Executive Summary

Introduction

This *Environmental Assessment* has been prepared by R.W. Corkery & Co. Pty. Limited to accompany an application for project approval by Werris Creek Coal Pty Limited ("the Proponent") to extend the life of the Werris Creek Coal Mine. This would be achieved by extending mining operations to the north of the currently approved limit of mining to recover the remaining "life of mine" resource of the Werris Creek Coal Measures. The proposed mine extension (and associated modifications to mining operations) is hereafter referred to as the "Life of Mine (LOM) Project".

The Werris Creek Coal Mine is located within the North West Slopes and Plains of New South Wales 4km south of Werris Creek, 11km north-northwest of Quirindi and approximately 45km southwest of Tamworth (**Figure A**). The existing Werris Creek Coal Mine is currently approved under Development Consent DA 172-7-2004 and is operated within Mining Lease (ML) 1563. The land that is the subject of the LOM Project application for project approval ("the Project Site") is owned by the Proponent, incorporates ML 1563 and additional lands, and covers an area of approximately 910ha.

The LOM Project is classified as a Major Project in accordance with the *State Environmental Planning Policy (Major Development) 2005* and consequently, the Minister for Planning is the approval authority. As a Major Project, it will be assessed under Part 3A of the *Environmental Planning and Assessment Act 1979* and an *Environmental Assessment* is required to be submitted to support the application for project approval.

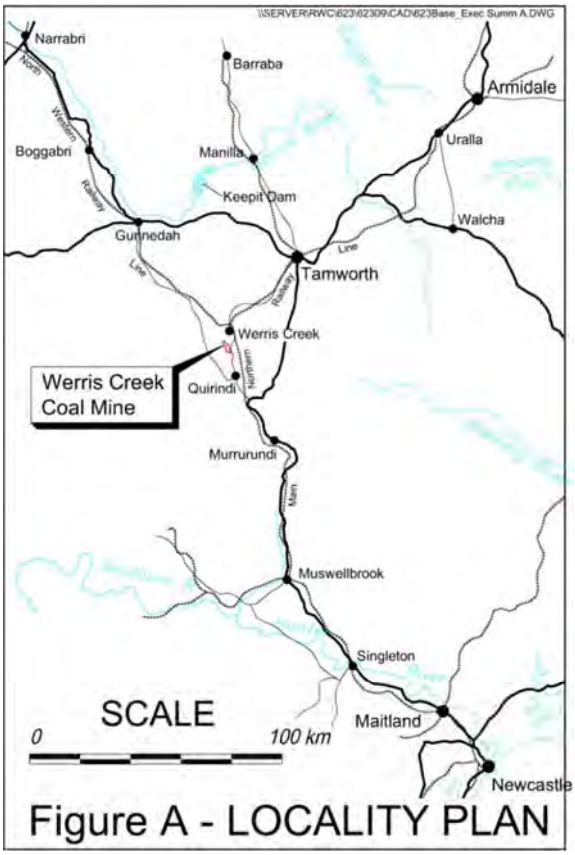


Figure A - LOCALITY PLAN

The *Environmental Assessment* provides information covering all proposed activities of the LOM Project. This summary presents an overview of the LOM Project, its design and operational safeguards and the predicted associated impacts on the surrounding environment.

The Proponent

The Proponent for the LOM Project, Werris Creek Coal Pty Limited, is the current owner and operator of the Werris Creek Coal Mine. The Proponent is a wholly-owned subsidiary of Whitehaven Coal Limited (WCL). WCL acquired a 100% interest in the Werris Creek Coal Mine in December 2007.

Planning Context

The LOM Project would be developed and operated in accordance with a number of State and regional planning instruments, namely:

- State Environmental Planning Policy (Major Development) 2005;
- State Environmental Planning Policy (Mining, Petroleum Production and Extractive Industries) 2007; and
- State Environmental Planning Policies 33 and 44.

The LOM Project is a permissible land use on the Project Site under the *Quirindi Local Environmental Plan 1991* and the *Parry Local Environmental Plan 1987*.

Existing Operations

The Werris Creek Coal Mine is currently operated under DA 172-7-2004 which was issued by the then Minister for Planning and Infrastructure on 18 February 2005 in accordance with Section 76(A) 7(b)(ii) of the *Environmental Planning and Assessment Act, 1979*. DA 172-7-2004 approved the mining and transportation of up to 2.0 million tonnes of coal per year, for a period of approximately 7 years from the granting of a mining lease.

Since the initial approval, there have been five modifications to DA 172-7-2004 as follows.

- DA Modification 1 – Approved an extension to the construction period for the mine access road.
- DA Modification 2 – Approved the removal of a site of Aboriginal heritage from within the mining area footprint.
- DA Modification 3 – Approved a variation to the mine's water management system, an increase in coal transportation by road (up to 50 000tpa) and an increase in the stockpile capacity and height at the Rail Load-out Facility.
- DA Modification 4 – Approved the establishment of a precursor storage facility (prill and emulsion) within ML 1563 and an alternate biodiversity offset strategy.
- DA Modification 5 – Approved an extension to the limit of mining, dewatering and storage of water from the former underground workings, as well as a further addition to the biodiversity offset area. The modified open cut layout was also planned to assist in development of the proposed LOM Project.

Mine Planning Considerations

As has been the case at the Werris Creek Coal Mine to date, the extent of open cut mining is ultimately determined by economic aspects such as coal price and mining costs at the time. Both coal price and mining costs determine the limit of the economic stripping ratio, i.e. the volume of overburden and interburden above and between the various coal seams which must be removed to access each tonne of coal. This, in turn, is determined by coal seam thickness and the depth of cover.

Economic Considerations

The following economic considerations were taken into account in the planning for the LOM Project.

- The stripping ratio (approximately 5.4:1) is in the lower range when compared to other open cut coal mines in New South Wales.
- The currently approved limit of mining restricts the recovery of coal to approximately 10.8Mt, which is only 36% of the measured coal resources. Therefore, there remains a significant amount of coal available for recovery at an acceptable stripping ratio.

- The coal seams are generally low in ash and do not require further beneficiation prior to sale. By avoiding the need to wash the coal, the production process is significantly simplified, improving the economic basis for the mining operations.
- The Werris Creek Coal Mine is located adjacent to an active rail siding on the Main Northern Railway Line with direct links from the mine to the Port of Newcastle. This minimises the cost of transporting the coal to export markets.

Geological Considerations

There are no geological impediments to the continued mining of the remaining coal resource to the north.

Environmental Considerations

The following subsections provide a summary of the main environmental issues considered in the design of the LOM Project.

Biodiversity

The proposed LOM Project would increase the area of the endangered ecological community (EEC) White Box Yellow Box Blakely's Red Gum Woodland and Derived Native Grassland community (in varying condition) to be disturbed (by approximately 194ha), as well as 0.35ha of Brigalow-Belah Woodland Community vegetation (also an EEC). To avoid and minimise impacts on native vegetation, site facilities have been preferentially located on land of lower condition class. A modification to the Werris Creek Coal Mine Biodiversity Offset Strategy (BOS) has also been proposed which includes a number of measures to offset the clearing of EECs within the Project Site.

Noise

As the open cut advances progressively closer to the town of Werris Creek, the noise level (without mitigation) received at receptors to the north of the Project Site would increase. To ensure that noise levels received at residences surrounding the Project Site are reduced to the minimum level practicable, the Proponent has incorporated a number of mitigation strategies, design features and operational restrictions into the design of the LOM Project.

Visual Amenity

As the open cut is progressively developed to the north, in particular as the hill on the "Old Colliery" property is removed, the mining operations would become increasingly visible to residents to the north. The Proponent has incorporated a number of strategies to reduce the impacts on visual amenity, including the construction of an Acoustic and Visual Amenity Bund to mitigate visual impacts of the LOM Project, particularly from the township of Werris Creek.

Blasting

As the open cut advances to the north, blasting operations would encroach within 500m of Werris Creek Road and the Main Northern Railway Line. A Deed of Agreement with ARTC relating to blasting has been established near the Main Northern Railway Line. The Proponent would also continue to implement a road closure management procedure when blasting within 500m of Werris Creek Road.

Groundwater

The open cut would intercept the partially inundated underground workings area of the former Werris Creek Colliery. The Proponent would maintain a safe working distance to the workings, both horizontally and vertically in accordance with I&I NSW guidelines, until such time as the underground workings have been completely dewatered.

Project Description

Figure B displays the principal components of the LOM Project.

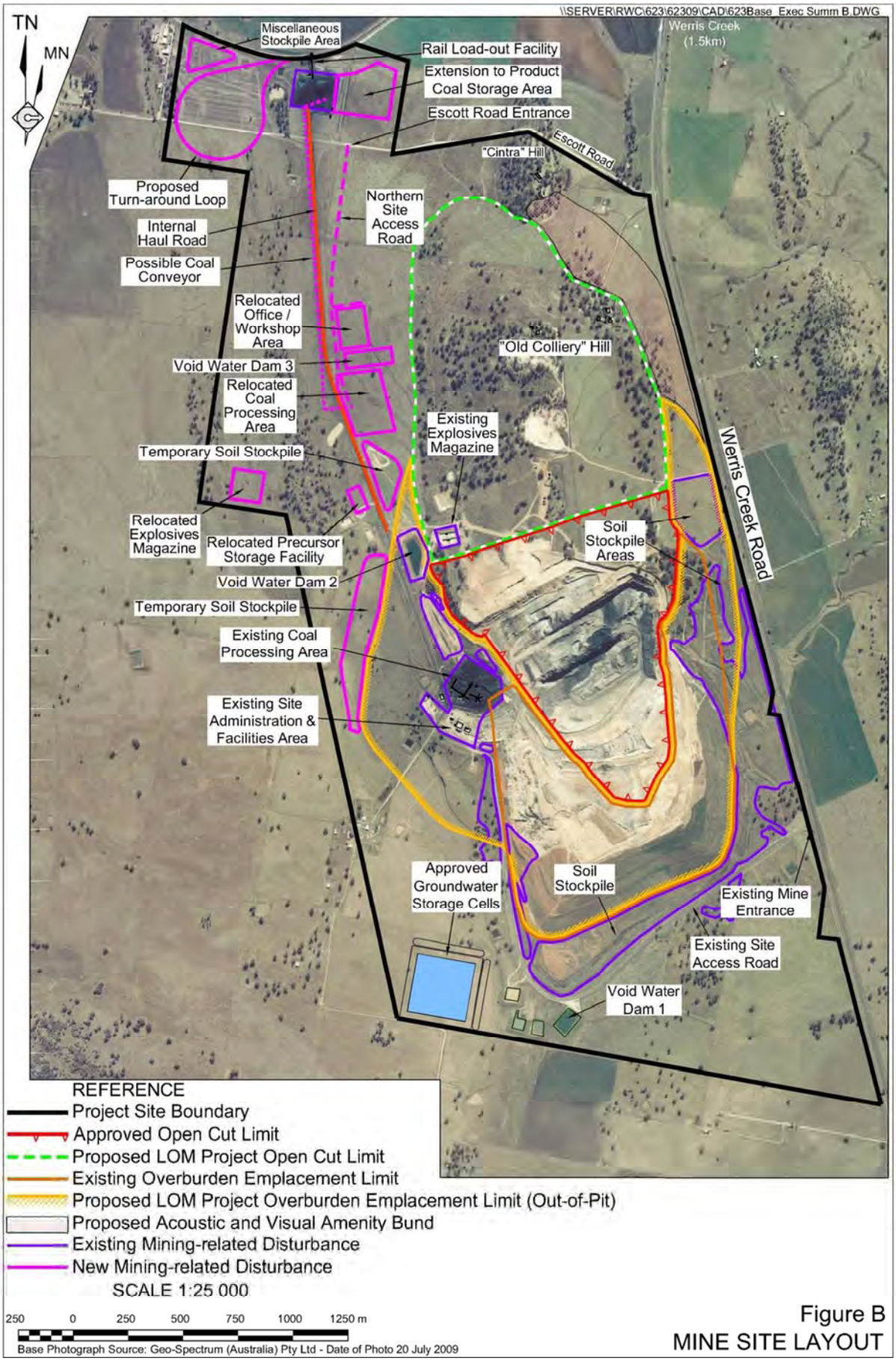


Figure B
MINE SITE LAYOUT

Construction Activities

The following construction, relocation and modification works would be undertaken.

- Installation of a second feed point to the Rail Load-out Facility.
- The extension of the Product Coal Storage Area to accommodate the storage of up to 250 000t of coal products.
- The closure of the current Site Access Road.
- Relocation of both the Site Administration and Facilities Area and Coal Processing Area.
- Minor modifications to the crushing and screening facilities including enlarging the stockpile area to provide for the storage of up to 200 000t of ROM coal.
- Relocation of the explosives magazine and a Precursor Storage Facility.
- Construction of a new entrance to the Project Site off Escott Road to the immediate east of the intersection of the Rail Load-out Road and Escott Road. A new mine access road from the Escott Road Entrance to the Coal Processing Area and Site Administration and Facilities Area would be constructed.
- To accommodate the increased volume of traffic using Escott Road, the intersection between Escott Road and Werris Creek Road would be upgraded.
- A 'turn-around' rail loop to the southwest of the existing Rail Load-out Facility would be constructed.

Land Preparation

The preparation of the land for open cut mining activities would be undertaken in the same manner as for the existing operations. Land preparation activities would include the clearing of vegetation, the installation of drainage infrastructure, and the stripping of soil.

Dewatering of the former Werris Creek Colliery underground workings would also occur ahead of open cut mining activities.

Overburden and Interburden Management

The majority of overburden and interburden materials would require blasting. Based on the proposed open cut design and the mining rate, it is projected that an average of 10 blasts would be initiated per month. Overburden and interburden would then be transported by haul truck to the overburden emplacement area. At its highest point, the overburden emplacement would reach an elevation of approximately 445m AHD.

Over the life of the LOM Project, an additional 143Mbcm of overburden and interburden material would be removed. The majority of this material would be placed within or over the footprint of the limit of mining. The remainder would be placed in an extension of the out-of-pit overburden emplacement to the east or west of the existing limit of mining, or within the proposed Acoustic and Visual Amenity Bund.

Coal Recovery and Processing

The LOM Project would produce up to 2.5Mtpa of thermal and Pulverised Coal Injection (PCI) coal for the domestic and international markets.

As the coal is exposed following the extraction of overburden and interburden, a series of horizontal benches would be developed through the exposed coal seams to provide near horizontal working areas for the mining equipment. Based on the synclinal nature of the coal seams, the construction of benches would be undertaken in two similar but distinct ways dependent on whether the coal of the more steeply dipping outer edges of the open cut, or almost flat inner sections is being mined.

The majority of Run-of-Mine (ROM) coal would be transported directly to the ROM pad within the Coal Processing Area where it would be reduced in size by crushing and screening to meet customer requirements. Processing of the ROM coal would occur at a rate of up to 500t/hr.

Transportation

Transport by Rail

Between 5 000t and 7 000t of coal would be transported daily to the Product Coal Storage Area via the Rail Load-out Road. Coal would continue to be loaded into train wagons via the Rail Load-out Facility on the Werris Creek Siding of the Main Northern Railway Line. The Proponent anticipates that, on average, 11 trains would be despatched each week. As is currently the case, the maximum number of trains entering and exiting the Rail Load-out Facility each day would be restricted to three, with timing the subject of ARTC rail scheduling.

Until the turn-around rail loop is constructed, the rail wagons would continue to be shunted from the Main Northern Railway onto the siding beyond the train loading bin and then loaded from the overhead bin as they return towards the Main Northern Rail Line.

Transport by Public Road

Up to 100 000 tonnes per annum of domestic product coal would be transported from the LOM Project via the public road network. 95% of all coal haulage would travel south on Werris Creek Road, west on Taylors Lane before joining the Kamilaroi Highway to the north of Quirindi.

Rehabilitation

The Proponent would continue to implement a progressive approach to the rehabilitation of disturbed areas to ensure that areas where mining or overburden placement are completed, are quickly shaped and vegetated to provide a stable landform. The LOM Project would require modification to the currently approved final landform. Class III land would be established on the footprint of the Rail Load-out Facility and Product Coal Storage Area. The remaining footprint of the LOM Project area would be rehabilitated to woodland ecological communities.

Mine Life and Hours of Operation

The LOM Project would extend the life of the Werris Creek Coal Mine by approximately 20 years. It would be a 24 hour, seven day week operation (with the exception of blasting, which would be restricted to between 9.00am and 5.00pm, Monday to Friday). Activities such as vegetation clearing, soil stripping and rehabilitation would generally only be undertaken during daylight hours.

Employment

For the initial 1 to 2 years of the LOM Project, it is anticipated that a construction workforce of between 5 and 20 full-time equivalent persons would be employed. It is anticipated that an additional 10 full-time personnel to the existing workforce of 80 would be required during the operational phase of the LOM Project.

Issue Identification and Prioritisation

In order to undertake a comprehensive *Environmental Assessment* of the LOM Project, appropriate emphasis needs to be placed on those issues likely to be of greatest significance to the local environment, neighbouring landowners and the wider community. These issues (and their potential impacts) were identified through a program of community and government consultation, preliminary environmental studies and literature review.

Issue identification was followed by an analysis of the risk posed by each potential impact in order to prioritise the assessment of the identified environmental issues within the *Environmental Assessment*.

Consultation

Consultation with the local community involved:

- individual discussions with the landowners / residents of properties surrounding the Project Site;
- consultation with the Aboriginal community;
- media releases and television and radio interviews;
- distribution of community newsletters; and
- a community open day.

The Proponent and its consultants also regularly consulted with various government agencies and authorities throughout the planning phase of the LOM Project.

Issue Prioritisation

Considering the environmental issues raised throughout the consultation process, a review of the LOM Project design and local environmental features was undertaken to identify risk sources and potential environmental impacts for each environmental issue. An analysis of risk for each potential environmental impact was then completed with a risk rating assigned to each impact based on likelihood and consequence of occurrence, ie. in the absence of any mitigation measures. Through a review of the allocated risk ratings and the frequency with which each issue was identified, the relative priority of each issue was determined, with this priority used to provide an order of assessment and depth of coverage within the *Environmental Assessment*.

Based on the issues identified and the risk ratings allocated to the potential environmental impacts of these, the following order of priority of environmental issues has been determined.

1. Groundwater
2. Surface Water
3. Noise and Vibration
4. Air Quality
5. Biodiversity
6. Cultural Heritage
7. Soils and Land Capability
8. Visual Amenity
9. Traffic and Transport
10. Socio-economic Setting

Environmental Setting

The Project Site is located within a valley created by two north-south trending ridgelines extending from Werris Creek in the north to Quipolly Creek in the south.

Elevations within this area range from approximately 340m AHD on the banks of Werris Creek to 670m AHD on Grenfell Hill, 3.5km west of the Project Site.

The town of Werris Creek lies to the north of the Project Site. A number of privately owned rural residences also lie to the north, east and south of the Project Site (**Figure C**).

Land use within the Project Site and immediate surrounds is best described as smaller scale mixed farming. This mixed farming involves a combination of cropping and cattle grazing. There are also several other current or previous land uses within or immediately surrounding the Project Site. These include:

- Liverpool Plains Shire and Tamworth Regional Council gravel extraction quarries;

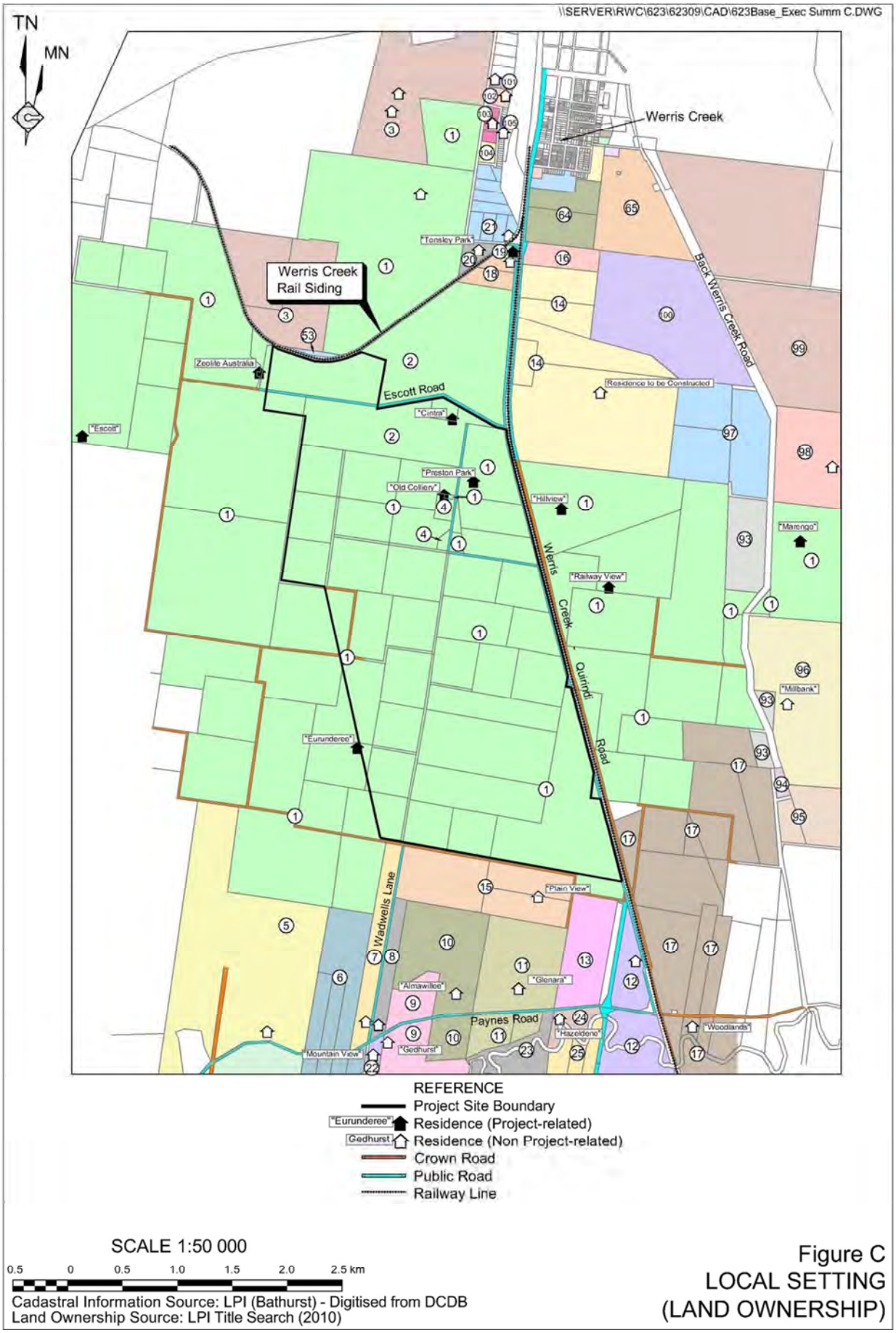


Figure C
LOCAL SETTING
(LAND OWNERSHIP)

- a zeolite processing plant, operated by Zeolite Australia Pty Ltd, and servicing a zeolite mine west of the Project Site; and
- coal mining at the former Werris Creek Colliery was undertaken on and adjacent to the Project Site. Remnants of this underground mining and surface activity are present on the "Preston Park" property.

Werris Creek Road is aligned adjacent to the eastern Project Site boundary, with the Main Northern Rail Line located immediately east of Werris Creek Road. The Werris Creek Rail Siding, which diverts from the Main Northern Rail Line in Werris Creek is to the north of the Project Site.

Environmental Safeguards and Impacts

The components and features of the existing environment on and around the Project Site have been studied in detail and the LOM Project designed to avoid or minimise impacts on that environment. A brief overview of the main components of the surrounding environment, the proposed safeguards and the assessed level of impact are set out as follows.

Groundwater

The main groundwater source within the Project Site is the water stored in the former Werris Creek Colliery underground workings which underlies the LOM Project footprint. It has been estimated that approximately 200ML of water is currently stored within these workings.

The Permian Coal Measures which have a low permeability is the main aquifer associated with the Project Site. This aquifer is underlain by the Werrie Basalt, which has weathered clays in its upper profile which act as an aquitard between the Werrie Basalt and the Permian Coal Measures. Quaternary alluvium associated with Quipolly Creek is situated approximately 2.5km from the Project Site.

Existing groundwater quality is generally suitable for irrigation or stock use, with the exception of water within the underground workings, which is only suitable for stock use.

The potential hydrogeological impacts associated with the LOM Project are identified as follows.

- Groundwater inflow into the open cut could impact on the availability of groundwater to other users, as well as the quality of surrounding aquifers and surface waters.
- Dewatering the former Werris Creek Colliery underground workings could possibly impact on groundwater systems and the availability of groundwater to other users.
- The removal of base flow to the Quaternary alluvium could impact on local stream systems.
- Contamination of groundwater due to hydrocarbon or chemical spills associated with the Project.
- Impacts on groundwater dependent ecosystems (GDEs).

A detailed groundwater assessment was completed and determined the following.

- As evaporation would generally be greater than infiltration, the LOM Project would operate as a dry mine.
- Modelling predicted that up to a 1.0m drawdown in the water table would occur within the Project Site and that drawdown in the basalt outside the Project Site would be less than 0.1m.
- It was predicted a full recovery of the water table would be achieved within approximately 10 years following the cessation of open cut mining.
- There would be no impact to either the Werris Creek or Quipolly Creek alluvial systems.

- Oxidation of pyritic compounds within the coal seams may occur which could result in a decrease of groundwater pH and the subsequent release of metals. However, there would be limited to no impact on the basalt layer due to the highly impermeable layer between the basalt layer and the coal seams.
- Groundwater drawdown would not be widespread and would be limited to impacts that are considered to be within the range of seasonal variation. It is assessed as unlikely that there would not be any associated impacts to GDEs.

Groundwater monitoring would continue to be conducted for the LOM Project and contingency plans to mitigate any substantial changes to groundwater quality or availability implemented if required.

Surface Water

The Project Site is located in the Namoi River Catchment and within the smaller catchments of Werris and Quipolly Creeks, contributing 1.5% and 3% respectively towards these catchments. The Project Site has three licensed discharge points through which excess water can be discharged from the Project Site under conditions within Environment Protection Licence (EPL) 12290.

Water sources comprise the brackish void water collected within the open cut (groundwater plus rainfall) and the clean and dirty water from surface runoff from the Project Site. While the majority of clean water would be diverted off the Project Site using diversion banks, the void water and the dirty water would be stored to fulfill operational requirements.

The results of the water balance indicate that during wet years the LOM Project would generate excess void water additional to operational water requirements. This excess void water would be retained within the void water storage system. Total suspended solid concentrations in dirty water stored in sediment basins and storage dams on the Project Site may require appropriate treatment, e.g. chemical flocculation, to meet EPL 12290 conditions prior to discharge via the licensed discharge points. To ensure that wet weather discharges do not pollute the receiving waters, end-of-line sediment basins associated with the licensed discharge points would be maintained in a dry condition, wherever possible.

Assuming the implementation of the proposed surface water management and the mitigation measures proposed for the LOM Project, it is assessed that the overall impact of the LOM Project would be minimal on water quality and water quantity within the Werris and Quipolly Creek catchments (and thus the Namoi River Catchment).

Noise

The sources of noise around the Project Site are typical of a rural environment with contributions from farming activities, insect noise, livestock, wind through vegetation and vehicles on local roads. The existing Werris Creek Coal Mine also contributes to the local noise environment. The calculated existing Rating Background Noise Level (RBL) for the median L_{90} noise level surrounding the Project Site was determined to be between 21 and 32 dB(A).

Initial noise assessment criteria have been established as:

- an $L_{Aeq(15min)}$ of 5dB(A) above the assumed 30dB(A) background level for mine operations;
- an L_{Amax} of 15dB(A) above the assumed background level for night-time sleep disturbance;
- an $L_{Aeq(1hr)}$ of 55dB(A) and 50dB(A) for daytime and evening road traffic noise respectively; and
- a maximum $L_{Aeq(24hr)}$ of 60dB(A) and L_{Amax} of 85dB(A) for rail traffic.

The Proponent has proposed the following controls and management measures to minimise the noise emissions associated with the LOM Project.

- The number of drills operating at one time would be restricted to two.
- All mobile equipment operating at the surface to the north of the advancing open cut would be stood down under noise enhancing conditions during the evening and night time.
- Whilst the Coal Processing Area remains in its current location, the number of trucks and excavators operating during inversion conditions would be limited to 10 and 3 respectively.
- Manufacturer specified attenuator kits would be retro-fitted to each truck providing a 8dB reduction in the dynamic sound power level (SWL).
- A 1 600rpm reverse gear limit on bulldozers operating on exposed areas of the Project Site would be enforced.
- A 5m high barrier around the northeastern perimeter of the relocated coal processing infrastructure would be constructed.
- The construction of the Acoustic and Visual Amenity Bund would be completed prior to the open cut advancing beyond the crest of the "Old Colliery" Hill.
- The Proponent would ensure that all equipment exhibits sound power levels consistent with those presented in the noise assessment.
- During the evening and night-time periods, and periods of noise enhancing winds, overburden emplacement activities would be preferentially undertaken 'in-pit'.
- A Noise Management Plan would be developed and implemented prior to the commencement of the LOM Project.

As part of an investigation of all reasonable and feasible mitigation measures, the Proponent also considered the use of Extra Quiet (XQ) specification trucks, however, a review of the nominated noise reduction indicated that the attenuation proposed for the existing truck fleet would achieve a comparable or better reduction in noise. Further reductions in the mobile equipment workforce was also considered, however, given the proposed mitigation to the mobile and fixed plant already noted, the contribution to total mine noise from all noise sources across the Project Site becomes relatively uniform. As a consequence, it would require a reduction of the mining fleet by 1/3 to achieve a significant noise reduction at the most affected residences. A reduction of this amount is not feasible as it would compromise the viability of the LOM Project.

Based on the noise modelling conducted, the LOM Project would generate noise levels above those currently experienced at receivers surrounding the Project Site. These noise levels, assuming the implementation of the Proponent's operational commitments, would comply within the nominated criteria for all construction and operational activities under non-noise enhancing conditions. However, it is predicted that exceedances of noise criteria of up to 5dB(A) would occur under infrequent noise enhancing conditions at a number of residences surrounding the Project Site. At one residence ("Plain View"), noise exceedances may be greater than 5dB(A) while the Coal Processing Area remains in its current location (until approximately Year 3) operations. The Proponent is currently negotiating an agreement with the owner of the "Plain View" property and anticipates having an agreement in place prior to the commencement of the LOM Project.

Noting the majority of exceedances were predicted under severe (12º/100m) inversion conditions, a sensitivity analysis of the noise model to differing inversion conditions was completed. This identified that when a more moderate inversion condition (6º/100m) was simulated, the noise levels received at the surrounding residences reduced significantly, with exceedances of noise criteria predicted at only two locations. When a lower strength (INP default) inversion of 3º/100m was used, no exceedances of criteria were predicted. This illustrates that the occurrence of elevated noise levels is likely to be restricted to periods when the most severe inversion prevail.

The noise predictions modelled for the LOM Project represent noise levels significantly reduced from those originally predicted. This has been achieved through the implementation of all reasonable and feasible noise attenuation measures. It is considered that the modelled noise levels represent the lowest noise level that could practically be achieved by the Proponent under the conditions modelled.

The Proponent proposes to implement real-time noise and meteorological monitoring to provide mine management with an accurate real-time record of the noise levels being received at selected residences, or potential noise enhancing conditions which could lead to elevated noise levels at these residences. This would ensure that restrictions or modifications to operations could be made if practicable, and in a timely manner, in the event that exceedances are identified or noise levels are approaching relevant noise criteria. The Proponent would also continue its monthly attended noise monitoring program and add at least four extra residences to this program.

Given the noise management and mitigation measures proposed, it is considered that Project Specific Noise Criteria could be established at each receiver within the noise management zone for noise enhancing conditions of between 35 and 40dB(A).

Noise modelling also predicted the following.

- With the exception of a 1dB(A) exceedance at the "Plain View" residence, all maximum noise levels associated with the LOM Project would be below the sleep disturbance criteria.
- Noise emissions from road transport associated with the LOM Project would be below the road traffic noise criteria.
- Noise emissions from rail noise associated with the LOM Project would be below the design goals during all periods for both rural and suburban receivers.

Blasting

To ensure the impacts from blasting associated with the LOM Project are minimised, blast design would continue to include the following features.

- Ensuring that burden distances and stemming lengths are sufficient to minimise overpressure and ground vibration impacts.
- Blast design and implementation would adhere to Australian Standard practices and comply with relevant blasting criteria.
- Continuous refinement of blast design by updating site laws on a regular basis based on previous blasting results.
- A blast exclusion zone of 500m would continue to be implemented during blasting for safety reasons.

Monitoring of the impacts associated with blasting would also continue to be implemented in accordance with the Blast Monitoring Program.

As the LOM Project would involve blasting activities within 500m of Werris Creek Road and the Main Northern Rail Line, safeguards would be implemented including the erection and maintenance of blast notification boards, road closures, communications with ARTC personnel and inspections for fly rock.

Based on the blasting assessment, the following was concluded.

- Ground vibration criterion would not be exceeded at any receiver for the range of likely blast sizes.
- Overpressure levels may exceed the 5% exceedance level of 115 dB at a single (yet to be constructed) residence for blasts greater than 520 kg MIC at the nearest distance of 1 315m. Overpressure criteria would likely be met (for 1 200kg MIC blasts) when blasting is at least 1 690m from this residence.
- The current blast exclusion zone and road closure management would be more than adequate to manage the potential impacts of fly rock.
- The adoption of the proposed blasting safeguards would ensure dust generated as a result of blasting is minimised.
- There would be no effect on livestock eating patterns, feed intake or behavioural activity as a result of blasting operations.

Air Quality

The air quality assessment for the LOM Project incorporated an assessment of the air quality impacts associated with the LOM Project, as well as from associated rail operations.

The impacts on air quality associated with the LOM Project were assessed against relevant criteria for depositional dust, Total Suspended Particulates (TSP) (annual average), PM_{10} (annual average and 24-hour average) and $PM_{2.5}$ (annual average and 24-hour maximum) at residences surrounding the LOM Project. Emissions from rail transportation activities associated with the LOM Project were also assessed at residences in the towns of Werris Creek and Quirindi.

Quantification of the identified particulate (TSP, PM_{10} and $PM_{2.5}$) generating activities associated with the LOM Project (including rail transportation activities) and the subsequent dispersion modelling of these emissions has indicated that cumulative annual average TSP, $PM_{10,}$ $PM_{2.5}$ and dust deposition levels and 24-hour average PM_{10} concentrations would generally comply with the relevant ambient air quality criteria at the nearest residences. However, results indicate the potential for occasional exceedance of the DECCW 24-hour PM_{10} criteria at the nearest non-Project related receptor to the northeast of the Project Site. Given the modelled scenario presents a conservative prediction of emissions likely to be generated by the LOM Project, the predicted emissions are likely to be higher than those that would actually occur and this predicted exceedance is therefore less likely to occur. Furthermore, the incremental contribution of the LOM Project remains below the nominated criteria.

Predictions of air quality impacts associated with the rail transport of coal determined the following.

- The maximum incremental contribution of 24-hour PM_{10} within Werris Creek represents approximately 6% of the DECCW criteria.
- The incremental contribution of 24-hour PM_{10} within Quirindi peaks at approximately 34µg/m^3 at the rail centreline and decrease to 15µg/m^3 at 130m from the rail centre line. At a 10m distance from the rail centreline, incremental concentrations are in the order of 30µg/m^3. The addition of the maximum 24-hour average background concentration from Tamworth (31.9µg/m^3) results in some PM_{10} (maximum 24-hour average) concentrations exceeding the NSW DECCW criterion of 50µg/m^3 at distances up to 100m from the rail centre line.

Notably, the prediction for 24-hour PM_{10} concentration within Quirindi represents a highly conservative assessment as the maximum incremental 24-hour average PM_{10} concentrations being assessed with the maximum 24-hour average background concentration from Tamworth being added.

Monitoring of emissions to air would be continued using the Proponent's existing air quality monitoring network. The assessment also recommends that $PM_{2.5}$ concentrations be monitored for a period of one year to quantify the modelling results.

Greenhouse Gas

A greenhouse gas assessment was conducted to determine the predicted impacts on greenhouse gas emissions associated with the LOM Project.

Based on the results of the assessment, it was determined that the total greenhouse gas emissions for the LOM Project (Scope 1, 2 and 3 emissions) would represent 0.1% of total NSW greenhouse gas emissions for 2007, and 0.03% of Australian national emissions for 2007. As such it is unlikely that greenhouse gas emissions associated with the LOM Project activities would have any significant impact on the air quality, or make a significant contribution to Australian greenhouse gas emissions.

Biodiversity

A desktop assessment and field survey was conducted to assess the potential impacts from the LOM Project on native flora and fauna.

Flora

Based on a desktop survey of previous assessments and the field survey, the following communities were identified within the LOM Project Site.

- **White Box Grassy Woodland**. This vegetation community is considered to meet the classification as an endangered ecological community (EEC) under the NSW *Threatened Species Conservation Act 1995* and as a Critically Endangered Ecological Community (CEEC) under the Commonwealth Environment Protection and *Biodiversity Conservation Act 1999*.
- **Bluegrass – Spear Grass – Redleg Grass Derived Grasslands**. This was included as part of the White Box Grassy Woodland threatened ecological community and given two condition classes, 3a (high diversity) and 3b (low diversity).
- **Brigalow – Belah Woodland**. This community is listed as 'Endangered' under both Acts noted above.
- **Cropped and Cultivated Paddocks**. These areas have been modified from the natural state to the extent that native species are now uncommon and most of the cultivated areas were either cleared at the time of survey or dominated by planted introduced species.

The LOM Project would result in the disturbance to approximately 194ha of the White Box Grassy Woodland and Derived Native Grassland EEC and 0.35ha of the Brigalow-Belah Woodland EEC.

Field investigations of the Project Site and surrounds also found that:

- groundwater dependent ecosystems (GDEs) are present within Quipolly and Werris Creeks and could be adversely affected if a reduction in the base flow from the alluvium to the creeks occur;
- five species listed as Noxious Weeds were recorded within the Project Site; and
- the Project Site represents "potential Koala habitat".

Fauna

Based on database searches and field survey, it was determined that eight threatened fauna species are 'known' to occur on the Project Site, while a further nine threatened species and three migratory species have the 'potential' to occur on the Project Site.

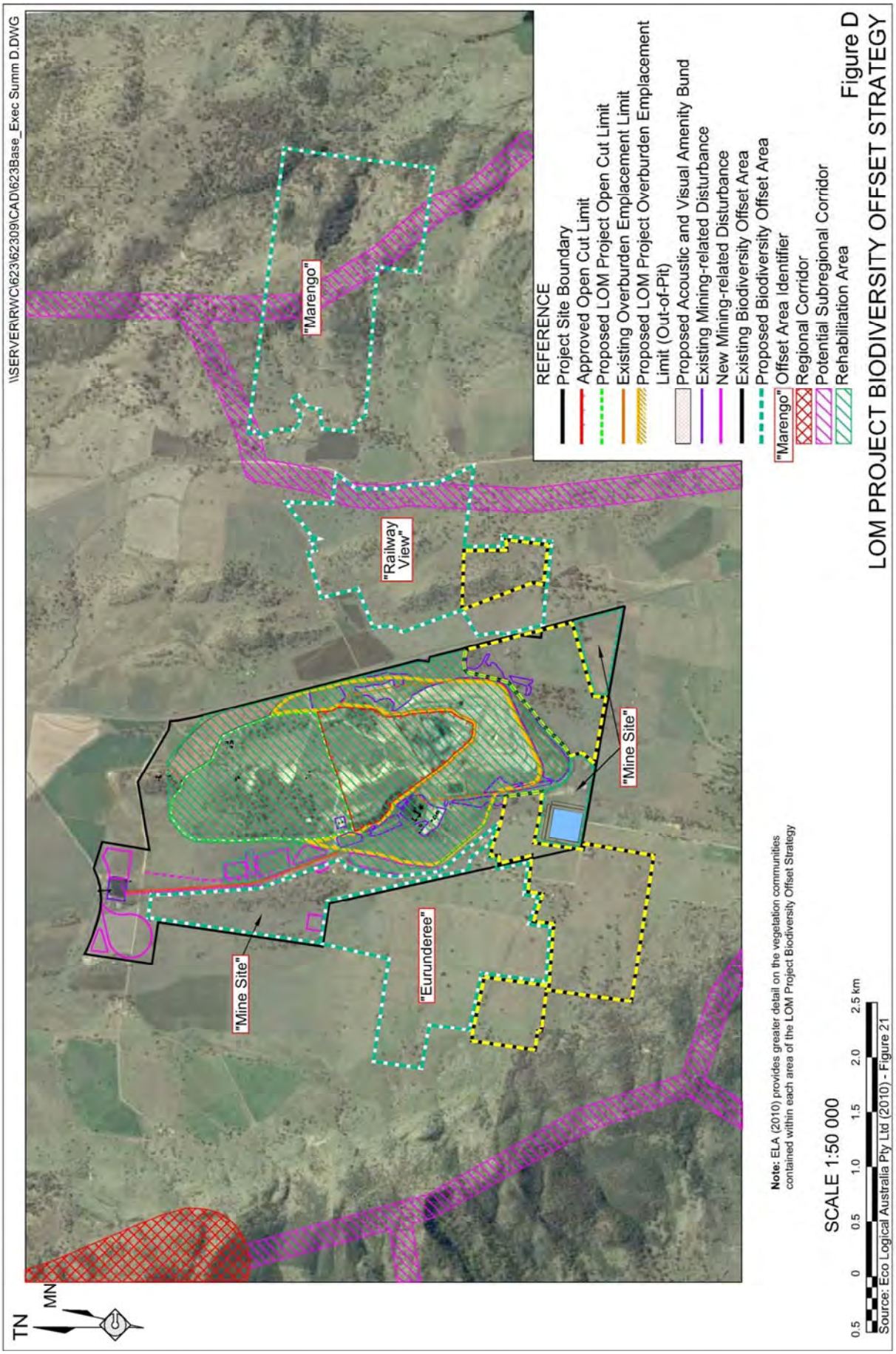
A Biodiversity Offset Strategy (BOS) has been proposed for the LOM Project to ensure there is no net loss of biodiversity values in the long term as a consequence of the residual impact of the LOM Project. The LOM Project BOS would incorporate native vegetation communities including Grassy White Box Woodland and Derived Native Grassland from the Project Site and three surrounding properties (see **Figure D**). The LOM Project BOS provides an offset ratio of approximately 3:1 for direct 'like for like' vegetation (of the EEC), and approximately 4:1 when all conserved vegetation is considered.

In addition to the LOM Project BOS, the following management and mitigation measures have been proposed to reduce the residual impact on biodiversity.

- The additional area of land required for the creation of out-of-pit overburden emplacements would be limited.
- Ancillary infrastructure would be located preferentially in areas of lower condition class vegetation.
- Vegetation clearing would generally be undertaken during a single campaign each year during seasons that minimise the risk of impacting on hibernating microbats or breeding woodland birds.
- A Pre-start Clearing Inspection of a proposed disturbance area would be completed to identify the presence of fauna, and biological resources present including habitat resources and the availability of endemic seed.
- Habitat augmentation through the placement of previously cleared timber would be conducted on rehabilitated areas.
- The final landform would be progressively rehabilitated through the sowing and planting of native woodland and grassland vegetation (except for 37ha rehabilitated to Class III agricultural land) which would be fenced.
- Weed management, particularly focused on noxious weeds, would be undertaken.
- A seed collection strategy and program would be implemented.
- Detailed monitoring and inspection programs of rehabilitated areas that review progress against set criteria based on vegetation community benchmark data would be completed.

Based on the biodiversity assessment conducted for the LOM Project, the following was concluded.

- The direct impact of vegetation clearing associated with the LOM Project is acceptable as the area of impact has been minimised and mitigation measures have been proposed to further reduce the overall impact.
- The removal of 194ha of Grassy White Box Woodland and Derived Native Grasslands would be adequately offset through the establishment of the proposed LOM Project BOS.
- The displacement of an old growth remnant of the EEC Brigalow within the Brigalow Belt South, Nandewar and Darling Riverine Plains Bioregions would constitute a significant impact. The targeted rehabilitation of a 3.7ha area of the final landform using Brigalow species would significantly reduce the impact which when considered in conjunction with other mitigation measures was assessed as a positive outcome.
- The proposed rehabilitation and LOM Project BOS would provide for an improvement in biodiversity values.


\\SERVER\RWC\623\623091\CAD\623Base_Exec Summ D.DWG
"Marengo"
"Railway View"
"Mine Site"
"Mine Site"
"Eurunderee"
REFERENCE
Project Site Boundary
Approved Open Cut Limit
Proposed LOM Project Open Cut Limit
Existing Overburden Emplacement Limit
Proposed LOM Project Overburden Emplacement Limit (Out-of-Pit)
Proposed Acoustic and Visual Amenity Bund
Existing Mining-related Disturbance
New Mining-related Disturbance
Existing Biodiversity Offset Area
Proposed Biodiversity Offset Area
"Marengo" Offset Area Identifier
Regional Corridor
Potential Subregional Corridor
Rehabilitation Area
Note: ELA (2010) provides greater detail on the vegetation communities contained within each area of the LOM Project Biodiversity Offset Strategy
SCALE 1:50 000
0.5 0 0.5 1.0 1.5 2.0 2.5 km
Source: Eco Logical Australia Pty Ltd (2010) - Figure 21
TN MN
Figure D
LOM PROJECT BIODIVERSITY OFFSET STRATEGY

- The LOM Project would not result in a reduction to the long-term viability of any of the affected species or ecological communities.
- The LOM Project would not accelerate the extinction of any of the affected species or communities.
- The LOM Project would not adversely affect critical habitat.
- There would be no impact on any GDEs located within the riparian zones of Quipolly or Werris Creeks.
- Any temporary edge effects would be offset by the implementation of the LOM Project BOS.
- Potential indirect impacts associated with noise from the Project is considered unlikely to have a significant impact on local biodiversity.

Aboriginal Heritage

The Aboriginal cultural heritage survey and assessment considered those areas of the Project Site that would be impacted by the LOM Project and had not been surveyed previously. The assessment included background research and literature review, consultation and community involvement, the development of a predictive model for site location, a field survey, the development of management strategies for Aboriginal Cultural Heritage and an assessment of impacts.

Following consultation with local Aboriginal stakeholders and a field survey of the Project Site, no Aboriginal artefacts were identified. It is assessed therefore, that the LOM Project would have no direct impact on Aboriginal cultural heritage values.

Non-Aboriginal Heritage

A non-Aboriginal heritage assessment was also undertaken for the LOM Project with a field survey completed in conjunction with the Aboriginal heritage field survey. Based on previous historical archaeological investigations of the Werris Creek area the remnant coal mining infrastructure of the former Werris Creek Colliery located within the Project Site has been identified as being of some local historic significance.

The field survey determined that the following remnant features of the Werris Creek Colliery still exist within the Project Site.

- The underground workings.
- The above-ground ruins.
- The deputy mine manager's residence.
- A coal loading ramp.

The assessment concluded that the remnant features of the former Werris Creek Colliery are not of high historical significance, even at a local level. The impact associated with the removal of the remnant features of the former Werris Creek Colliery is considered to be minor, as the historic sites do not meet the NSW Heritage Office (2001) criteria for high significance sites (even at a local level).

No specific strategies are required to manage the removal of these remaining features, however, the Proponent has committed to preserve a photographic record (and other specific features as requested) of the former Werris Creek Colliery to ensure the history of the site is recorded for posterity.

Soils, Land Capability and Agricultural Suitability

Soils

Three soils units were identified within areas of the Project Site that are currently undisturbed by open cut mining activities. These are:

- Brown Chromosol (73ha).
- Stoney Brown Chromosol (144ha).
- Dark Brown Vertosol (205ha).

The soil management procedures that are already implemented for the existing Werris Creek Coal Mine operation would continue to be adopted for the stripping, stockpiling and spreading of soil for the LOM Project.

It was determined that based on the existing soil stockpiled and the soil to be stripped from the new areas of disturbance there would be approximately 855 000m^3 of subsoil and 682 000m^3 of topsoil available for rehabilitation purposes for the LOM Project. This would provide for a surplus of both topsoil and subsoil available for rehabilitation purposes.

Assuming the implementation of the proposed soil stripping, windrowing, handling and storage procedures, described in the assessment are adhered to, there would be minimal impact on soil resources associated with the LOM Project.

Land Capability

The majority of the pre-mining (prior to the commencement of mining in 2005) land capability within the Project Site was Class III land. Class V land occurs mainly on the steeper slopes overlying the coal measures. Some Class VI land also occurs on the ridge tops. It is noted that as open cut mining is already conducted at the Werris Creek Coal Mine and therefore some land within the Project Site is classified as Class M.

Based on the soil available for rehabilitation and the proposed final landform, the post-mining land capability would include Class III to Class VII land. The rehabilitation plan for the Project Site requires a limited area (37ha) of Class III land, with the rest of the Project Site being established with woodland vegetation. Areas established with the woodland vegetation would have a range of land capability classes from Class III to Class VII.

The rehabilitation of the majority of the Project Site back to native woodland has been determined to be a more sustainable outcome for the land and there would be no impact on agricultural enterprises in the immediate area.

Agricultural Suitability

The post mining agricultural suitability is predicted to have capabilities between Class 2 and Class 5. It is noted that the rehabilitation plan for the Project Site requires a limited area (37ha) of Class 2 land, with the rest of the Project Site being established with native woodland vegetation for ecosystem establishment which does not require a specific agricultural suitability class.

Given the proposed post-mining land capability and agricultural suitability classes, it was determined that there would be no impact on agricultural enterprises in the immediate area of the Project Site and there are adequate soil resources to meet post mining land capability and agricultural suitability objectives. Assuming the implementation of proposed soil management measures, the land would be capable of maintaining current levels of agricultural production (even though the majority of the Project Site would be rehabilitated to native woodland).

Visibility

As the LOM Project would progress in a northerly direction towards the town of Werris Creek and the potential visual impacts of the LOM Project have been assessed.

The following mitigation measures would be implemented to reduce the visual impact of the LOM Project at surrounding residences.

- Once mining operations reach the base of “Old Colliery” Hill, construction of the Acoustic and Visual Amenity Bund would commence at the northern extent of mining operations.

- A screen of native trees and shrubs would be planted around the perimeter of the overburden emplacement and Acoustic and Visual Amenity Bund, prior to it being constructed.
- Trees would be planted around the perimeter of the extended Product Coal Storage Area.
- Coal processing, maintenance and office infrastructure would be located in such a way that the local topography provides a visual barrier to the town of Werris Creek and the residences located to the south of the town.
- The overburden emplacement would be progressively revegetated to provide a visual barrier to the east of the Project Site including the Werris Creek Road.
- Areas of disturbance would continue to be progressively rehabilitated once they are no longer required for mining purposes.
- Floodlights would continue to be positioned and directed to minimise emissions. Where the use of floodlights is required, they would be directed downwards and towards the west.

Based on the implementation of the noted visual controls, the following was concluded with respect to impacts on visual amenity.

- Residents to the north and northeast of the Project Site (including those in the town of Werris Creek), looking south would not have a view of the open cut mining operations.
- The outlook for residents from the south looking north would not change.
- The native tree screen to be planted on the perimeter of the extended Product Coal Storage Area would assist to screen the stockpiling and associated activities.
- The toe of Visual and Acoustic Amenity Bund would be at least 25m from the property boundary and at least 50m from the shoulder of Werris Creek Road. This would form a continuation of the existing overburden emplacement area and provide a visual barrier to the open cut operations from Werris Creek Road.

While the proposed LOM Project would be noticeable from some new vantage points surrounding the Project Site, it is considered that with appropriately placed visual controls, the impact could be managed such that the impact is adequately minimised and mitigated.

Transportation Aspects

The roads that would be affected by traffic generated by the LOM Project are as follows.

- Escott Road (Shire Road [SR] No. 143).
- Werris Creek Road (Main Road [MR] No. 130).
- Taylors Lane (Shire Road [SR] No. 53).
- Kamilaroi Highway (State Highway [SH] No.29).

Escott Road and the Escott Road – Werris Creek Road intersection would be upgraded. These upgrades would include the following.

- Widening of the road pavement to a 10m formation.
- Providing an 8m seal over the 10m formation and improving the alignment of the road.
- Constructing the Escott Road Entrance as a basic right hand (BAR) / basic left hand (BAL) type intersection.
- Constructing the Escott Road – Werris Creek Road intersection to provide for:
  - a deceleration lane in the form of a channelised right turn lane (CHR) for vehicles approaching from Werris Creek to accommodate light vehicles and the small number of returning unladen haulage vehicles;

- an auxiliary left turn lane (AUL) on the northbound lane of Werris Creek Road; and
- an acceleration lane southbound on Werris Creek Road to accommodate the acceleration of laden trucks to appropriate merge speed.

Werris Creek Road is considered suitable for the proposed increase in haulage from the Werris Creek Coal Mine in its current form.

The Taylors Lane and Werris Creek Road intersection is currently below standard for B-Double configurations. The Proponent has committed to providing a contribution to the upgrade of this intersection based on proportional use.

Although Taylors Lane is in generally good condition, the increased haulage associated with the LOM Project would accelerate the rate of pavement failure. The Proponent would continue to provide ongoing funding for maintenance to Taylors Lane on a per tonne basis (in the form of section 94 contributions).

The existing Taylors Lane – Kamilaroi Highway intersection would accommodate the proposed increase in heavy vehicle movements attributable to the LOM Project. Any further upgrade would be the responsibility of the road authority, in this case Liverpool Plains Shire Council.

The intersection of Lennox and Loder Streets with the Kamilaroi Highway in Quirindi is considered adequate to accommodate the existing traffic. No further road upgrades are therefore proposed for this intersection.

There are a maximum of 26 rail paths possible per day on the main line to the south of Werris Creek. The LOM Project would not result in any significant increase in this number.

Given that the LOM Project would not significantly increase the number of rail paths, or the duration of level crossing delays, it is considered that the impact associated with road closures (which is a feature of the road network now) is acceptable. The minor increase in rail traffic associated with the LOM project is far preferable to an increase in road traffic that would be associated with the same volume of coal.

It is concluded that the proposed increases in traffic associated with the LOM Project would be appropriately mitigated by the proposed road works, contributions plan and operational safeguards.

Waste Management

The following waste mitigation and management measures would be implemented for the LOM Project.

- A register of the types and quantities of wastes produced on the Project would be maintained.
- Storage areas would be designed and maintained to contain spillages.
- Recyclable and non-recyclable waste would be segregated and retained in designated storage areas prior to removal from the Project Site.
- The Project Site would be kept in a clean and tidy condition.
- Waste would be regularly removed from the Project Site by licensed contractors.
- Waste management and minimisation would be reported in the AEMR.
- Samples of the overburden / interburden would be sampled and analysed periodically for salinity and acid generating potential.
- Water pumped from the underground workings would be stored in one of the groundwater storage cells and be preferentially used for operational purposes.

- Within the workshop building, waste oils and grease would be collected and pumped to bulk storage tanks.
- Waste water from the Project Site ablutions facilities would be irrigated to a waste water utilisation area licensed by EPL 12290. Solid waste would be periodically collected by a waste collection and disposal contractor.

With the proposed safeguards and controls, it is considered that the impacts of waste generation associated with the Project Site would be acceptable and that the LOM Project would not significantly contribute to increasing the local waste stream.

Hazards

Bushfire hazards

The LOM Project operations would increase the number and type of ignition sources in the local area. However, the proposed controls and safeguards, in conjunction with general clearing activities associated with the LOM Project would ensure that a lowered bushfire hazard was maintained within the Project Site.

Traffic Incident

Mine traffic would cross Escott Road, which could potentially result in an accident involving a road registered mine vehicle and a vehicle driven by a member of the public. The turn-around rail loop would traverse Escott Road and as such there is the potential for an accident involving a train and vehicle driven by a member of the public.

Given the low risk associated with this particular hazard and the proposed hazard reduction measures and strategies, it is unlikely that a traffic incident involving a mine vehicle and vehicle of the public would occur.

Spontaneous Combustion

The coal from the Werris Creek Coal Mine is in the medium to high spontaneous combustion potential range.

Existing hazard reduction strategies would continue to be implemented to mitigate spontaneous combustion hazards for the LOM Project.

The proposed hazard reduction measures and strategies have proven in the past to adequately manage the incidents resultant from this hazard. The potential impact associated with spontaneous combustion is therefore low.

Storage and Use of Potentially Hazardous Materials

The risk screening and PHA for hazardous materials determined that none of the dangerous goods to be used on the Project Site are deemed hazardous.

Land Contamination

The only potential sources of land contamination on the Project Site would be diesel fuel and other hydrocarbon products. Existing hazard reduction strategies would continue to be implemented to mitigate land contamination hazards for the LOM Project.

The proposed hazard reduction measures and strategies would ensure that the risk of land contamination is very low. The potential impact associated with land contamination is therefore low.

Socio-Economic Setting

The "Agriculture, forestry and fishing" industry is the dominant industry within the Liverpool Plans LGA. Mining is only a small industry within the area accounting for only 1% to 2% of the employed population, however, this is in line with employment in the mining industry across NSW.

The local community values the lifestyle and peace and quiet of the local area. Based on a survey completed for the Liverpool Plains Shire Council in 2009, it was determined that a number of residents are concerned about the balance between farming and mining including what effect coal mining in particular may have on water supplies.

In addition to the mitigation measures and management procedures relating to amenity aspects such as noise, air quality, visibility, transportation, the Proponent would continue to contribute to local community projects through the establishment of a Community Enhancement Fund to the value of $300 000 (with 2/3 of this to be spent within the township of Werris Creek). The Proponent would also continue to encourage the local community to raise issues of concern which would be addressed to the extent feasible in a timely fashion.

The LOM Project would continue to benefit the local and wider community directly through the provision of employment, expenditure within the local communities, payment of royalties, levies and taxes and expenditure on local community projects. It is acknowledged, however, that the proposed LOM Project would also have some negative socio-economic impacts. Based on the assessment, it was determined that any negative socio-economic impacts would be more than adequately countered by the positive effect the proposal would have on employment and contribution to the local and wider community.

Project Evaluation and Justification

There are residual impacts associated with the LOM Project associated with noise, biodiversity and air quality. However, it has been assessed that with the implementation of the proposed mitigation measures as outlined in this *Environmental Assessment* the residual impacts associated with the LOM Project would be minimised.

The consequences of not proceeding with the LOM Project include the following.

- The coal recoverable by open cut methods would not be mined. Such an outcome would be contrary to the State's and the Proponent's objective to maximise resource utilisation.
- There would be a loss of jobs for those currently employed at the Werris Creek Coal Mine once the coal resource is exhausted to the currently approved limit.
- The opportunity to create an additional 10 full-time jobs would be foregone.
- The disposable wages for both the current workforce and the additional full-time workforce would be foregone, a substantial proportion of which would be spent in the local area.
- Foregoing the additional PAYE taxes for the 20 year life of the mine.
- Foregoing additional coal royalties and payments to State Authorities as well as export earnings which would help offset, at least in part, Australia's foreign debt.
- The additional impacts on the local biophysical environment would not eventuate.

Conclusion

The proposed Werris Creek Coal Mine LOM Project has, to the extent feasible, been designed to address the issues of concern to the community and all levels of government. The Project provides for the production, sale and despatch of up to 2.5Mtpa of thermal and PCI coal products to domestic and export markets. The ongoing operation of the Werris Creek Coal Mine would ensure that current employment opportunities associated with the operation are maintained and that more employment opportunities would arise which would continue to contribute to the local economy. The post-mining landform would integrate the re-establishment of native woodland for native conservation with land for agricultural purposes resulting in a net land use benefit.