar nevertheless the extant physical remains of the sawmill provide an excellent example of the material and equipment, and the sequence and relationship of the equipment to the milling process, one might expect to find on a sawmill site.

A comprehensive photographic record was made of the sawmill site, a selection of which is included in **Appendix 1**. A site plan of the sawmill was also produced, a copy of which is included as **Figure 7**. A record of the various dimensions of the items within the sawmill site area as follows.

- Length of the site (from end of the log-trolley track to the end of the plank-trolley track: 20.1m.
- Width of site (from western end of log-rack to outer edge of belt cams): 6.48m.
- Log-rack rails:
  - Diameter: 23/23/24cm
  - Length (from the rear forwards): 427/428/424cm
- Squared-log rack rails:
  - Diameter: 17/16/16cm
  - Length (from the rear forwards): 424/429/426cm
- Plank-rack rails:
  - Diameter: 13/13/15cm
  - Length (from the rear forwards): 242/250/242cm
- Prop (upper rail): 15cm square, 68cm long
- Log-trolley track (inner width between rails):
- 53cm Sleepers (only one measured): 120cm x 21cm
- Plank-trolley track (inner width between rails): 77cm
- Rough saw: 90cm diameter.
- Rough saw belt cam:
  - Diameter: 26cm
  - Width 15cm
- Fine saw belt cam:
  - Diameter: 20cm
  - Width 17cm
- Fine saw approach roller (length): 92cm
- Fine saw roller leaving (length): 80cm
- Unsawn logs (diameter): 32-40cm
- Belt (canvas covered rubber belt) (width): 10cm
- Discarded planks of pine (various lengths of the following)
  - 10 cm wide x 3.5 cm thick (4" x 1 ½" allowing for shrinkage)
  - 8 cm wide x 5 cm thick (3¼" x 2")
  - 10 cm wide x 2.5 cm thick (4" x 1")
  - 14 cm wide x 3 cm thick (5½ x 1¼")
  - 10 cm wide x 2.75 cm thick (4" x 1¼").

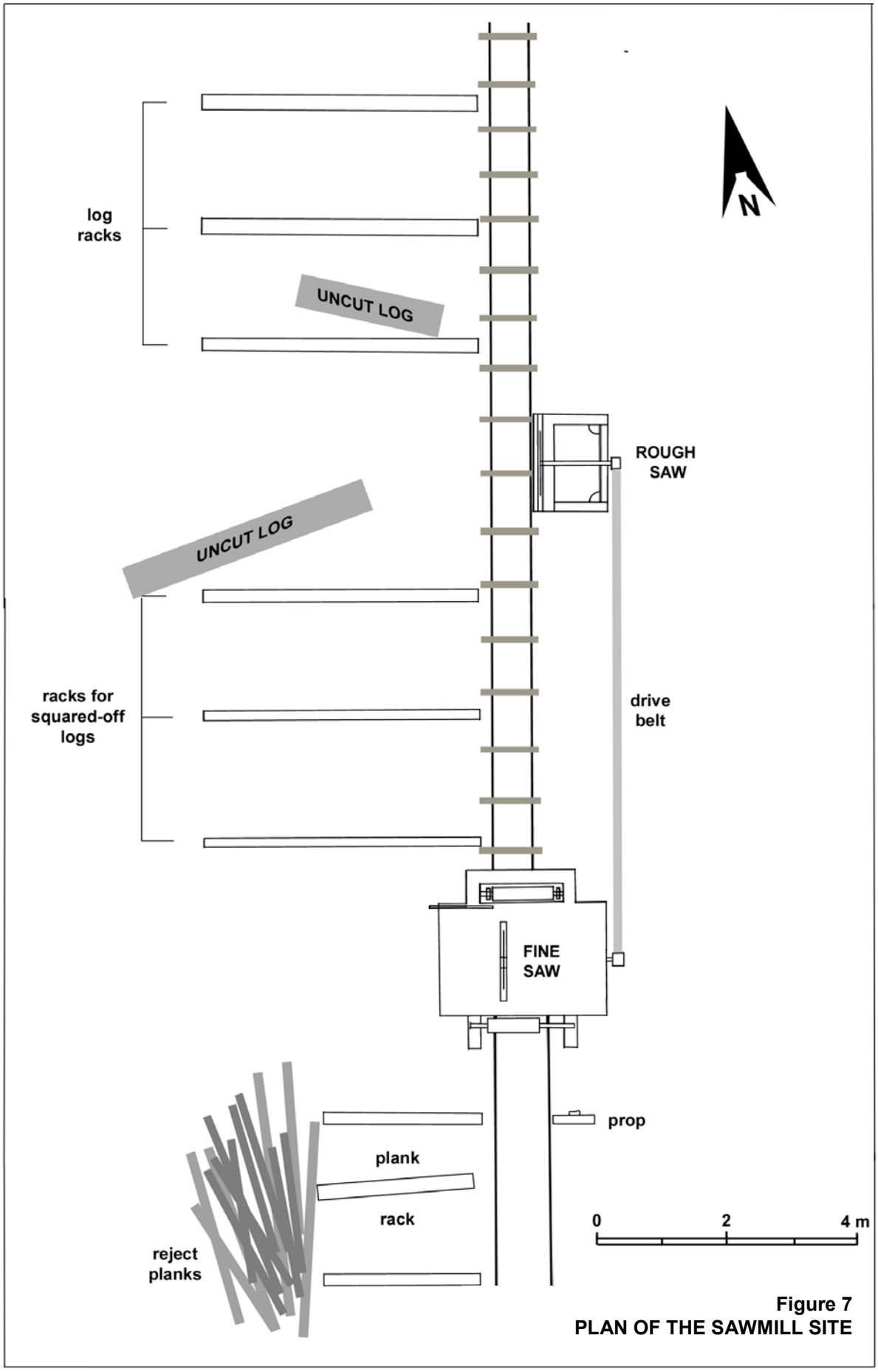


Figure 7
PLAN OF THE SAWMILL SITE

An explanation of the terms used on **Figure 7**, and in the captions to the photographs in **Appendix 1**, is as follows.

Log-rack

The three rails at the northern end on which the logs were rolled to begin the milling process. The three rails were of natural uncut logs over which the logs to be cut were rolled onto the log-trolley. The first two rails were higher than the third, perhaps to assist in rolling the logs onto the log-trolley.

Log-trolley

The trolley used to transport the log to the rough saw. The log-trolley track: railway line track laid on sleepers. This had to be substantial to take the weight of a full log prior to the rough saw, and the squared log afterwards. The rails were held in place by square-headed bolt-screws in railway fashion.

Rough saw or log-saw

The large diameter saw used to square the log.

Squared-log rack

The three rails onto which the squared logs were stored. The rails were flat-topped to minimise the damage that would be caused to the squared logs from being laid onto rounded rails, i.e., to widen the impact zone and spread the load.

Fine saw or plank-saw

The small-toothed, small diameter saw used to produce the planks.

Plank-trolley

The trolley onto which the planks were removed from the fine saw.

Plank-trolley track

Angle-iron laid along longitudinally-laid parallel wooden supporting strips, the flange facing outwards, the angle-iron being held in place by bent spikes. The trolley and the track on which it ran was of only light construction as it only had to support the weight of one or two planks at a time.

Plank-rack

The rails onto which the sawn planks were stacked prior to removal.

Prop

A “T” shaped feature probably used to support the discarded linear off-cuts produced when cutting planks on the Fine saw or plank-saw.

5 ASSESSING HERITAGE SIGNIFICANCE

5.1 NSW Heritage Office Guidelines for Assessing Heritage Significance

Heritage assessments are undertaken to provide useful and appropriate information to the Heritage Branch of the Department of Planning, local government, owners of the subject properties, and the proposing developers, for the most appropriate and preferred further management and/or conservation of a site, in accordance with regulated guidelines.

The Sawmill Site is not listed on the registers of the National Trust or the Heritage Branch, nor is it on the Narrabri LEP 1992. But as an item of historic interest it warrants an assessment of its heritage significance.

In 2001, NSW Heritage Office issued revised guidelines for assessing heritage significance entitled "Assessing Heritage Significance" (NSW Heritage Office, 2001). Section 5.2 considers the identified sawmill against the seven criteria of this guideline document. Section 5.3 considers the identified sawmill against the preservation criterion of the Burra Charter.

5.2 SIGNIFICANCE ASSESSMENT: The Sawmill Site

Criterion (a) – *an item is important in the course, or pattern, of NSW's cultural or natural history (or the cultural or natural history of the local area).*

Assessment: The sawmill does not meet this criterion. Nothing is known of the history of the sawmill and its role would only have been significant to the immediate local community.

Criterion (b) – *an item has a 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*).

Assessment: The sawmill does not meet this criterion.

Criterion (c) - *an item is important in demonstrating aesthetic characteristics and/or a high degree of creative or technical achievement in NSW (or the local area).*

Assessment: The sawmill does not meet this criterion. There is no evidence to suggest that the sawmill was unique or in any way technically different to others that might exist elsewhere in the Pilliga or on the adjacent properties.

Criterion (d) – *an item has strong or special association with a particular community or cultural group in NSW (or the local area) for social, cultural or spiritual reasons.*

Assessment: The sawmill does not meet this criterion.

Criterion (e) – *an item has 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).*

Assessment: The sawmilll does not meet this criterion. The information it provides is only of value to a specific application (i.e., a UNE field-school) and only then as an illustration of the milling process. It is probable that there are numerous other abandoned sawmill sites elsewhere and that the Mine Site sawmill is just one of many variations of the sawmilling process.

Criterion (f) – *an item possesses uncommon, rare or endangered aspects of NSW's cultural or natural history (or the cultural or natural history of the local area).*

Assessment: The sawmill does not meet this criterion.

Criterion (g) – *an item is important in demonstrating the principal characteristics of a class of NSW's:*

Cultural or natural places; or cultural or natural environments.

(or a class of the local area's: cultural or natural places; or cultural or natural environments).

Assessment: The sawmill does not meet this criterion.

5.3 "The Illustrated Burra Charter"

Within "The Illustrated Burra Charter", Article 17: Preservation, which refers to the criteria under which preservation of a site is appropriate, states:

> "*Preservation is appropriate where the existing fabric or its condition constitutes evidence of cultural significance, or where insufficient evidence is available to allow other conservation processes to be carried out.*"

When assessed against NSW Heritage Office (2001), the identified sawmill fails to meet the criterion that would warrant its preservation as defined by "The Illustrated Burra Charter".

6 STATEMENT OF HERITAGE SIGNIFICANCE

As a consequence of considering the above criteria the heritage significance of the "Sawmill" on the Narrabri Coal Mine Site is assessed as follows.

> *"The Sawmill is assessed to be of no local historical interest, and of only low educational value, insufficient to warrant its classification as a structure of Heritage Significance".*

7 CONCLUSION

It is concluded that there are no constraints to the proposed development of the Narrabri Coal Mine on non-Indigenous heritage grounds.

Appendix 1

Photographic Record of the Sawmill

Please note this appendix has been printed in black and white. A colour copy is available on the digital version of this report provided on CD.

Plate 1 – View from the south

Plate 2 – View from the southwest.

Plate 3 – View from the southeast

Plate 4 – View showing the alignment of the saws and the trolley tracks.

Plate 5 – View from the opposite direction, with the fallen log-trolley on the right.

Plate 6 – View showing the alignment of the belt cams.

Plate 7 – View of the log-saw from the Southeast (scale 1m)

Plate 8 – The log-saw viewed from the east (scale 1m).

Plate 9 – The log-saw viewed from the north.

Plate 10 – Detail of the drive shaft and belt cam of the log-saw.

Plate 11 – Detail of the drive shaft and saw blade of the log-saw.

Plate 12 – Detail of the repair work to the log -saw support frame.

Plate 10 – Detail of the drive shaft and belt cam of the log-saw.

Plate 11 – Detail of the drive shaft and saw blade of the log-saw.

Plate 12 – Detail of the repair work to the log -saw support frame.

Plate 13 – Plank-saw viewed from the north.

Plate 14 – Plank-saw viewed from the west.

Plate 15 – Plank-saw viewed from the east.

Plate 16 – Plank-saw viewed from the south.

Plate 17 – Detail of the plank-saw blade attachment, minus the blade.

Plate 18 – Detail of plank-saw drive shaft bracket clamp.

Plate 19 –Bracket clamp viewed from above.

Plate 20 – Plank-saw belt cam and bearing (scale 25cm).

Plate 21 – Detail of the bearing housing.

Plate 22 – Detail of western end of plank-out roller (plank-saw).

Plate 23 – Detail of eastern end of plank-out roller (plank-saw).

Plate 24 – Detail of western end of log-in roller (plank-saw).

Plate 25 – Detail of frame above plank-saw bench (of unknown function).

Plate 26 – Saw gauge on the plank-saw in an open (wide plank) setting.

Plate 27 – Saw gauge in a closed (narrow plank) setting.

Plate 28 – Detail of the south-western corner of the plank-saw bench, showing the evidence of recycled timber and repairs.

Plate 29 – View of the plank-saw from the west, showing the sawdust chamber beneath the bench.

Plate 30 – The log trolley on its side to the north of the log-saw.

Plate 31 – The log trolley in the vertical position (scale 1m).

Plate 32 – View showing the length of railway-track rail attached to the base of the trolley to act as a counter-weight to that of the log.

Plate 33 – View showing the construction of the base of the trolley.

Plate 34 – Aspect showing the width of the log-trolley (on its side).

Plate 35 – The scale bar is supporting the log-holder (to hold the log in place).

Plate 36 – Wheels to the log-trolley

Plate 37 – A section of log-trolley track.

Plate 38 – Detail of the track fastenings for the log-trolley (scale 25cm).

Plate 39 – Plank trolley.

Plate 40 – Frontal aspect of the plank trolley.

Plate 41 – Side view of the plank trolley. (scale bars 1m).

Plate 42 – View showing the angle-iron tracks of the plank trolley (scale 1m).

Plate 43 – Detail of the plank-trolley track. The hook spike is clamping the flange of the angle iron to the longitudinal timber sleeper (scale segments 1cm).

Plate 44 – Site View from the southwest Showing the three log racks on the left and the squared-log racks on the right.

Plate 45 – The log racks.

Plate 46 – Detail of the fastening to the western end of the first log in the log rack.

Plate 47 – Detail of the fastening to the eastern end of the first log in the log rack.

Plate 48 – The discarded drive belt and the central fastening to the third log in the log rack (scale segments on belt 1cm).

Plate 49 – View showing a large log placed under the damaged third log of the log rack.

Plate 50 – View showing the differences in height between the first two rails and the third rail in the log rack (scales 1m).

Plate 51 – The three racks that comprise the squared-log rack, viewed from the northwest.

Plate 52 – Detail of the fastening in the squared-log rack. Note the flat top to the rail.

Plate 53 – Detail of the end of one of the rails in the squared-log rail, showing that it was hand-sawn. Note also the flat top.

Plate 54 – The three rails of the plank-rack viewed from the southwest.

Plate 58 – Pine tops, and off-cuts dump.

Plate 59 – Petrol drum indicating a petrol driven power source for the saws.

Plate 60 – Much more recent drum that indicates that the mill operated for some time.

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