WHITEHAVEN COAL

ABN: 69 107 169 102

Werris Creek Coal Pty Limited

Environmental Assessment

for the

Werris Creek Coal Mine Modification 2 (PA 10_0059)

Prepared by:

R.W. CORKERY & CO. PTY. LIMITED

April 2015

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Ref No. 623/17

April 2015

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Executive Summary

Werris Creek Coal Pty Limited operates the Werris Creek Coal Mine, located approximately 1.5km south of the town of Werris Creek and approximately 11km north-northwest of Quirindi in northern NSW (refer to **Figure 1.1**). Originally operated under development consent DA-172-7-2004 issued on 18 February 2005 for the recovery of approximately 10 million tonnes of coal, Project Approval (PA) 10_0059 was subsequently granted on 29 October 2011 for the complete recovery of the coal contained within the Werris Creek coal measures. PA 10_0059 has been modified once (30 August 2012), under Section 75W of the *Environmental Planning and Assessment Act 1979* (EP&A Act), to enable the relocation of some surface infrastructure.

This *Environmental Assessment* has been prepared to support an application for a second modification to PA 10_0059 under Section 75W of the EP&A Act ("the Proposal"). The Proposal seeks to modify the following component activities and operations at the Mine.

- A small lateral extension of the Out-of-Pit Overburden Emplacement to the west over an area designated for soil stockpiles.
- A northerly extension of the 400m to 445m AHD benches of the Overburden Emplacement by approximately 250m.
- Incorporation of a new Dry Separation Plant to process coal with rock or other impurities. This coal is likely to be recovered initially from those seams previously mined by the Werris Creek Colliery.
- Provision for the supply of surplus void water for beneficial agricultural activities on and surrounding the Mine Site.
- Increase the hours of road transportation for coal products.

Figure 2.1 presents the location of the proposed modifications to the overburden emplacement, required as a result of an increase in volume of overburden being generated, and Dry Separation Plant, proposed to reduce the ash and other contaminant content of the coal without requiring washing. The application of void water to agricultural lands has been proposed to alleviate potential future storage capacity constraints within the existing void water dams of the Mine. The use of surplus void water for agricultural purposes is considered a more beneficial use for this water than evaporation or discharge. The increased hours of road transportation have been proposed to be coincident with the approved operating hours of the Whitehaven Coal Handling and Preparation Plant (CHPP) at Gunnedah, which currently receives the bulk of coal despatched from the Mine by road.

In order to undertake a comprehensive *Environmental Assessment* of the Proposal, those issues likely to be of greatest significance to the local environment, neighbouring landowners and the wider community were identified through:

- community and government consultation;
- a review of environmental planning documentation;
- a review of environmental performance at the Mine; and
- the experience of Mine personnel and the author of the *Environmental Assessment*.

It has been determined that the Proposal would have minimal or no impact on many aspects of the local environment, namely: blasting and vibration; biodiversity; cultural heritage; groundwater; soils and land capability; and hazards (such as bushfire). Environmental aspects where it was identified there could be some change in the level of impact received, and therefore where further assessment has been undertaken include: noise, air quality, visual amenity, surface water resources, void water management and transportation.

A summary of the outcomes of the assessment of each of these environmental aspects is as follows.

Noise

The assessment of noise emissions was conducted by modelling the noise emissions generated under a worst-case operating scenario (when mining operations approach the northern extent of the open cut and overburden is being placed on the upper lifts of the extended overburden emplacement), and reviewing the expected noise levels received at surrounding receivers against established noise criteria. A high level of confidence is placed in the noise model which has been regularly reviewed, updated and validated through comparison to actual noise monitoring results collected monthly at receivers surrounding the Mine.

The results of noise modelling indicate that with the exception of three residential receivers, the noise criteria of PA 10_0059 could be achieved (refer to **Table 4.2**). A worst-case night time noise level for Receivers R22, R96 ands R98 are now predicted to be higher than the current noise criteria, 1dB(A), 1dB(A) and 2dB(A) respectively. On the basis that the noise level predictions are reflective of a more accurate noise model, the implementation of all reasonable and feasible noise minimisation and mitigation, the very minor difference between current criteria and worst-case noise level predictions, and generally excellent performance of the Mine in complying with noise criteria, an increase in the noise criteria at these selected receivers is recommended.

In addition to the residential receivers, the noise levels received on Properties 16, 64 and 97 (Refer to **Figure 4.3**) was considered for the purposes of establishing noise criteria. Through interpretation of noise contours generated by the noise model, it is established that a noise level of 38dB(A) could be achieved over at least 75% of these properties with building entitlements.

The potential impact of an extension to the hours of road transportation was undertaken, with the $L_{eq(1hour)}$ noise levels generated by the heavy vehicle movements between 6:00pm and 10:00pm would be well below (8.6dB) the road noise criteria defined by the NSW Road Noise Policy. Furthermore, the predicted $L_{eq(1hour)}$ noise level received at the closest residence to transport route would be equivalent to ambient (L_{eq}) evening noise levels measured at a residence which adjoins the transport route in 2010.

Air Quality

A comparison of air quality monitoring and other data was completed which validated the predictions of the dispersion model previously used to predict air emissions from the Mine and establish air quality criteria. The air emissions inventory of this validated model was then updated to reflect changes to the number and type of dust emissions sources (mobile and fixed plant), proposed activity areas, and a review of emission factors and calculation methodologies, in order to provide an estimate of TSP, PM_{10} and $PM_{2.5}$ emission rates. The modified emission rates were compared to the emission rates previously established and for which compliance with the air quality criteria were predicted.

The results of the comparison between the updated and previous emission rates indicate continued compliance air quality criteria can be achieved should the Proposal be approved.

Visual Amenity

With reference to several critical visual vantage points towards the Mine, it has been established that:

- views of the Mine from the south are unlikely to change;
- views of the Mine from the elevated vantage points to the east of the Mine would continue to change but not differ from that already approved;
- the upper lifts of the overburden emplacement, which are visible from vantage points in the south and east of Werris Creek, would encroach approximately 250m closer; and
- the effects of night time lighting are unlikely to change significantly given it is not proposed to increase the number of lighting plants or alter current light minimisation practices.

On the basis that the Applicant has demonstrated a commitment to minimising visual impacts (through progressive rehabilitation and establishment of a near real time camera to monitor lighting impacts), and the very minor changes to the visible elements of the Mine Site, the additional impact on local visual amenity of this minor modification is unlikely to be significant.

Surface Water Resources

A minor change to the drainage, collection and management of dirty water runoff is proposed. Runoff from the northern sections of the Acoustic and Visual Amenity Bund which was previously designed to drain around "Cintra Hill", would now be directed to a new sediment basin (SB18) before potential discharge to the northeast of the Mine (refer to **Figure 4.7**).

On the basis that this sediment basin is constructed in accordance with the design specification provided in the Environmental Assessment, the dirty water runoff could be managed to comply with criteria nominated in the Environment Protection Licence (12290) and the objectives of *Managing Urban Stormwater: Soils and Construction Vol. 1 4th Eds.*

Void Water

An updated Water Balance Model (WBM) for the Mine was prepared through consideration of actual water pumping and monitoring data. Considering rainfall, evaporation and groundwater inflows under three meteorological scenarios (dry, median and wet years) and three operating scenarios (Years 2015, 2017 and 2020), the WBM predicts that a surplus of up to 200ML would require disposal to prevent accumulation within the open cut in wet years.

The ability of land to accept void water without adversely impacting on soil properties or receiving waters was modelled using the EPA endorsed *Effluent Reuse Irrigation Model* (ERIM). Inputs to the modelling program included water quality data collected at the Mine and soil quality data collected from agricultural land adjacent to the Mine Site.

The modelling confirmed the following.

- The void water could be applied at an indicative rate of 6.25ML/ha/year, subject to specific analysis of the chosen location prior to application, without impact on the receiving soils and catchment.
- Application of void water at this rate would have no noticeable impact on soil nutrient or other contaminant (e.g. heavy metal) concentrations.

On the basis of the above, and subject to the completion of a specific *Pre-Agricultural Void Water Use Assessment* for the proposed lands prior to commencement, the application of void water to surrounding agricultural land is considered a practical and beneficial use of surplus void water resources.

Transportation

The volume of truck movements from the Mine would be naturally restricted by the limit on road transport imposed by PA 10_0059. Therefore, road traffic from the Mine would continue to be undertaken as periodic campaigns to supply specific domestic customers, the largest of which is the Whitehaven CHPP.

Even on the heaviest traffic days, truck movements would generally be restricted to less than 86, i.e. less than six movements per hour when spread over the 15 hours proposed for road transport. This would have no noticeable impact on road capacity or intersection performance and considering the small number of trucks which would be operated, the movement of trucks could be easily schedule to avoid convoying.

The proposed increase in hours of road transportation would therefore allow for the concurrence of hours of operation between transport and the Whitehaven CHPP without any significant impact on road condition, intersection performance or noise.

Evaluation and Conclusion

It is concluded that the Proposal would not result in any significant increase or additional impacts on the local environment. The very minor increases in noise levels predicted are in fact more likely a result of more accurate noise modelling than changes resultant from the Proposal. Continued compliance with air quality and surface water discharge criteria is predicted and any changes to visual amenity are considered very minor given the closest vantage points where these modifications may be viewed remains 3.7km to the north. The application of surplus void water to beneficial agricultural use is considered an acceptable and practical use of this water. The proposed increase in the road transport hours is also considered a practical modification which would not have any noticeable impact on the local road network or road users. On balance, it is assessed that the Proposal could be undertaken in a manner which meets relevant environmental criteria and meet reasonable community expectations.

1. INTRODUCTION

1.1 SCOPE

This *Environmental Assessment* has been prepared by R.W. Corkery & Co. Pty. Limited (RWC) to support an application to modify Project Approval 10_0059 (PA10_0059) by Werris Creek Coal Pty Limited ("the Applicant"). The proposed modifications (the "Proposal") would improve the operational flexibility of the Werris Creek Coal Mine (the "Mine" or "Mine Site") to continue mining efficiently and productively.

Following discussions with the NSW Department of Planning & Environment (DPE), it has been confirmed that an application to modify PA 10_0059 (the Proposal) may be made under Section 75W of the *Environmental Planning & Assessment Act 1979* (EP&A Act), in accordance with the transitional arrangements of the EP&A Act associated with the repeal of Part 3A. The application has been lodged online via the DPE Major Projects Assessment website.

The Mine is located within Mining Leases (ML) 1563, 1671 & 1672, and (at its closest point) is approximately 1.5km south of Werris Creek and 11km north-northwest of Quirindi in northern NSW (see **Figure 1.1**). The Proposal seeks to modify the following component activities and operations at the Mine.

- Increase the storage capacity of the overburden emplacement through a small increase to the footprint of the out-of-pit section and small northerly extension of the upper lifts of the in-pit section.
- Inclusion of a dry processing plant to remove excess coal impurities.
- Provide alternative beneficial agricultural uses for collected mine void water on agricultural land both owned by the Proponent and neighbouring private landowners.
- Modify drainage from the Acoustic and Visual Amenity Bund, with runoff from the northern section to be directed to a new sediment basin at the northern-most point of the bund.
- Increase the hours of road transportation for coal products.

The information contained in this document relates specifically to those aspects of the Mine to be modified. Aspects of the Mine that would not be modified would continue to be undertaken in accordance with the terms of approval nominated by *Condition 2* (of Schedule 2) of PA 10_0059, i.e. in accordance with;

- the *Environmental Assessment* prepared by R.W. Corkery & Co. Pty Limited for the Werris Creek Coal Mine Life of Mine (LOM) Project (RWC, 2010);
- the Statement of Commitments included as *Appendix 6* of PA 10_0059;
- Mine Infrastructure Augmentation Modification (10_0059 MOD 1) approved by the DP&E on 30 August 2012; and
- the conditions of PA 10_0059 and associated plans.

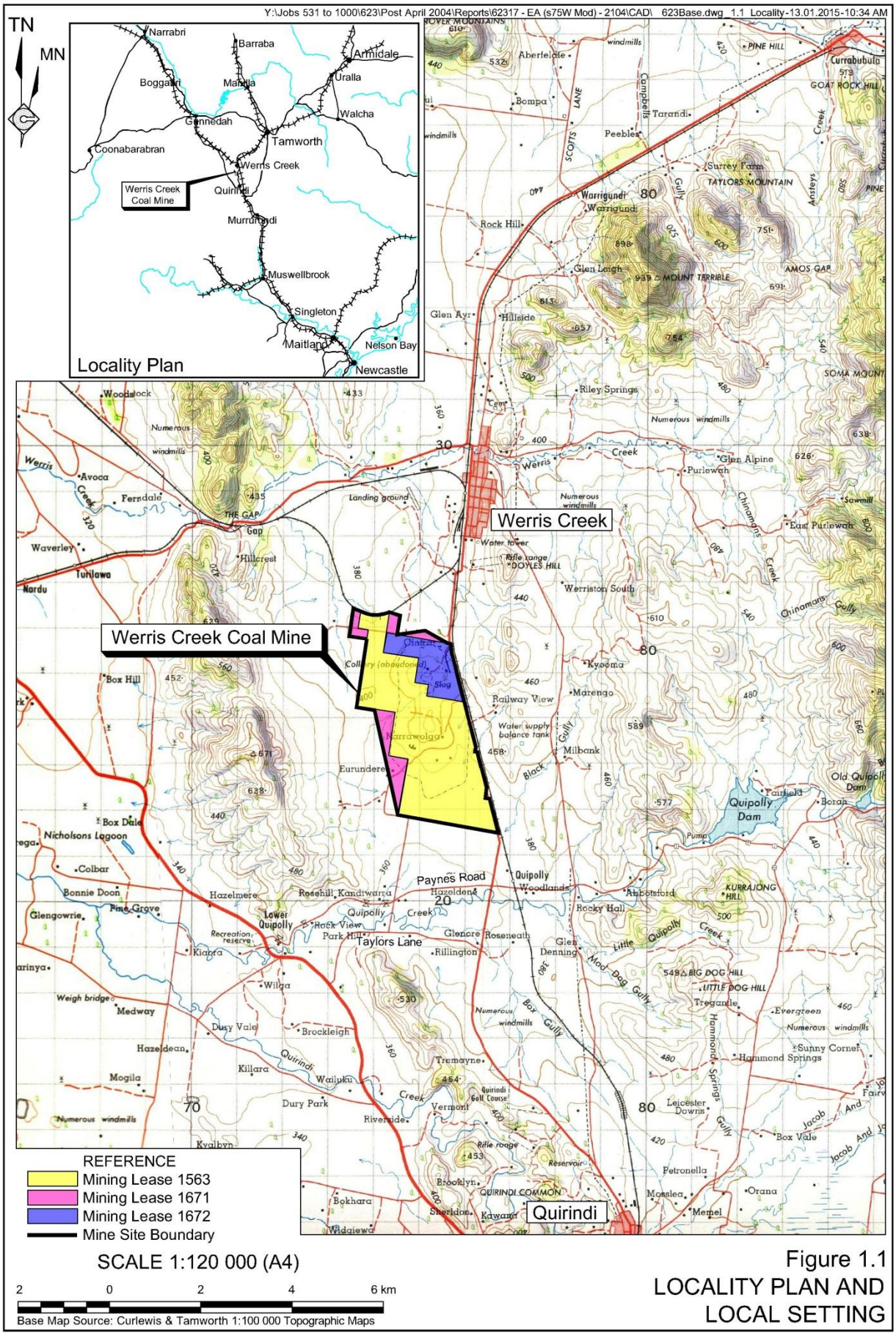


Figure 1.1
LOCALITY PLAN AND LOCAL SETTING

The information presented in this document covers all aspects of the planning, development, operation, rehabilitation and environmental management and monitoring of the Proposal, whilst utilising information sourced from the "*Werris Creek Coal Mine - Life of Mine Project Environmental Assessment*" (RWC, 2010), at a level consistent with industry standards and the scale of proposed operations. These aspects are presented in a manner that would provide DPE, other State and local government agencies, and community stakeholders with sufficiently detailed information to assess the Proposal and the impact upon the surrounding environment following the implementation of appropriate mitigation and management measures. **Appendix 1** provides correspondence with DPE and the informal requirements to be assessed within the document, as formal *Secretary's Environmental Assessment Requirements* (SEARs) were not required to be issued for the Proposal.

1.2 FORMAT OF THE REPORT

This *Environmental Assessment* includes five sections of text, a reference section and a set of appendices.

Section 1: Introduces the Proposal, the Applicant and relevant background information.

Section 2: Describes the Proposal in sufficient detail to enable the application for modification to be determined.

Section 3: Provides a description of the stakeholder consultation and a review of relevant planning instruments.

Section 4: Describes the key environmental issues associated with the Proposal.

Section 5: Summarises the minor administrative adjustments to the conditions of PA10_0059 proposed to clarify each in the context of the modified operations.

Section 6: Provides an updated Statement of Commitments to account for additional commitments included as a result of the Proposal as well as those commitments which have been superseded by operational controls or management measures documented in approved management plans.

Section 7: Evaluates the Proposal in terms of biophysical, economic and social consideration, and the goals and guidelines of Ecologically Sustainable Development and provides a conclusion to the document.

References: Lists the various source documents referred to for information and data used during the preparation of the *Environmental Assessment*.

Appendices: Present the following additional information.

1. Correspondence from DP&E re: application of Section 75W and assessment requirements.
2. Werris Creek Water Balance Assessment completed by Environ Pty Ltd.
3. Noise Impact Assessment completed by Spectrum Acoustics Pty Limited.
4. Air Quality Impact Assessment prepared by SLR Consulting Pty Ltd.
5. Void Water Irrigation Assessment completed by SEEC.

1.3 THE APPLICANT

The Applicant for the Proposal, Werris Creek Coal Pty Limited (ABN 69 107 169 102), is the current owner and operator of the Werris Creek Coal Mine. The Proponent is a wholly-owned subsidiary of Whitehaven Coal Limited (WCL) which is currently operating and developing coal projects in the Gunnedah Coalfields Region of New South Wales.

WCL acquired a 100% interest in the Werris Creek Coal Mine in December 2007. WCL has been progressively undertaking a review of operations with a view to improving the operational efficiency and environmental performance of the Mine.

1.4 MINE SITE

The application area for this *Environmental Assessment* is covered by the existing Werris Creek Coal Mine, within the existing MLs 1563, 1671 & 1672, incorporating an area of approximately 910ha. **Figure 1.2** identifies the Mine Site and the main features of the approved Werris Creek Coal Mine operations.

The existing operations are located on land owned by the Applicant. **Figure 1.3** identifies the land owned by the Applicant on and surrounding the Mine Site, along with the locations of Applicant-owned and privately-owned residences.

1.5 BACKGROUND TO THE PROPOSAL

1.5.1 Introduction

The following sub-headings provide background information to the Proposal regarding the existing approved mineral authorities, revised resources and reserve calculations and the approved activities occurring at the Mine that are proposed to be modified.

1.5.2 Existing Approvals, Licences and Tenements

Table 1.1 identifies the approvals, licences and tenements currently in place for the Werris Creek Coal Mine, the issuing / responsible authority, date of issue, duration (where limited) and relevant comments.

1.5.3 Identified Resources and Reserves

The most recent resource statement (Coxhead, 2014) identified the coal resource as 27.9 million tonnes (Mt) (**Table 1.2**).

The most recent reserve statement (Runge Pincock Minarco, 2014) identified a proved and probable reserve of 21.0Mt within ML 1563, ML 1671 and ML 1672 (see **Table 1.3**). This reserve excludes the coal removed by the former Werris Creek Colliery.

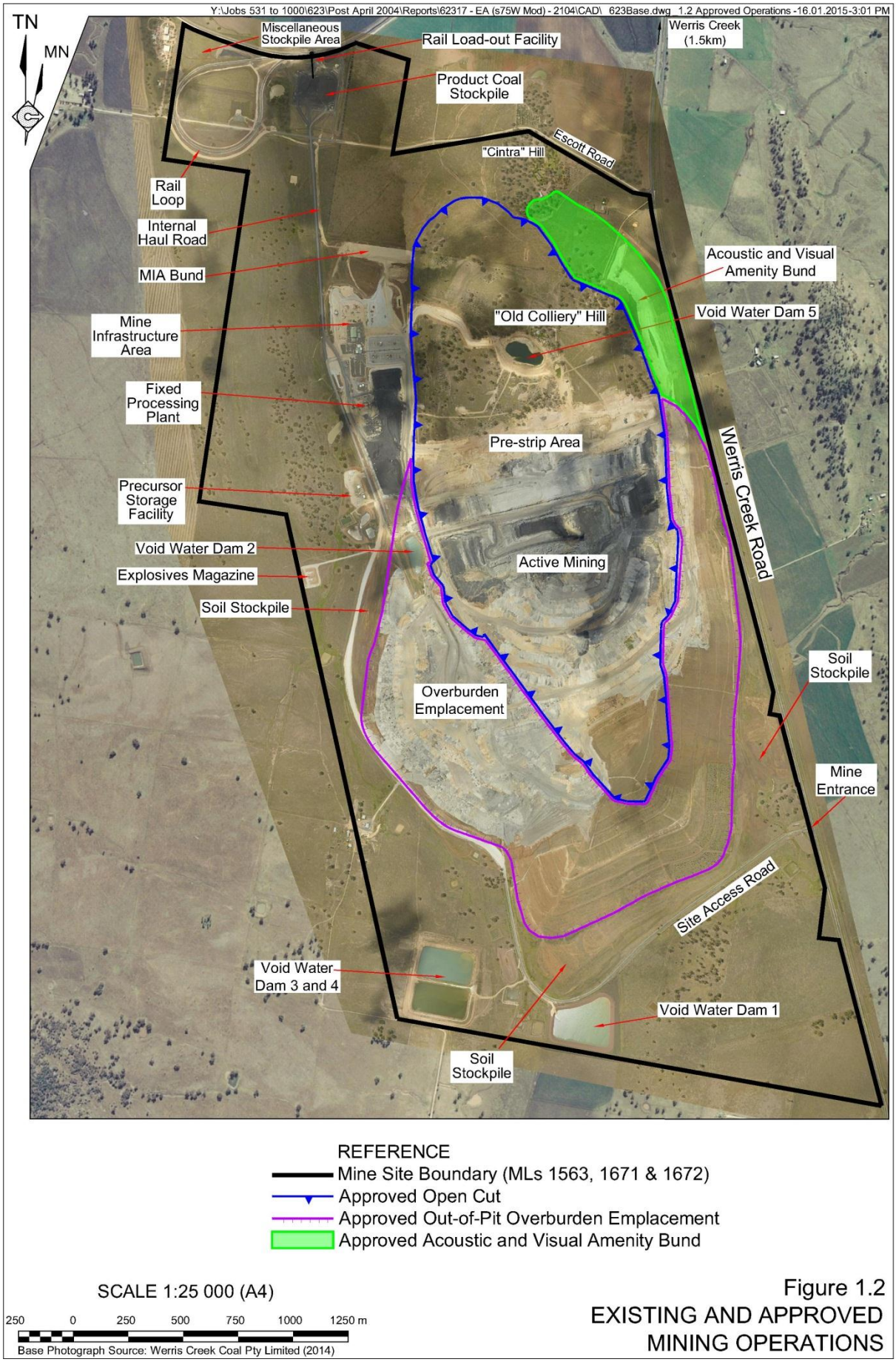
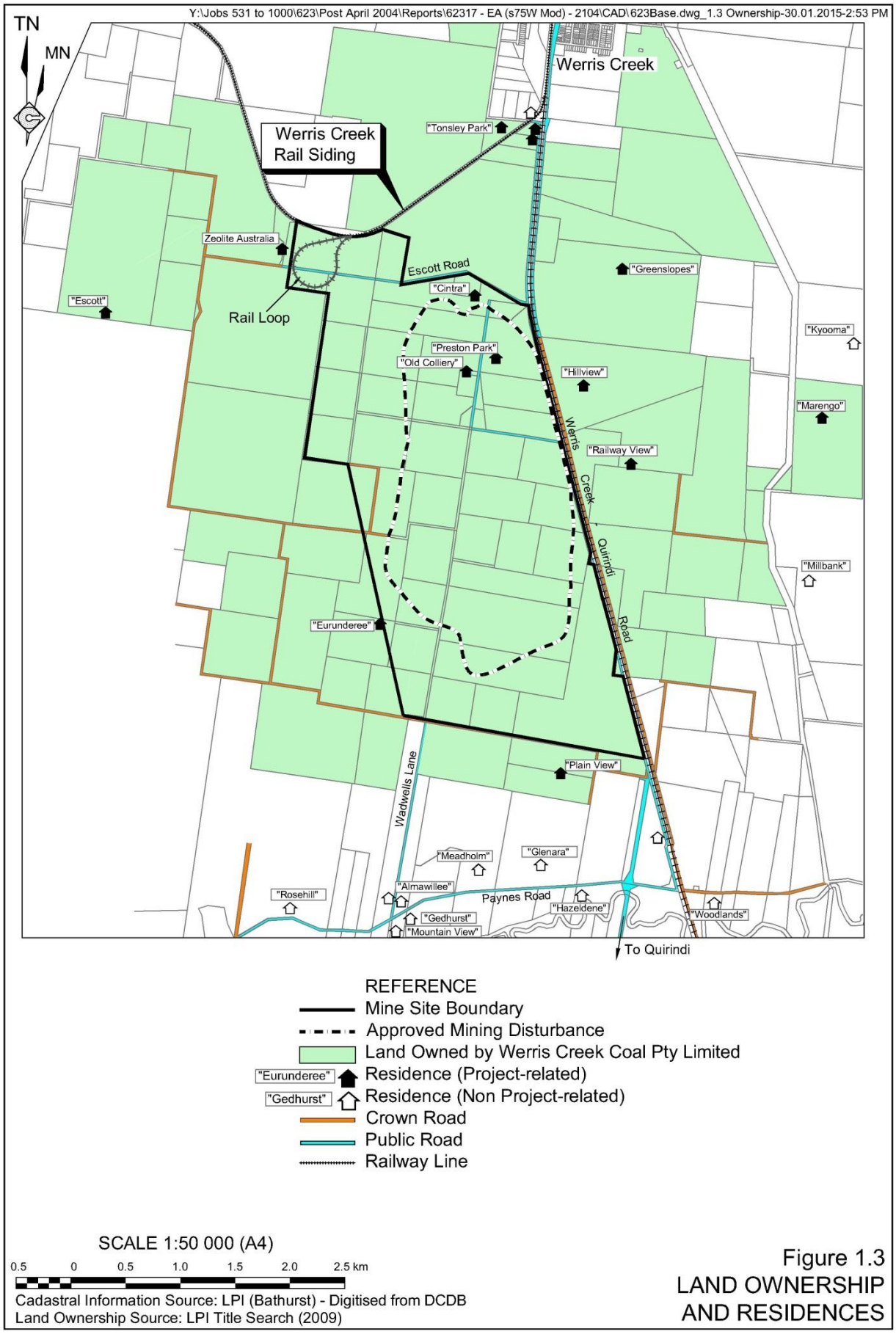


Figure 1.2
EXISTING AND APPROVED MINING OPERATIONS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TN
MN
Werris Creek
Werris Creek Rail Siding
"Tonsley Park"
Zeolite Australia
Escott Road
"Greenslopes"
"Escott"
Rail Loop
"Cintra"
"Kyooma"
"Preston Park"
"Old Colliery"
"Hillview"
"Marengo"
Werris Creek
"Railway View"
Quirindi Road
"Millbank"
"Eurunderee"
Wadwells Lane
"Plain View"
"Meadholm"
"Glenara"
"Rosehill"
"Almawillee"
Paynes Road
"Hazeldene"
"Woodlands"
"Gedhurst"
"Mountain View"
To Quirindi
REFERENCE
Mine Site Boundary
Approved Mining Disturbance
Land Owned by Werris Creek Coal Pty Limited
"Eurunderee" Residence (Project-related)
"Gedhurst" Residence (Non Project-related)
Crown Road
Public Road
Railway Line
SCALE 1:50 000 (A4)
0.5 0 0.5 1.0 1.5 2.0 2.5 km
Cadastral Information Source: LPI (Bathurst) - Digitised from DCDB
Land Ownership Source: LPI Title Search (2009)
Figure 1.3
LAND OWNERSHIP
AND RESIDENCES

Table 1.1
Tenements, Licences and Approvals

Issuing Authority	Type	Date of Issue	Expiry	Comments
Department of Planning & Infrastructure [1]	PA 10_0059	25 October 2011	December 2032	Issued under the now repealed Part 3A of the EP&A Act.
	PA 10_0059 MOD 1	30 August 2012		Approving modification to the location of void water dams and explosives magazine.
Department of Primary Industries, Mineral Resources[2]	ML 1563	23 March 2005	23 March 2026	For the purpose of prospecting and mining for coal.
Department of Trade & Investment, Regional Infrastructure & Services - Division of Resources & Energy	ML 1671	9 March 2012	9 March 2033	For mining purposes of: • Construction maintenance and use of various mine infrastructure; • Stockpile management; • Equipment and/or materials storage; • Electrical power infrastructure; and • Ground works associated with drilling.
	ML 1672	9 March 2012	9 March 2033	For the purpose of prospecting and mining for coal.
Environment Protection Authority	Environment Protection Licence No. 12290	18 April 2005	Anniversary date: 01 April Review Date: 23 June 2019	
Department of Infrastructure, Planning and Natural Resources [3]	Water Access Licence (WAL) 29506	21 February 2013	In perpetuity	Industrial and Mining Bore allocation of 50 ML per year.
	WAL 32224	19 June 2013	In perpetuity	Aquifer interference (excavation) 211 ML per year.

Note 1: Now, Department of Planning & Environment (DP&E)
Note 2: Now, Department of Trade & Investment, Regional Infrastructure & Services - Division of Resources & Energy (DRE)
Note 3: Now, Department of Primary Industries – NSW Office of Water (NOW)

Table 1.2
Coal Resource Summary (ML1563, ML1671 & ML1672)

Category	Resource
Measured	20.9Mt
Indicated	5.3Mt
Inferred	1.7Mt
Total	29.9Mt

Source: Coxhead (2014)

Table 1.3
Coal Reserve Summary (ML1563, ML1671 & ML1672)

Category	Reserve
Proved	16.7Mt
Probable	4.3Mt
Total	21.0Mt

Source: Runge Pincock Minarco (2014)

1.6 APPROVED AND ONGOING ACTIVITIES

1.6.1 Introduction

The approved mining and associated activities of the Mine are identified on **Figure 1.2**. The existing site layout of the Werris Creek Coal Mine comprises of the following components.

1.6.2 Open Cut Mining Area

Designed to recover the coal from the synclinal (bowl-shaped) coal measures, the open cut mining area is roughly elliptical in shape. Since commencement of mining in 2005, the open cut has been developed as a series of east-west oriented benches, with access to the lower sections of the open cut obtained by haul ramps developed on the low wall of the open cut (where overburden is progressively placed within the mined out sections of the open cut). Benches at varying heights are maintained to ensure that development and coal recovery are being undertaken at consistent rates over the life of the mine, thereby ensuring a consistent supply of ROM coal to the processing plant.

Mining is approaching the deepest section of the open cut (see **Figure 1.4**) and is encountering the underground workings of the former Werris Creek Colliery. As a result of reduced coal recovery from some seams[1], the strip ratio is greater than the originally forecast (5.4:1). As a result, the volume of overburden requiring disposal is being generated at an accelerated rate to that originally forecast. As is discussed in Section 1.6.3, this increased and accelerated generation of overburden is resulting in the open cut void being backfilled at an increased rate reducing the available space for waste emplacement.

1.6.3 Overburden Emplacement Area

Originally constructed around the eastern, southern and southwestern perimeter of the open cut area, overburden and interburden is now largely placed within the mined-out sections of the open cut. The out-of-pit disturbance footprint of the overburden emplacement has been effectively reached with successive lifts of between 10m and 20m raising the height of the emplacement to 445m AHD as it is progressively constructed in a northerly direction. In accordance with designs presented in the 2010 EA for the LOM Project (RWC, 2010), the upper 400m to 445m AHD lift of the overburden emplacement is restricted in extent to the north. As illustrated by **Figure 1.4**, large sections of the eastern and southern embankments of the overburden emplacement have been profiled, spread with soil and revegetated (105ha as of December 2014).

[1] Between the 2012/2013and 2013/2014 AEMR periods, the coal reserve of the Mine was reduced by approximately 4Mt (WCC, 2013, WCC, 2014).

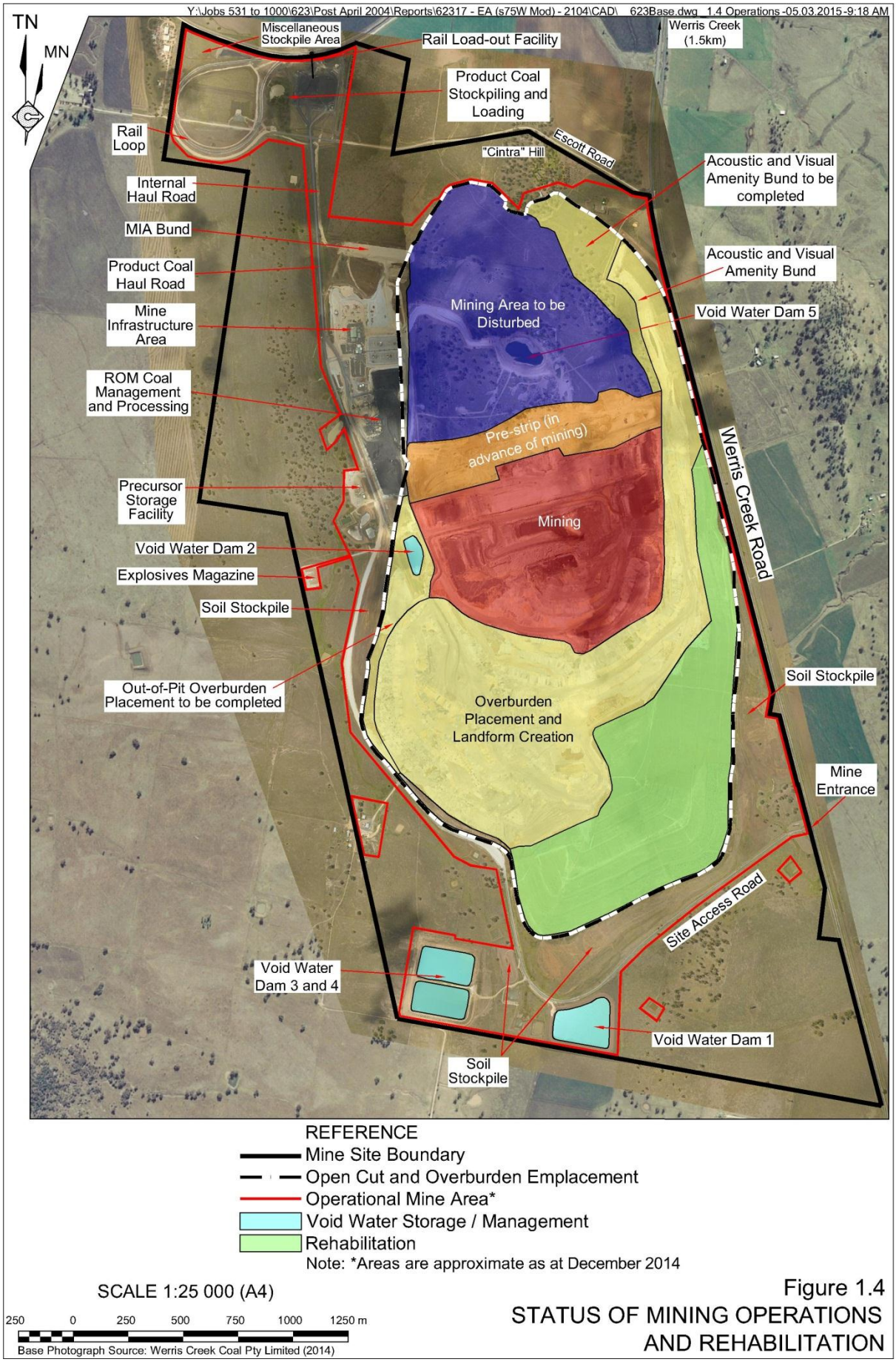

Figure 1.4
STATUS OF MINING OPERATIONS AND REHABILITATION

As noted in Section 1.6.2, a higher than anticipated strip ratio has resulted in an increase in the volume of overburden requiring disposal. The capacity with the overburden emplacement is further constrained by the development of haul ramps into and out of the open cut on the low wall side, i.e. against the emplacement as this limits the areas where overburden can be tipped for safety reasons. Recent projections indicate that by 2016 the active capacity (available at the time that overburden is generated and requires disposal) of the overburden emplacement would be reduced to 22.5 million bank cubic meters (Mbcm) and provide for only a 15% surplus over the scheduled overburden and interburden to be generated (19.5Mbcm) in that year.

Such a small active capacity of the overburden emplacement would impact productivity by imposing significant inefficiencies associated with having to haul overburden from the bottom of the open cut to the top of the overburden emplacement (or vice versa) depending on where the actual space is available for overburden emplacement.

A recent review of the active capacity of the overburden emplacement determined this to be only 8 weeks of mining. This does not provide sufficient margin for events that may result in further increases in overburden generation, restriction in areas available for placement of overburden or reduced coal recovery. It is feasible to envisage a situation where continued mining is compromised by a lack of available areas within the approved overburden emplacement for placing overburden.

1.6.4 Acoustic and Visual Amenity Bund

The structure was proposed and approved to provide for an acoustic and visual screen of mining operations as the open cut is developed through "Old Colliery" Hill. Constructed as a northerly extension of the Out-of-Pit Overburden Emplacement around the eastern and northeastern perimeter of the open cut, this structure is approximately 60% complete (see **Figure 1.4**). The Acoustic and Visual Amenity Bund is progressively profiled, respread with topsoil and revegetated as constructed to limit the visual impact of the bund itself from surrounding vantage points.

1.6.5 Coal Processing and Stockpiling Operations

ROM coal mined from the open cut is delivered to the ROM Pad where it is stockpiled according to quality, i.e. ash content and other impurities. **Figure 1.4** identifies the main features of the Coal Processing Area.

No washing of the coal is undertaken, however, crushing and screening is required to achieve customer size requirement prior to despatch. Coal is segregated at the ROM Coal Stockpile based on the expected ash content of the coal. The higher ash coal products are processed through the fixed plant crusher at an average 420t/hr using a Front End Loader to feed the hopper of the primary crusher (to <150mm) and subsequently processed through the secondary crusher to <50mm size, this being the specification for export quality coal. Low ash coal products are processed by the mobile crushers at an average 240t/hr straight to <50mm product and then screened. While this is the general configuration of the coal processing plant, based on shipments and other market demands as specified; different coal products can be produced using either crushing plants.

As mining has encountered the underground workings of the former Werris Creek Colliery, the quality of the coal recovered from the affected coal (Seams D and E) has reduced. Some coal has been transported to the Whitehaven Coal Handling and Processing Plant at Gunnedah by road in accordance with the limits set by PA 10_0059 for processing to reduce ash content.

1.6.6 Site Entrance, Mine Infrastructure Area and MIA Bund

The entrance to the Mine off Werris Creek Road has been retained in preference to the construction of a new entrance off Escott Road, as proposed in RWC (2010), primarily due to the change in status of Escott Road. Where previously, this road was to be upgraded as a public road servicing local properties, WCC has leased, while in the process of purchasing, the road easement from Liverpool Plains Shire Council. As a private road, servicing the Mine and properties owned by WCC, no upgrade of this road is required. Therefore, the previously identified benefits of more direct road access from the Mine Site via Escott Road, as presented in RWC (2010), are now outweighed by the additional cost and traffic disruption of upgrading Escott Road. Furthermore, the existing entrance on Werris Creek Road is appropriate for the volume of traffic using and passing this entrance.

Mine offices, workshops and other facilities are collectively referred to as the Mine Infrastructure Area. To the north of the Mine Infrastructure Area, and as nominated in RWC (2010), a bund wall has been constructed (MIA Bund) to attenuate noise generated within the Mine Infrastructure Area and Coal Processing Area and reduce the visibility of operations from the north (see **Figure 1.4**).

1.6.7 Water Management

Water is categorised as either: void, dirty, clean or waste/contaminated water, with each category segregated and managed separately.

- **Void Water**. Water which accumulates within the open cut and comprises of incidental (direct) rainfall, rainfall runoff from the overburden emplacement and open cut catchment, and groundwater intercepted in the base of the open cut void. This water is collected at the lowest point in the void and pumped as required to one of five void water dams (see **Figures 1.2** and **1.4**).

  Total operational capacity of the void water dams is 714ML[2], distributed between the five dams as follows.

  – Void Water Dam 1: 250ML.

  – Void Water Dam 2: 25ML.

  – Void Water Dam 3: 214ML.

  – Void Water Dam 4: 145ML.

  – Void Water Dam 5: 80ML.

[2]This takes into account freeboard requirements. Maximum capacity to the spillway level of dams is higher than the operational capacity.

Notably Void Water Dams 2 and 5 (105ML) occur within the open cut and overburden emplacement impact footprint with an additional dam (which would have an equivalent storage capacity) approved for construction between the Mine Infrastructure Area and MIA Bund.

The purpose of the dams is to provide temporary storage of water prior to use for dust suppression and/or evaporation as discharge of this water is not permitted. Evaporation from the void water dams is expedited through the operation of two misting evaporators which spray the water as a fine mist over the surface of the void water dams. Records from the 2013/2014 AEMR period indicate that one evaporator, operated 24 hours per day for six months over spring - summer and during daylight hours the remainder of the year[3], resulted in the evaporation of 180ML. A second evaporator has been introduced with results to February 2015 confirming this is operating at an equivalent evaporative rate.

The void water dams have been operating close to capacity and the total volume of void water requiring storage within the Mine Site has the potential to exceed the capacity of the surface void water dams. Any excess void water would therefore require temporary storage within the open cut, which in turn could affect mining of the basal coal seam if water storage prevents access to this coal seam.

- **Dirty Water**. Runoff from areas disturbed by mining and ancillary activities is directed to a series of sediment basins designed to provide storage capacity for runoff following a 5-day 90th percentile rainfall event. The operation and maintenance of these structures is undertaken in accordance with the Site Water Management Plan.
- **Clean Water**. Runoff from areas undisturbed by mining and ancillary activities is allowed to flow over and off the Mine Site without active management. Clean water diversion structures are maintained to divert clean water flows around the mining operations.
- **Waste/Contaminated Water**. Any water from the workshop and fuel farm areas treated to manage potential hydrocarbon contamination. Water from the administration area is directed to an on-site septic system for treatment.

1.6.8 Coal Transportation

The despatch of product coal from the Mine is either by rail to the Port of Newcastle or by road to domestic customers.

The despatch of coal by rail requires the product coal to be transported via the Internal Haul Road to the Product Coal Storage Area and Rail Load-out Facility (see **Figure 1.4**). From the product coal stockpiles, the coal is delivered to a rail load-out bin by conveyor and discharged to rail wagons. A rail loop provides for efficient movement of the train to and from the Main Northern Rail Line.

[3] Operation of the Evaporator was ceased to manage noise emissions as required during these periods.

A small quantity of coal is transported from the Mine by road for delivery to local markets. Road registered trucks enter the Mine via the Site Entrance on Werris Creek Road and travel to and from the Coal Processing Area via the Site Access Road. The majority of truck movements are to and from the south via Werris Creek Road and Taylors Lane. The despatch of coal to the local road network is restricted to 7:00am to 6:00pm Monday to Friday and 7:00am to 2:00pm Saturday.

1.6.9 Hours of Operation, Life of Mine and Employment

Hours of Operation

With the following exceptions, the Mine is approved to operate 24 hours a day, seven days per week.

- Blasting is restricted to between 9.00am and 5.00pm, Monday to Saturday.
- The 2010 *Environmental Assessment* for the Werris Creek Coal Mine identifies that "except under exceptional circumstances, e.g. in the event an emergency supply of coal is requested by a domestic customer, the despatch of coal carrying trucks from the Project Site would be restricted to 7:00am to 6:00pm Monday to Friday and 7:00am to 2:00pm Saturday".

Mine Life

Based on an average production rate of 2.5Mtpa, and slightly lower than expected coal recovery, the remaining life of the Mine is 6 years.

Employment

Approximately 140 personnel are directly employed at the Mine.

1.6.10 Rehabilitation

The Company is implementing a progressive rehabilitation strategy to establish the final landform for two principal uses.

(i) Re-establishing the following woodland vegetation communities.

- Box Gum Woodland and Derived Native Grassland (EEC equivalent).
- Brigalow-Belah Woodland (EEC equivalent).
- Shrubby White Box Woodland.

(ii) Class III capable agricultural land[4].

[4] Equivalent to Class 3 Land and Soil Capability in accordance with *The land and soil capability assessment scheme - second approximation. A general rural land evaluation system for New South Wales* (OEH, 2012).

As illustrated by **Figure 1.4**, the Mine has been successful in establishing a stable groundcover over the completed sections of the overburden emplacement. There has also been successful establishment of trees on the slopes of the completed overburden emplacement in accordance with land use (i) above.

A review of Annual Environmental Management Reports (AEMRs) prepared to document rehabilitation progress against targets set in the *Mining Operations Plan* (MOP) (WCC, 2011) have generally indicated achievement of annual targets.

1.7 IDENTIFIED CONSTRAINTS ON DEVELOPMENT

Current and potential constraints affecting ongoing operations at the Mine are as follows.

- As a result of the higher than anticipated strip ratio the volume of overburden is being generated in greater quantity, and at a more accelerated rate, than originally planned.

  Additional overburden emplacement capacity is required to account for the increase in total overburden volume. The mine development sequence requires modification to reduce the mining strip ratio.

- The volume of void water collected within the open cut has the potential to exceed the surface storage capacity. The storage of this excess void water within the open cut could potentially prevent mining of the deepest parts of the open cut for periods.

  Provision for the supply of surplus void water for agricultural purposes to adjacent land both owned by the Proponent and privately owned would provide for an additional and more beneficial use (compared to evaporation) of water generated at the Mine Site.

- Contamination of the coal recovered from the seams previously mined by the Werris Creek Colliery requires additional treatment prior to export.

  Provision of a dry separation plant would allow for the treatment of this coal without washing the coal.

- The approved hours of road transport of coal do not coincide with those of the Whitehaven Coal Preparation Plan (CHPP), 7:00am to 10:00pm, where the bulk of road transported coal is delivered.

  A minor amendment to the Mine's hours of operation for road transport would remove this inconsistency.

1.8 MANAGEMENT OF INVESTIGATION

This document has been prepared by Mr Alex Irwin (B.Sc. Hons), Senior Consultant with R.W. Corkery and Co Pty Limited, and Mr Chris Dickson, B.Sc.), Consultant with the same company. Company personnel who provide information for the Proposal include Mr Andrew Wright, WCC's Environmental Officer, and Mr Jeremy Taylor, WCC's Senior Mining Engineer.

Professional representatives of the Applicant that have assisted with the preparation of this document include, but not limited to:

- Mr Martin Doyle (*Ph.D, B.Sc. (Hons)*) – Principal Air Quality Consultant with SLR Consulting Australia.
- Mr Neil Pennington (*Ph.D, B.Math., B.Sc.*) – Principal Noise Consultant with Spectrum Acoustics.
- Mr Mark Passfield (*B.Sc. (Hons*)) – Director of Strategic Environmental and Engineering Consulting Pty Ltd.
- Ms Fiona Robinson (*M.Eng., B.Eng.*) – Principal of ENVIRON and Mr Simon Gaskell *(M.Sc., B.Sc.)* – Manager at ENVIRON.

2. DESCRIPTION OF THE PROPOSAL

2.1 INTRODUCTION

2.1.1 Objectives of the Modification

The Applicant's objectives in developing the Mine are identified in *Section 2.1* of RWC (2010). The Applicant's objectives in modifying PA10_0059 are as follows.

- To ensure that the Mine remains compliant with existing conditions or commitments, unless modified by this Proposal.
- To reduce, to the maximum extent practicable, the overall environment impact of the Mine.
- To minimise, to the maximum extent practicable, the impact on the local community and other stakeholders.
- To ensure that the ongoing operation of the Mine can continue in a safe and reliable manner.

2.1.2 Overview of the Proposal

The Proposal includes the following activities.

- A small lateral extension of the Out-of-Pit Overburden Emplacement to the west over an area designated for soil stockpiles (~6ha)[5].
- A northerly extension of the 400m to 445m AHD benches of the Overburden Emplacement by approximately 250m[6].
- Incorporation of a new Dry Separation Plant to process coal with rock or other impurities. This coal is likely to be recovered initially from those seams previously mined by the Werris Creek Colliery.
- Provision for the supply of surplus void water for beneficial agricultural activities surrounding the Mine Site. For the purpose of this assessment, irrigation has considered that the off-site application of void water can be undertaken without adverse impact on soils and receiving waters.
- A minor modification to drainage from the northern section of the Acoustic and Visual Amenity Bund.
- Increase the hours of road transportation for coal products.

Figure 2.1 presents the location of the proposed modifications to the overburden emplacement, surface drainage and the Dry Separation Plant.

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[5] The extension occurs over an area already disturbed for the purpose of soil stockpiling.
[6] The northerly extension of the in-pit component of the overburden emplacement does not require any additional extension of the Mine impact footprint.

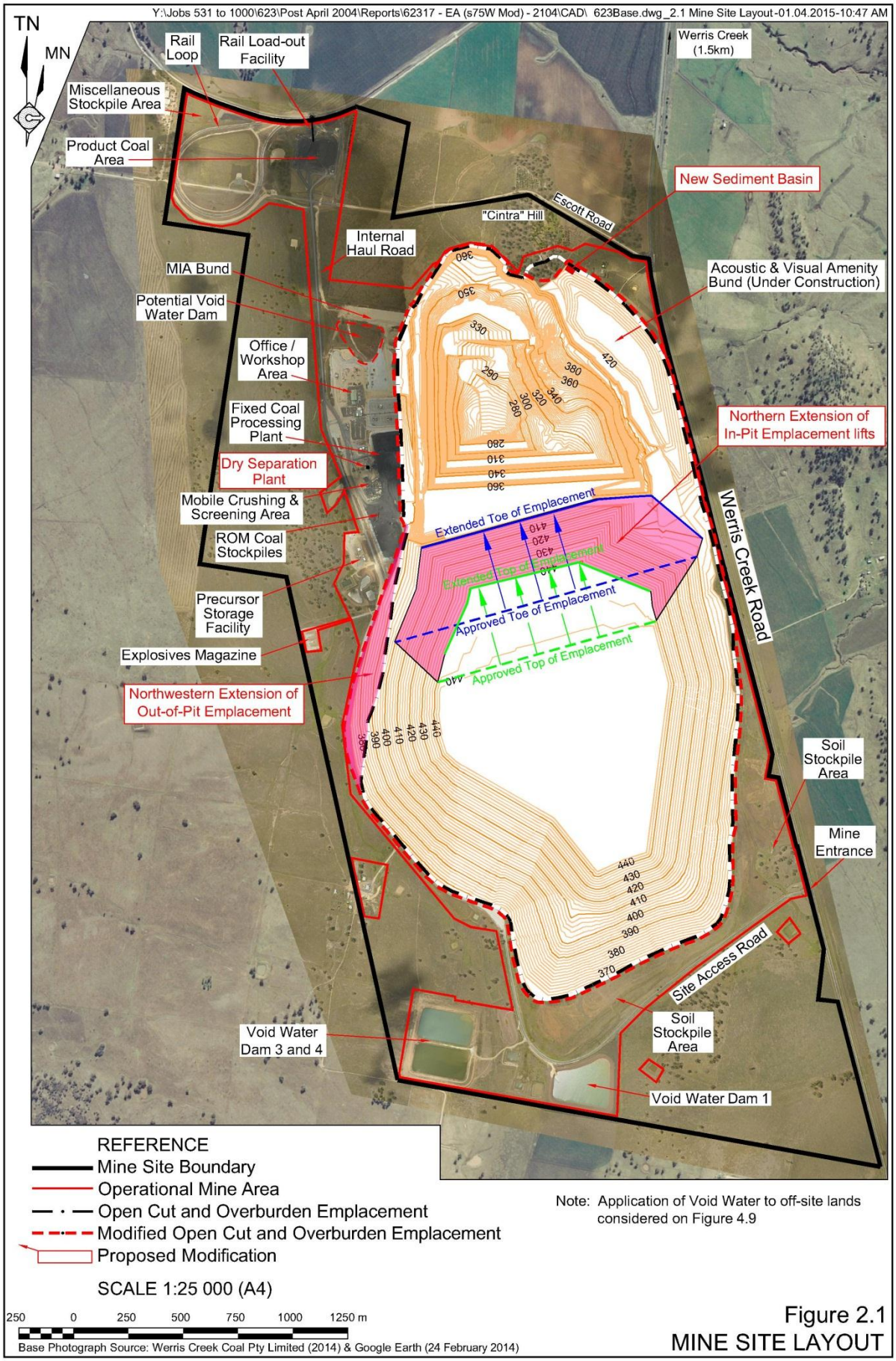

Figure 2.1
MINE SITE LAYOUT

It is noted that the proposed modification does not specify the location or method of void water application. This would be reviewed on a case by case basis as applications for access to the void water are received from land owners or lease holders seeking water for agricultural use. As is discussed in further detail in Section 2.5, approval is sought for void water to be made available for use off the Mine Site, subject to the preparation of *Pre-Agricultural Void Water Use Assessments* (e.g. for irrigation or stock watering) for specific locations and uses. Given the application of void water would be undertaken as an agricultural enterprise on that land, not a mining activity, no change to the approved Mine Site boundary would be required to accommodate this land.

It is noted that a change in the sequence of mining within the approved open cut footprint is planned and will be presented to the Division of Resources & Energy (DRE) of the Department of Trade & Investment, Regional Infrastructure & Services as part of an amended Mining Operations Plan (MOP) following determination of the Proposal. The amended mining sequence is presented in this document to provide context to the proposed modification to the overburden emplacement.

Finally, the Proposal includes a range of minor administrative adjustments to the conditions of PA10_0059 to clarify each in the context of the modified operations. These are identified where relevant through the *Environmental Assessment* with a summary of proposed changes included as Section 5.

2.2 MINING OPERATIONS

2.2.1 Mine Area

The area to be mined would not change as a result of the Proposal and is constrained by the coal reserve of the Werris Creek coal measures.

2.2.2 Mining Methods

The method of mining is to remain unchanged from that currently undertaken and described in previous environmental assessments (RWC, 2010) and annual reports (WCC, 2014).

2.2.3 Mine Design and Sequence

In order to offset the higher coal to overburden / interburden strip ratios encountered at the Mine, the development of a north-south oriented bench targeting the shallow, low strip ratio coal along the western edge of the mining area is proposed (see Panel 1 for End 2015 of **Figure 2.2**).

As the open cut moves through the base of the synclinal coal measures, the north-south oriented bench and would merge with the east-west oriented benches creating an approximately 45° angled bench. Panel 2 (End 2017) of **Figure 2.2** illustrates this merging of north-south, east-west benches along the western half of the open cut.

As the open cut progresses towards the northern perimeter, with all coal seams occurring closer to surface as the syncline dips up, the benches would again revert to an east-west orientation to allow for multiple coal seams to be mined concurrently, thereby keeping the coal quality and strip ratio consistent (see Panel 3 for End 2020 of **Figure 2.2**).

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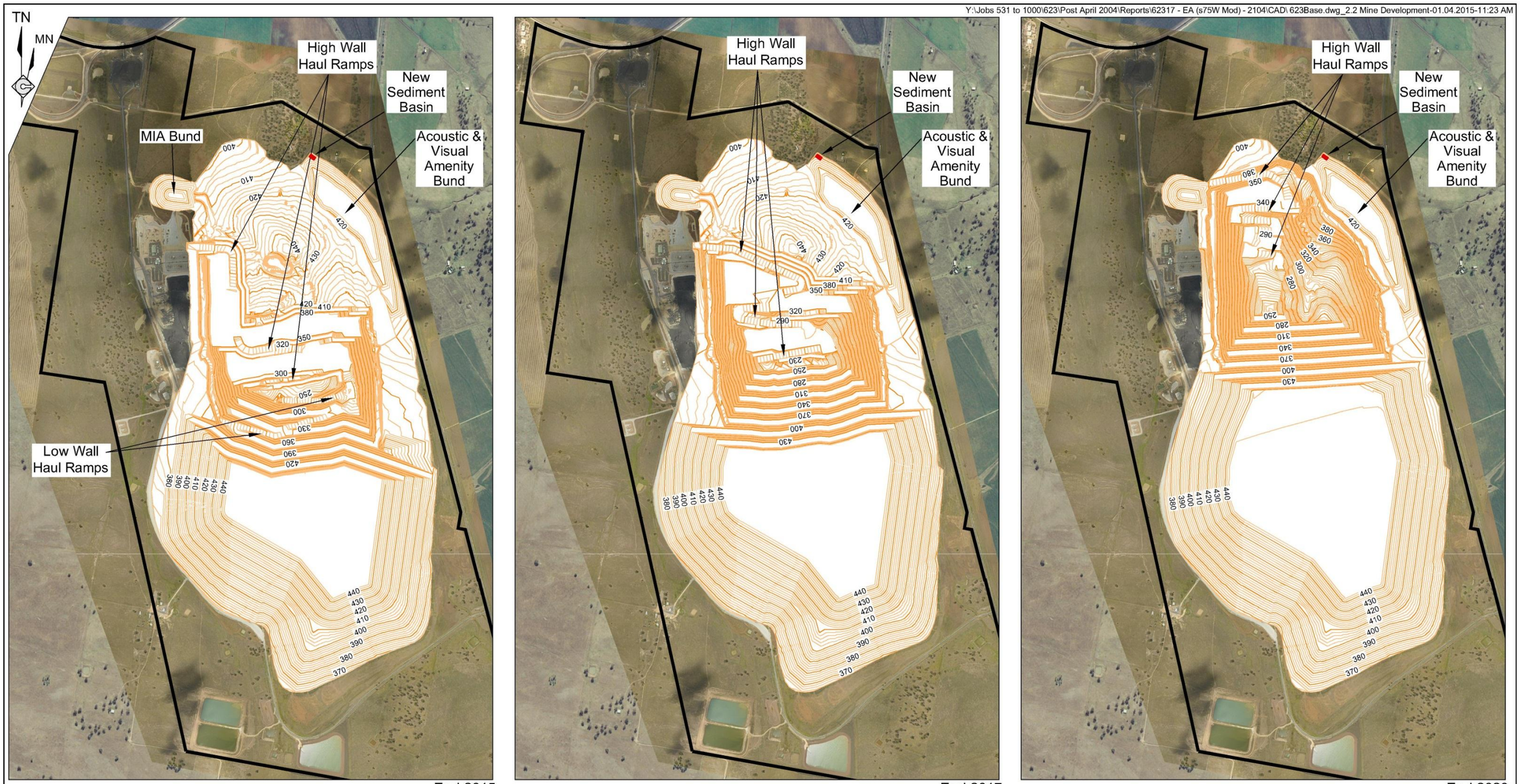

REFERENCE
Mine Site Boundary
390 Proposed Contour (m AHD)

SCALE 1:25 000 (A3)
250 0 250 500 750 1000 1250 m
Base Photograph Source: Werris Creek Coal Pty Limited (2014)

Note: Final mining stage, final landform and rehabilitated landform presented in Figure 2.6

Figure 2.2
MODIFIED MINE DEVELOPMENT SEQUENCE

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Figure 2.2 also illustrates the change from haulage against the low wall to the high wall of the open cut. Panel 1 identifies the creation of haul ramps on the high wall to the upper benches with haul ramps on the low wall retained at lower elevations. By the end of 2016, all haul ramps are to be transferred to the high wall side and Panel 2 (of **Figure 2.2**) illustrates this (for the end of 2017).

This is proposed as a method of increasing the active capacity of the overburden emplacement as well as to enable the design of a second egress from the open cut, in the unlikely event that the primary haul ramp is blocked or deemed unsafe at any time. Other important features of the modified mine design, which can be observed on **Figure 2.2** are as follows.

- Development and mining from wider 80m benches (as opposed to the less productive 50m wide benches).
- Development of 21m benches every 30m of high wall as opposed to the current variation between 10m and 20m high benches of the current mine design.
- A reduction in the overall slope of the active open cut face from 55° to 33°, as a result of the wider (80m) mining benches, which reduces the risk of high wall instability.

2.2.4 Mining Equipment

Table 2.1 presents the current mobile equipment operated at the Mine which remains equivalent to the indicative mining fleet presented in RWC (2010). One minor difference is that as the mine is developed to its deepest point, an additional three haul trucks are likely to be required to enable efficient removal of overburden. Equipment involved in the clearing of vegetation, stripping or replacement of topsoil and subsoil is operated on a campaign basis. Additional equipment used at the mine includes generators (either freestanding or integrated with various items of equipment) and miscellaneous maintenance equipment, e.g. welders.

As discussed in RWC (2010), the number and type of equipment may change over time based on changing requirements for activities. The equipment listed in **Table 2.1** should therefore be viewed as indicative with any major changes to be documented through the AEMR process.

2.2.5 Mining, Production Limit and Mine Life

The Proponent is not applying for any modification to the maximum rate of coal production. However, as a consequence of annual production approaching the maximum rate of 2.5Mtpa more regularly, and the higher than anticipated strip ratio, the overall development and completion of mining is likely to be accelerated from that presented in the 2010 *Environmental Assessment* (RWC, 2010). RWC (2010) anticipated mining operations continuing to 2028 whereas the revised mining and production sequence has mining completed in 2021 and rehabilitation (refer to Section 2.10) in 2022.

Table 2.1
Mining Equipment

Item	No. on Site	Function	Duration of Use
Excavator (540t)	1	Overburden Excavation/Loading	Full Time
Excavator (360t)	1		
Excavator (190t)	3	Overburden/Coal Excavation/Loading	Full Time
Haul trucks (Cat 785)[1]	9[3]	Overburden/Coal Haulage	Full Time
Haul trucks (Cat 793XQ)[2]	10		
Bulldozer (D11)	3	Overburden Prime Push, Overburden/Coal Rip/Push, Final Landform Development Clearing, Overburden Emplacement/Road Maintenance, Coal Stockpile Maintenance	Full Time
Bulldozer (D10)	4		Full Time
Bulldozer (D9)	1		Full Time
Bulldozer (D6)	1	Campaign Rehabilitation	Campaign
Bulldozer (D5)	1		Campaign
Grader	1	Road/Overburden Emplacement Maintenance	Full Time
Fuel/Service Truck	1	Equipment Refuelling/Servicing	Full Time
Scraper	4	Topsoil/Subsoil Removal and Replacement	Campaign
Drill Rig	3	Blast hole Drilling	Full Time
Explosives Truck	3	Loading Blast holes (day shift only)	Full Time
Front-end Loader (FEL)	3	Screening Plant/Product Coal Loading	Full Time
Water Cart	4	Dust Suppression	Full Time

Note 1: Incorporates noise attenuation Note 2: XQ refers to Extra Quiet.

Note 3: Up to 3 additional operating trucks required when mining occurs at deepest point within open cut. Typically an extra two trucks are retained on the Mine Site as replacement for maintenance and repairs of operating trucks.

Source: Werris Creek Coal Pty Limited

A minor administrative modification to PA 10_0059 revolving around coal production is proposed. *Condition 6* of Schedule 2 currently references coal extraction limits to a calendar year. The Applicant currently completes all reporting, both internal and other financial reporting, on a financial year basis and it is requested that the condition is modified to enable all reporting based around production to be consolidated. The following modification to the condition is proposed.

6. The Proponent shall not extract more than 2.5 million tonnes of ROM coal from the site in a ~~calendar~~ financial year.

2.2.6 Mine Dewatering

No change to the method of mine dewatering is proposed. The provision for irrigation of void water once dewatered is discussed in Section 2.5.

2.3 OVERBURDEN AND INTERBURDEN MANAGEMENT

2.3.1 Introduction

The removal of the overburden and interburden represents the main earthmoving component for the mining operation. As identified in Sections 1.6.3 and 1.7, the ability to manage overburden and interburden within the approved mining area under the current mine sequence is a potential constraint on operations at the Mine. The following sub-sections review the characteristics of the overburden and interburden, removal and management, and modifications to the design.

2.3.2 Overburden / Interburden Characteristics

A previous investigation of the physical and chemical characteristics of the overburden and interburden of the Werris Creek coal resource completed by URS (2004) concluded that there is a low potential for both acid formation and soluble salt generation from the overburden and interburden material. There has been no evidence observed in the 10 years of operation to suggest that this original investigation is incorrect and there remain no specific handling and emplacement requirements for these materials.

2.3.3 Overburden / Interburden Volumes

The approved overburden emplacement is designed to contain approximately 143Mbcm. Recent projections indicate that by 2016 the active capacity (available at the time that overburden is generated and requires disposal) of the overburden emplacement would be reduced to 22.5 million bank cubic meters (Mbcm) and provide only a 15% surplus over the scheduled overburden and interburden to be generated (19.5Mbcm) in that year. Such a small active capacity of the overburden emplacement would impact productivity by imposing significant inefficiencies associated with having to haul overburden from the bottom of the open cut to the top of the overburden emplacement (or vice versa) depending on where the actual space is available for overburden emplacement.

The most recent mining schedule indicates that the active capacity of the overburden emplacement, i.e. the capacity remaining should no further void space be created behind mining, is only 8 weeks. This does not a provide a sufficient buffer should increased volumes of overburden be encountered, or events such as high rainfall resulting in accumulation of water within the open cut restricting access to the lower levels of the open cut for mining or overburden placement. After 2017, the strike length and depth of the pit reduces because mining has passed through the base of the syncline and the coal seams dip upwards to the surface. At this time the strip ratio will reduce and therefore the quantity of overburden handled and emplaced will reduce easing the pressure on the active capacity of the overburden emplacement area.

2.3.4 Overburden / Interburden Design Features

2.3.4.1 Introduction

The progressive development of the modified overburden emplacement is illustrated by **Figure 2.2** (with **Figure 2.6** providing further illustration of the overburden emplacement at the completion of mining and on rehabilitation). The critical design features of the two key features of the modified overburden emplacement, namely the western extension of the out-of pit emplacement and northern extension of the 400m to 445m AHD section of the in-pit emplacement are considered in the following sub-sections.

2.3.4.2 Out-of-Pit Emplacement (Western Extension)

The out-of-pit emplacement would be extended by approximately 6ha over an area currently assigned to the stockpiling of soil. This is planned for completion during 2016, with any remaining soil contained to be either used for the rehabilitation of the profiled sections of the overburden emplacement or relocated to other areas assigned for the stockpiling of soil. The extension would increase the capacity of the overburden emplacement by approximately 2.0Mbcm, however, importantly this additional capacity would be external to the open cut void and therefore increase the active capacity of the emplacement.

In line with current overburden design principles, the lower to middle slopes of the overburden emplacement extension would be constructed with comparatively gentle slope of 10° or less. Existing contour banks on the rehabilitated landform would be extended to manage surface water runoff and assist in minimising erosion of these slopes.

2.3.4.3 In-Pit Emplacement (400m to 445m AHD Extension)

Located predominantly within and above the void created by the open cut, the 400m to 445m AHD section of the Overburden Emplacement would be extended by approximately 250m to the north. The extension would increase the capacity of the overburden emplacement by approximately 13.5Mbcm.

As discussed in Section 2.2.3, the modified in-pit overburden emplacement does not include haulage ramps to the open cut. By transferring the haul ramps to the high wall side of the open cut, the active capacity for overburden emplacement would increase from 8 weeks to approximately 6 months.

In line with current overburden design principles, the advancing northern face of the in-pit emplacement would be constructed with steeper slopes which would ultimately be reduced to 18^{o} (1V:3H) or less in the final landform. Section 2.10 reviews the activities required to create the final 18° slope. On the out-of-pit eastern and western slopes, the slopes of the overburden emplacement would be constructed with comparatively gentle slope of approximately 10°. On the outer slopes and final in-pit (northern) slope, existing contour banks would be extended to manage surface water runoff and assist in minimising erosion of these slopes.

2.3.5 Overburden and Interburden Management Methods

While the volume of overburden / interburden requiring placement within the overburden emplacement is now greater than previously predicted, no change to the total volume of current and approved overburden and interburden removal and placement is proposed.

2.4 PROCESSING OPERATIONS AND STOCKPILE MANAGEMENT

2.4.1 Introduction

The Proponent would continue to process ROM coal as described in Section 1.6.5. The mobile crushing unit operating at the southern end of the Coal Processing Area would also continue to operate to supply coal for domestic markets and the Whitehaven CHPP. No change to the hours of operation is proposed and production rates would remain the same as those currently approved (2.5Mtpa).

As noted in Sections 1.6.5 and 1.7, greater than anticipated contamination of the coal recovered from the seams previously mined by the Werris Creek Colliery requires additional screening of shaly and other non-coal material to ensure export coal specifications are maintained. Coal containing such contaminants is often washed, however, this would introduce a new waste material (tailings) on the Mine. An alternative processing approach, dry-screening, has therefore been proposed which does not require the addition of water nor generate a new waste material.

2.4.2 Dry Separation Processing

Coal recovered from the seams affected by the former underground workings, as well as other coal with rock, ash or other contaminant, would be stockpiled separately prior and post crushing. The coal would be pre-screened to remove the <50mm component which would be co-disposed with the overburden.

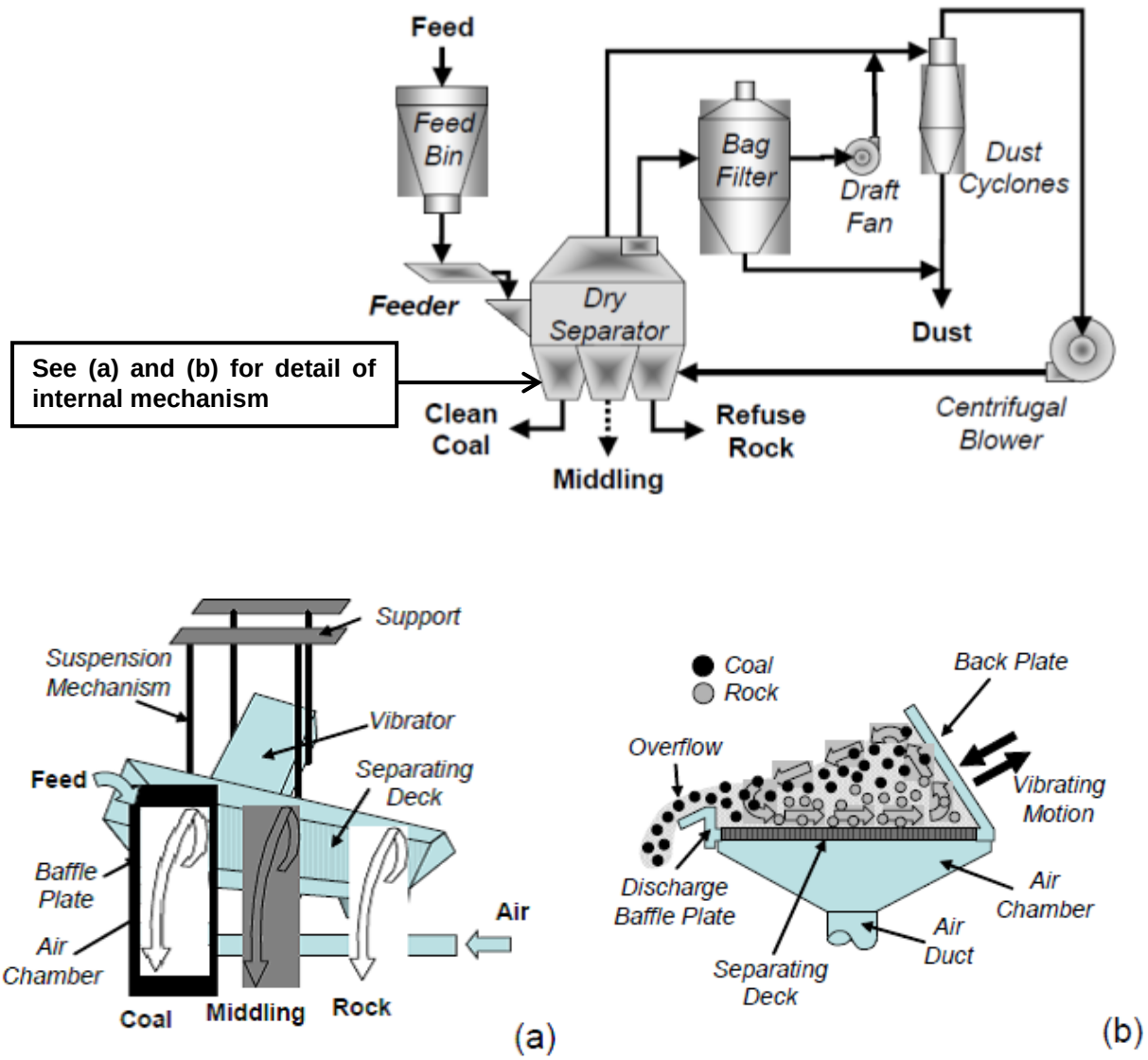
The screened coal would then be loaded to a feed hopper by front-end loader and passed over a vibrating table. The vibration creates a fluidized layer of the material on the table deck which is then passed over an air table separator which incorporates the following.

- A downward sloping deck with a series of (6mm) apertures through which air is blown through.
- A series of baffles along the deck edge to collect and remove the particles as they move towards the edge of the deck.

The lower density (lighter) coal particles, which are lifted more easily by the force of the air move to the top of the fluidized layer and slide first off the downward sloping table. The higher density (heavier) particles of shale and other contaminants are slower to move off the deck and accumulate at the back of the table.

The air is recycled through the plant by the action of a cyclone which creates an exhaust effect. The air is drawn from table through a bag filter where larger diameter dust particles are captured for removal. The action of the cyclone filter removes additional particulate matter before the air is forced back though the apertures of the table by a centrifugal blower.

Figure 2.3 provides a schematic illustration of the dry separation process.



Source: Honaker (2007)

Plate A 180tph Dry Separation Plant (Source: FGX)

Figure 2.3
DRY PROCESSING OPERATIONS

The Proponent anticipates up to 10% of ROM coal could be processed by the dry processing unit, up to 250 000tpa. Dry processing would be undertaken as sufficient stockpiles are generated, i.e. campaign based, and a unit with a throughput of 200t/hr is proposed. **Plate A** of **Figure 2.1** provides an example of a dry processing plant equivalent in size and configuration to that proposed.

2.4.3 Stockpile Management

The area of the Mine designated for ROM and product coal stockpiling would remain the same. The component of the ROM coal to be dry separated would be placed within separate stockpiles on the ROM Pad, close to the Dry Separation Plant by front-end loader to limit the haul distance for the front-end loader.

The coal produced by the Dry Separation Plant would be transferred to a larger stockpile by front-end loader as it accumulates below the air separator table before being transferred to the Product Coal Storage Area prior to rail load-out. The overburden removed through the Dry Separation Plant would similarly be stockpiled and periodically transferred by front-end loader and placed with other overburden material from mining within the overburden emplacement.

The Product Coal Storage Area extension approved by PA 10_0059 has yet to be constructed and is considered unlikely over the life of the Mine.

2.5 VOID WATER MANAGEMENT

2.5.1 Introduction

As noted in Section 1.6.7, water which accumulates in the open cut void is collected within sumps at the base of the void and periodically pumped to surface void water dams for storage prior to use for dust suppression and/or evaporation. The following sub-sections review the quality of the water, water balance under a variety of rainfall conditions, and proposed strategy for the beneficial agricultural use of void water from the Mine.

2.5.2 Void Water Quality

Samples of void water within the open cut and Void Water Dams 1, 3 and 4 were taken on 11 November 2014 following a rainfall event. Samples of void water were then taken from the open cut on 18 November 2014 after a 1 week period of dry weather. **Table 2.2** provides a summary of the water quality and includes the various triggers for short-term agricultural application (irrigation), livestock watering and aquatic ecosystem protection (95%) of ANZECC (2000). Some minor exceedances of Short-term Exposure Limits for irrigation for electrical conductivity and sodium are identified, however, appropriate management of this water if irrigated would be undertaken to ensure no accumulation of salts within the land to which the water might be applied (see Sections 2.5.4.4 and 4.6.5).

Table 2.2
Void Water Quality

Analyte	Unit	Void Water		Void Water Dams				ANZECC (2000) Criteria		
		(after rain)	(no rain)	1	2	3	4	I (STE)	L	E (95%)
pH		8.02	7.92	8.5	8.41	8.74	8.97	6-8.5	-	6-8.5
Electrical Conductivity	µS/cm	921	929	**1100**	**1070**	994	**1030**	950	-	-
Sodium Adsorption Ratio		3.03	3.23	4.59	NT	4.82	4.74	-	-	-
Total Dissolved Solids	mg/L	512	501	602	NT	546	561	-	4000	-
Hardness as $CaCO_3$	mg/L	244	229	215	NT	173	175	-	-	-
Alkalinity as $CaCO_3$	mg/L	159	160	150	NT	129	121	-	-	-
Sulphate	mg/L	98	118	154	NT	144	145	-	1000	-
Chloride	mg/L	113	117	150	NT	140	147	175	-	-
Calcium	mg/L	78	77	50	NT	43	42	-	1000	-
Magnesium	mg/L	12	9	22	NT	16	17	-	2000	-
Sodium	mg/L	109	113	**155**	NT	**146**	**144**	115	-	-
Potassium	mg/L	9	12	10	NT	10	10	-	-	-
Aluminium	mg/L	<0.01	<0.01	0.02	NT	0.03	0.06	20	5	0.055
Arsenic	mg/L	0.006	0.004	<0.001	NT	0.002	0.001	2	0.5	0.024
Cadmium	mg/L	<0.0001	<0.0001	<0.0001	NT	<0.0001	<0.0001	0.05	0.01	0.0002
Chromium	mg/L	<0.001	<0.001	<0.001	NT	0.012	0.001	1	1	0.001
Copper	mg/L	0.001	0.001	0.001	NT	0.002	0.003	5	1	0.0014
Lead	mg/L	<0.001	<0.001	<0.001	NT	<0.001	<0.001	5	.01	0.0034
Nickel	mg/L	0.006	0.005	<0.001	NT	0.008	<0.001	2	1	0.011
Selenium	mg/L	<0.01	<0.01	<0.01	NT	<0.01	<0.01	0.05	0.02	0.011
Zinc	mg/L	0.024	0.011	0.051	NT	0.006	0.146	5	20	0.008
Iron	mg/L	<0.05	<0.05	<0.05	NT	0.07	<0.05	10	-	-
Mercury	mg/L	<0.0001	<0.0001	<0.0001	NT	<0.0001	<0.0001	0.002	0.002	0.0006
Fluoride	mg/L	0.1	0.2	0.2	NT	0.2	0.1	-	-	-
Ammonia	mg/L	0.15	0.23	<0.01	NT	0.01	<0.01	-	-	0.9
Nitrite	mg/L	0.07	0.08	0.03	0.05	0.05	0.07	-	9.1	-
Nitrate	mg/L	6.23	6.13	2.29	4.86	2.48	4.78	-	90.3	0.7
Kjeldahl Nitrogen	mg/L	6.3	1.3	0.5	0.7	1.1	1	-	-	0.5
Phosphorous	mg/L	0.01	<0.01	<0.01	<0.01	0.06	<0.01	0.8	-	-
Biological Oxygen Demand	mg/L	<2	<2	<2		<2	<2	-	-	85-110

Note 1: I (STE) = Irrigation (Short-term Exposure) L = Livestock Watering E (95%) = Ecosystem Protection (95% species)
NT = Not tested

Bold identifies exceedance of I (STE) criteria underline identifies exceedance of E(95%) criteria

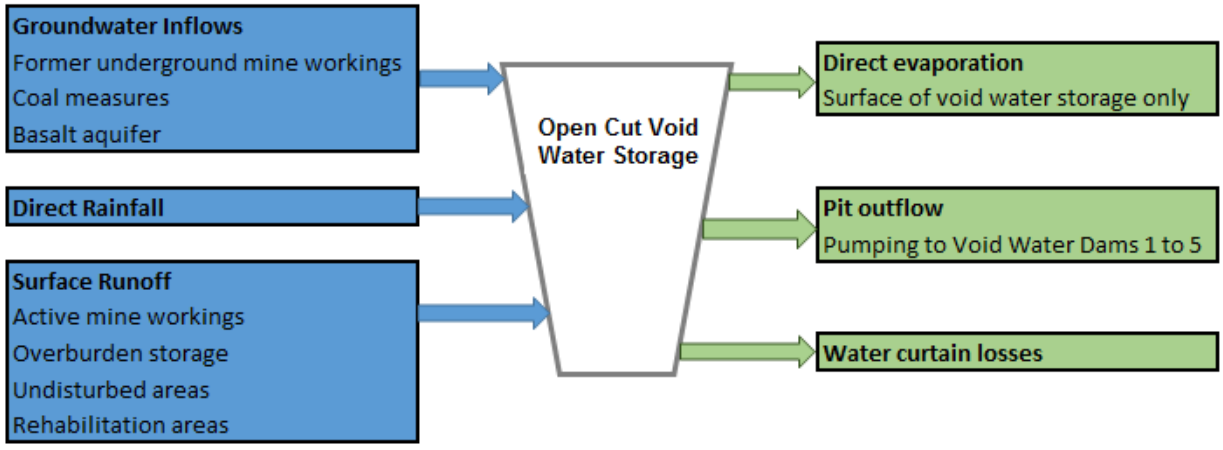
Source: ALS Laboratories

As the void water to be stored at surface is marginally brackish (EC of 900 to 1 1000µS/cm), the void water dams are constructed with compacted clay to achieve a permeability value of <1 x 10^{-9}m/s over 500mm. No discharge from the Mine is currently permitted from the void water dams, although it is worthy of note that the salinity of the water contained within Quipolly Creek and Werris Creek downstream of the Mine has consistently been measured with an Electrical Conductivity exceeding 900µS/cm (WCC, 2014).

2.5.3 Void Water Balance

As discussed in Section 1.6.7, the Mine has in recent years operated with the void water dams at or near capacity with misting evaporators used to maximise storage. This suggests the Water Balance Model (WBM) prepared for the Mine by GSSE (2010) for the purposes of the LOM Project *Environmental Assessment* underestimated the inflows to the open cut void from rainfall (increasing strike length of the pit and increased area of overburden emplacement capturing runoff) and the former underground workings (originally planned to be dewatered but water has been used to manage potential spontaneous combustion).

GSSE (2010) predicted that even without the accelerated evaporation provided by the misting evaporators, there would only be a small surplus of void water (29ML) during wet (90th percentile rainfall) years. In order to more accurately assess the future water management requirements of the Mine, ENVIRON was commissioned by the Applicant to review and update the Mine WBM. **Figure 2.4** presents a schematic illustration of the water in-flows and out-flows considered as part of the WBM for the open cut void of the Mine.



Source: Modified after ENVIRON (2015) – Figure 1

Figure 2.4
VOID WATER BALANCE

Groundwater in-flows were predicted using the calibrated groundwater model for the Mine previously designed by ENVIRON (2014). The 113 year data set of daily rainfall from the Bureau of Meteorology Station (No. 055062) at Werris Creek Post Office was used to provide the direct rainfall in-flow. Inputs for surface runoff were generated by calibrating the original runoff coefficients produced by GSSE (2010), which appear to have been over generalized for assessment of the LOM Project, against observed variation in void water storage. ENVIRON (2015), presented in full as **Appendix 2**, provide a more detailed description of the Conceptual WBM and calibration of inputs.

In order to best understand the likely surplus / deficit of water over the remaining life of the Mine, three mining scenarios were considered. These scenarios coincide with those presented in **Figure 2.2** and represent:

- development of the open cut and rehabilitation at the end of 2015;
- development of the open cut and rehabilitation at the end of 2017 (which includes the decommissioning of Void Water Dam 2 and Void Water Dam 5); and
- development of the open cut and rehabilitation at the end of 2020.

For each mining scenario, a dry (15th percentile), median and wet (90th percentile) rainfall year was considered (as taken from the 113 year data set from BOM Station No. 055062).

Table 2.3 presents a summary of the WBM output for each combination of mining and rainfall scenario. It is noted that this output does not account for the additional evaporation provided by the misting evaporator units.

The Applicant would continue to operate two evaporator units over the void water dams. While some small fluctuation in the volume of water evaporated annually is expected as a result of variable rainfall, this is not expected to impact significantly on the total volume evaporated. On this basis, it is expected that two evaporators, operating 24 hours per day over the longer, warmer spring – summer months and during daylight hours over the cooler, shorter autumn – winter months, would provide for additional evaporation of up to 360MLpa. Accounting for periods of non-operation due to noise management or general maintenance, as well as particularly wet years, a conservative estimate of the average annual evaporation to be used in the WBM for the evaporators is 300ML per annum.

Table 2.3
Void Water Balance

Inputs / Outputs		Year 2015			Year 2017			Year 2020		
		Median	15th %ile	90th %ile	Median	15th %ile	90th %ile	Median	15th %ile	90th %ile
Inputs	Rainfall/runoff	737	570	1 043	835	643	1 192	792	605	1 130
	Groundwater Inflow	54	54	54	47	47	47	22	22	22
	Input (return) from Underground	67	67	67	-	-	-	-	-	-
	Total	**858**	**691**	**1 164**	**882**	**690**	**1 239**	**814**	**627**	**1 152**
Outputs	Evaporation[1]	408	381	329	428	408	374	409	328	358
	Water use	365	365	365	365	365	365	365	365	365
	Total	**773**	**746**	**694**	**793**	**773**	**739**	**774**	**693**	**723**
Balance		**85**	**-55**	**470**	**89**	**-83**	**500**	**40**	**-66**	**429**

Note 1: From surface of void water storages only (does not include additional evaporation from misting evaporator units)

Source: Modified after ENVIRON (2015) – Table 1

Table 2.4 provides a revised summary of the WBM output for each combination of mining and rainfall scenario with the inclusion of this additional evaporation.

Table 2.4
Void Water Balance (with Evaporators)

Inputs / Outputs		Year 2015			Year 2017			Year 2020		
		Median	15th %ile	90th %ile	Median	15th %ile	90th %ile	Median	15th %ile	90th %ile
Inputs	Rainfall/runoff	737	570	1 043	835	643	1 192	792	605	1 130
	Groundwater Inflow	54	54	54	47	47	47	22	22	22
	Input (return) from Underground	67	67	67	-	-	-	-	-	-
	Total	**858**	**691**	**1 164**	**882**	**690**	**1 239**	**814**	**627**	**1 152**
Outputs	Evaporation (from Void Water Dam Surface)	408	381	329	428	408	374	409	328	358
	Evaporation (from Evaporator Units)	300	300	300	300	300	300	300	300	300
	Water use	365	365	365	365	365	365	365	365	365
	Total	**1 073**	**1 046**	**994**	**1 093**	**1 073**	**1 039**	**1 074**	**993**	**1 023**
Balance		**-215**	**-355**	**170**	**-211**	**-383**	**200**	**-260**	**-366**	**129**

Source: Modified after ENVIRON (2015) – Table 1

Table 2.4 suggests void water additional to dam storage capacity (up to 200ML) is predicted under both median and high rainfall conditions prompting either retention of water within the open cut or an alternative water management strategy. In the event that the evaporator units were removed from operation, although not proposed at this stage, the potential surplus could increase to 500MLpa[7].

Considering the capacity of the void water dams of the Mine are operating close to capacity (of 714ML), the predicted deficits during low and median rainfall years are not anticipated to impact on water availability for dust suppression given the existing volume of water currently available for the Mine to draw down against.

2.5.4 Proposed Void Water Agricultural Use

2.5.4.1 Introduction

On the basis of the WBM predictions (see **Tables 2.3** and **2.4**), the volume of void water generated could exceed the capacity of the void water dams under median and high rainfall scenarios. In order to alleviate the storage capacity shortfall, the Applicant proposes to make

[7] This would only occur if the volume of water to be transferred to an off-site user significantly exceeds that volume which is currently being evaporated.

this water available to the owners or users (under lease) of land adjoining or surrounding the Mine Site for irrigation and/or other agricultural use (i.e. stock watering). Notably, the Applicant has been approached by neighbouring land owners with respect to water availability, with the proposal to make this water available supported by the Mine Community Consultative Committee (which represents the interests and concerns of the local community) (refer to Section 3.2.1.1).

At this point, the Applicant has only fielded expressions of interest in the use of available void water with no specific location identified or confirmed. Hence, the Proposal presented in this *Environmental Assessment* is not for a prescribed irrigation program, rather for the inclusion of a condition within PA 10_0059 that allows for void water to be supplied to third party users, subject to the satisfaction of specific requirements for each individual supply contract. The Applicant notes that any irrigation or other agricultural use of void water would be undertaken by the land owner / user (referred to hereafter as "the Irrigator"[8]) in accordance with the approved land use. Furthermore, obtaining relevant/necessary licences or approvals would be the responsibility of the Irrigator to obtain and manage.

While specific areas for irrigation have not been prescribed, in order to illustrate that void water irrigation may be undertaken without adversely impacting on the local environment, the *Environmental Assessment* incudes a *Void Water Irrigation Assessment* (VWIA) (SEEC, 2015). The VWIA models the application of void water to land, using parameters derived from sampling and analysis of two soil types indicative of the local setting. In summary therefore, this document, and the VWIA included as **Appendix 5**, has been prepared to:

(a) demonstrate that irrigation of the void water is a feasible use of this water, i.e. could be undertaken without adverse impact on the land to which it is applied;

(b) delineate the relative responsibility(ies) of the Applicant as the supplier of water and the irrigator as the user of water; and

(c) provide for suitable controls that are enforceable to ensure that appropriate controls are in place (both by the Applicant and Irrigator) to ensure water application is undertaken appropriately for the nominated land area and does not impact adversely on the land or catchment.

2.5.4.2 Feasibility of Irrigation

Irrigation is a common land use within the local setting, in particular to the south of the Mine Site on land in the Quipolly Creek area. It is acknowledged that the water used for irrigation in this locality is sourced primarily from the alluvium associated with the creek, which is a different source of water to that which accumulates within the open cut void (mixture of in-flows from rainfall, coal seams and interburden and underlying Werrie basalt).

[8] It is noted that water could be sourced for the purpose of stock watering as well.

In order to demonstrate the feasibility of irrigating the quality of water accumulated in the open cut void, Strategic Environmental and Engineering Consultants (SEEC) has modelled the application of this water to local land using the EPA endorsed *Effluent Reuse Irrigation Model* (ERIM)[9]. Soil indicative of the land surrounding the Mine Site was sampled (on the "Escott" property to the west and "Cintra" property to the north) and used for modelling purposes.

While the exact method for the application of void water to land would be finalised in conjunction with the land owner / lease holder (see Section 2.5.4.3) and following a site-specific assessment (see Section 2.5.4.4), the modelling of SEEC (2015) has confirmed that irrigation at a rate of approximately 6.25ML/ha/year could be accommodated. On this basis, in the event of a 90th percentile rainfall year, resulting in a surplus of up to 200ML, the Applicant would require irrigation to an area of up to 32ha. Section 4.7 provides the detail of the ERIM inputs and outputs as part of an assessment of impact.

2.5.4.3 Management of Irrigation - General

Unless modified by contract between the Applicant and Irrigator, the Applicant would be responsible for the accumulation and storage of void water on the Mine Site (within void water dams or the open cut) and initial pumping transfer (to the Mine Site boundary) of this water. The Irrigator would be responsible for the delivery of this water to irrigation infrastructure or off-site water storage and irrigation of the water in accordance with additional approvals or licences (as required).

The Applicant proposes that any irrigation program be managed in accordance with the following.

(1) **The Applicant** would extend the quarterly surface water monitoring program to include those analytes critical to the assessment of impact on soil salinity and nutrient levels.

(2) A potential **Irrigator** would provide a proposal to the Applicant for supply. This would require information on the intended use, location, method of application and rate of application.

(3) Unless existing soil data is considered representative, **the Applicant** would commission soil sampling at the nominated site. The results of the soil analyses, and most recent void water analysis, would be input into a site specific run of ERIM to confirm application can be undertaken.

(4) A *Pre-Agricultural Void Water Use Assessment* would be prepared by **the Applicant**.

(5) A contract between **the Applicant** and **Irrigator** would be reached including relative responsibilities for water quality, storage, transfer and use of the water. The contract would also specify the proposed water use, area of application, method of application (direct irrigation or transfer to secondary off-site storage), maximum application rates and other terms following the completion of a *Pre-Agricultural Void Water Use Assessment*.

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[9] The void water is not effluent as described in the *Protection of the Environment Operations Act 1997*, however, the salinity of the void water exceeds the relevant trigger for stream water quality for a NSW upland stream (350µS/cm) (ANZECC, 2000). For this reason, SEEC took a conservative approach to assessment by treating the water as effluent and applying the *Environmental Guidelines: Use of Effluent by Irrigation* (DEC, 2004).

(6) For irrigation to land in the local area, surface pipes would be installed or relocated from the most appropriate void water dam (considering proximity) to the site of the proposed irrigation. Unless modified by the terms of contract, **the Applicant** would provide for the installation of pipe infrastructure, would be responsible for the operation of pumps on the Mine Site and would monitor pipe infrastructure located on the Mine Site. The **Irrigator** would be responsible for the operation and monitoring of the irrigation equipment, infrastructure (e.g. secondary dam) and pipework off the Mine Site.

(7) Irrigation would be the responsibility of the **Irrigator** undertaken generally in accordance with contractual terms and the site specific *Pre-Agricultural Void Water Use Assessment* (refer to Section 2.5.4.4).

(8) **The Applicant** would undertake annual sampling/testing of the irrigation area to confirm operation in accordance with the *Pre-Agricultural Void Water Use Assessment*.

2.5.4.4 Management of Irrigation – Site Specific

Each application for void water would be reviewed by the Applicant. As noted in Section 2.5.4.3 (3), the Applicant would complete site-specific modelling of the area (using ERIM or another EPA endorsed modelling program) to which the void water would be applied. On the basis that the site-specific assessment confirms application of void water could be undertaken sustainably, the Applicant would prepare an *Pre-Agricultural Void Water Use Assessment* (see Section 2.5.4.3 (4)) which would be provided to the EPA and DP&E for review and endorsement prior to commencement. As indicated above the *Pre-Agricultural Void Water Use Assessment* would provide specific information on the soil, method of irrigation and other relevant details.

2.6 TRANSPORTATION

2.6.1 Introduction

The majority of coal produced would continue to be sold to export markets and delivered via the Main Northern Railway Line from Werris Creek Coal Mine to the Port of Newcastle. The Company has approval to transport up to 50 000t of coal by road from the Mine. This coal was initially supplied to local markets and other domestic customers but has declined due to transport restrictions through certain local government areas imposed by PA 10_0059 (Schedule 2 Condition 8b). The Mine retains the capacity to deliver to the Whitehaven Coal Handling and Processing Plant (CHPP) at Gunnedah.

No changes to rail transport operations are proposed. The following sub-sections describe the road transport operations as these are the subject of the Proposal (increased hours of operation).

2.6.2 External Road Network

The majority of heavy vehicles exiting the Mine Site would continue to turn right onto Werris Creek Road and right again at Taylors Lane to the south of the Mine Site. The trucks would travel west on Taylors Lane before joining the Kamilaroi Highway. The majority of vehicles are now expected to make a right hand turn and travel towards Gunnedah although it is possible that occasional deliveries may require a left hand turn at the Kamilaroi Highway (noting that

transport through Mudgee and the Hunter Valley are prohibited by PA 10_0059). Domestic supplies destined for Tamworth or further north on the New England Highway would turn left from the site onto Werris Creek Road and make their way through the town of Werris Creek. **Figure 2.5** presents the primary transport route from the Mine Site to the Whitehaven CHPP. Traffic Types and Levels

The delivery of coal to the Gunnedah CHPP and domestic markets would be by a range of truck configurations carrying an average of 30t. Based on the despatch of 50 000t of coal per year and an average truck capacity of 30t, this equates to approximately 1 700 truck loads (3 400 movements) per year.

Table 2.5 provides an analysis of weekday coal haulage from the Mine to the Gunnedah CHPP between 3 February and 7 April 2014 which would be indicative of future campaigns.

Table 2.5
Campaign Based Haulage Truck Movement

Traffic Period (2014)		Operating Days	Deliveries						Coal (t)
			Total	Min	Max	Average	85th %ile	95th %ile	
3 Feb	28 Feb	16	414	18	35	26	33	-	12 397
3 Mar	31 Mar	21	638	11	47	30	39	47	19 668
1 Apr	7 April	5	134	7	34	27	-	-	3 959
Total		**41**	**1 186**	**7**	**47**	**28**	**34**	**43**	**36 024**

On the basis of the 2014 data, between 10 and 50 deliveries are expected per week day (4 to 10 on Saturdays), with an average of 28 (56 movements). Greater than 43 deliveries (86 movements) would only exit the Mine on 5% of days during the haulage campaign.

2.7 FACILITIES AND SERVICES

With the exception of the Dry Separation Plan described in Section 2.4.2, and irrigation infrastructure as described in Section 2.5.4, no additional facilities or services are proposed.

2.8 MINE LIFE AND HOURS OF OPERATION

On the basis of current mine design, mining of the Werris Creek coal measures would be completed in 2021, with rehabilitation to be completed during 2022.

The Mine is approved to operated 24 hours a day seven days per week, with blasting restricted to between 9.00am and 5.00pm, Monday to Saturday.

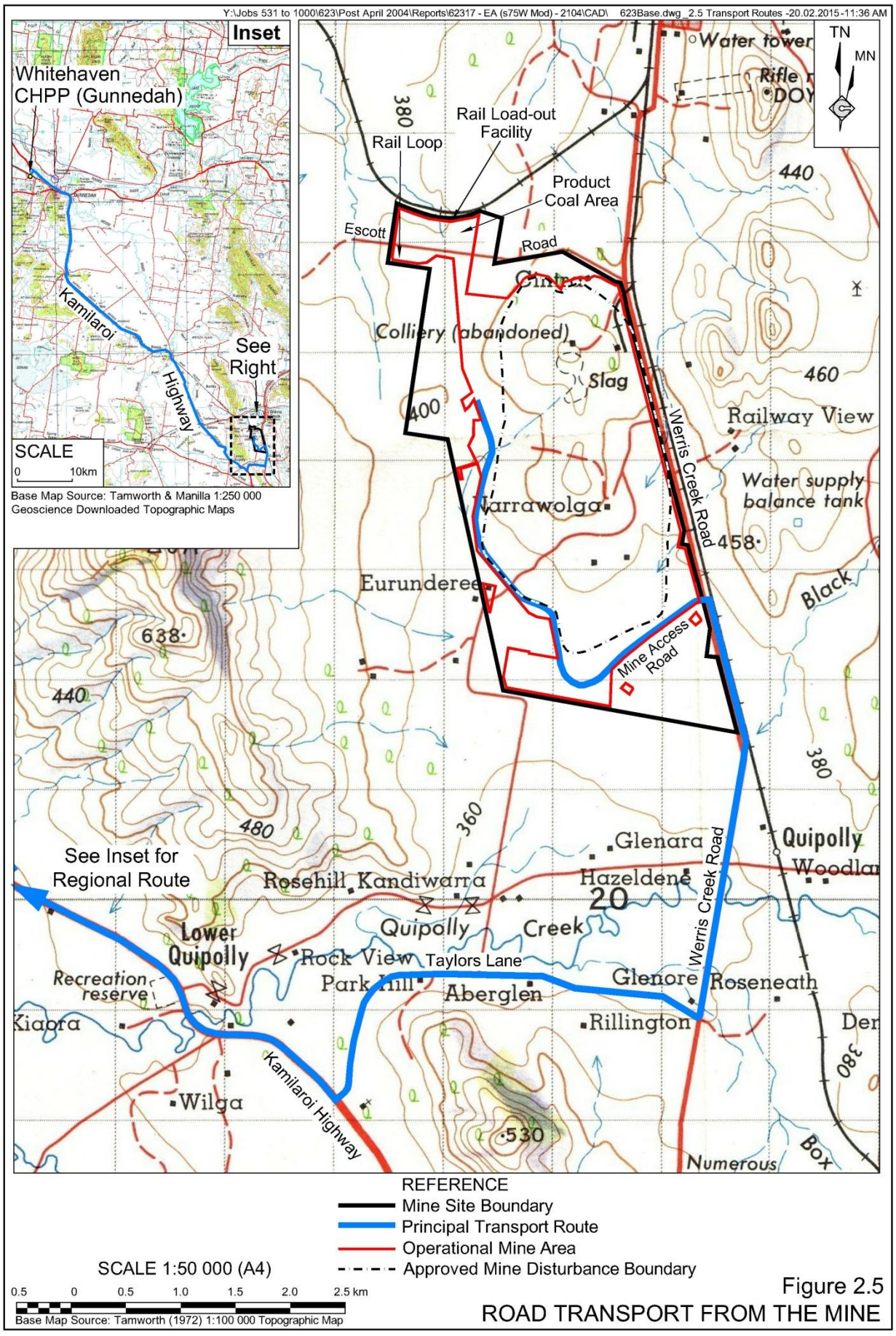

Figure 2.5
ROAD TRANSPORT FROM THE MINE

In order to better coordinate operations with the Whitehaven CHPP, which is approved to undertake domestic coal screening and despatch between the hours of 7:00am and 10:00pm Monday to Friday and 7:00am to 6:00pm Saturday, it is proposed to increase the hours of road transport to these hours. An additional benefit of the extended transport hours would be the ability of the Applicant to condense campaign transport operations from the Mine by 20% to 30% (by virtue of an increase in the available hours for transport each day/week of 35%). This would have benefits both to the Applicant (reduced haulage contract costs) and road users (reduced periods when coal carrying trucks operated between the Mine and Whitehaven CHPP).

2.9 EMPLOYMENT, CAPITAL COST AND ECONOMIC CONTRIBUTIONS

WCC currently employees 140 full-time equivalent personnel and it is not envisaged that this would change significantly as a result of the Proposal. Personnel would be required to operate the Dry Separation Plant, however, it is likely that these would be reassigned from the current workforce. Of the workforce, the majority (60) of Proponent employed personnel reside locally in the Liverpool Plains Shire including Quirindi, Werris Creek, Willow Tree, Wallabadah, Currabubula and Spring Ridge. The majority of the regular contractors are also based in Werris Creek, Quirindi, Tamworth and Gunnedah.

The Proponent has committed to employing locally where possible and would continue to contribute financially or in-kind to local community events and services. This includes the contribution of $300 000 to local Werris Creek and Quirindi projects between 2010 and 2017.

The Proponent would continue this proven commitment to Werris Creek and the Liverpool Plains Shire more generally over the remaining life of the Mine.

2.10 REHABILITATION, FINAL LANDFORM AND DECOMMISSIONING

2.10.1 Introduction

The Proponent would continue to implement a progressive approach to the rehabilitation of disturbed areas at the Mine to ensure that areas where mining or overburden placement are completed, these area are quickly shaped and vegetated to provide a stable landform. The progressive formation of the post-mining landform and the establishment of a vegetative cover would also minimise the visibility of mine-related activities from surrounding properties and from the Werris Creek Road and the town of Werris Creek.

2.10.2 Objectives

The Proponent's rehabilitation objectives remain unchanged from those of the approved operations. Particular emphasis would be placed on the re-establishment of native woodland vegetation that are commensurate with the White Box Yellow Box Blakely's Red Gum (Box Gum) Woodland endangered ecological community, which has been identified on the Mine Site. The restoration of woodland vegetation communities would compensate for those areas

disturbed by the mine development, link currently isolated remnant pockets of the Box Gum community, and provide a greater area and more diverse native fauna habitat and wildlife corridors.

The Proponent's rehabilitation objectives are divided into three specific categories, namely:

- integrating landscapes;
- achieving sustainable growth and development; and
- establishing the final land use.

The specific objectives associated with each category are as follows.

Integrated Landscapes

- To provide a vegetated corridor across Proponent owned land and the Quipolly Creek Catchment linking with sub-regional habitat corridors.
- To reduce the visibility of mine-related activities from adjacent properties, Werris Creek and the local road network.
- To create a final landform sympathetic to the surrounding topography.
- To provide a low maintenance, geotechnically stable and safe landform with minimal erosion.

Sustainable Growth and Development

- To achieve a soil profile capable of sustaining the specified final land use.
- To establish native vegetation with the species diversity commensurate to each relevant ecological community.

Final Land Use

- To re-instate an area of Rural Land Capability Class III commensurate with the agricultural land use on and around the Mine Site.
- To re-instate woodland vegetation communities commensurate with the remnant woodland vegetation disturbed by mining and associated activities.
- Undertake habitat augmentation to improve and promote corridors for fauna movement linking adjacent remnant woodland vegetation with the rehabilitation of the Mine Site.

2.10.3 Final Land Use

The Proposal would not result in any change to the principal uses of the rehabilitated landform, namely.

(i) Re-establishing the woodland vegetation communities commensurate to:

– Box Gum Woodland and Derived Native Grassland (EEC equivalent);

– Brigalow-Belah Woodland (EEC equivalent); or

– Shrubby White Box Woodland.

(ii) Class III capable agricultural land.

2.10.4 Final Landform

The overall final landform concept for the Mine would not change as a result of the Proposal, however, there would be several minor modifications.

- The hill rising to 445m AHD would extend further to the north (towards Werris Creek). The upper surface of the hill would remain generally flat, however, would be shaped with minor rises and swales to create an undulating terrain. Slopes around the constructed plateau would be approximately 10° or shallower.
- The area of land to be rehabilitated back to Class III land over the Product Coal Storage area would be reduced as a result of this area now remaining undisturbed. Notably, there would be no reduction in the area of Class III land in the final landform as the area that will remain undisturbed is currently classified as Class II land.

Figure 2.6 illustrates the final stage of mining (Panel 1), final landform prior to rehabilitation (Panel 2) and rehabilitated final landform (Panel 3).

2.10.5 Strategic Rehabilitation Management

2.10.5.1 Rehabilitation Domains

A domain is a land management unit with similar features of disturbance or end land use. Domains are considered either primary (operational) or secondary (post-mining) domains as follows.

1. Primary or operational domains - categorised on the basis of mining-related activities occurring within each domain.
2. Secondary or post-mining land use domains - categorised on the basis of similar post-mining land use objectives and rehabilitation outcomes.

Table 2.6 identifies the domains relevant to the Mine and **Figure 2.6** (Panel 2) identifies these in relation to the proposed rehabilitation of the Mine.

The following subsections provide a description of each of the domains.

2.10.5.2 Primary Domains

Domain 1 – Infrastructure Areas

This domain would include the Administration and Workshop Area, the Coal Processing Area, the Rail Load-out Facility, the Product and ROM Coal Storage Areas, the Explosives Magazine, the Precursor Storage Facility and any other miscellaneous buildings or roads (excluding haul roads).

Table 2.6
Primary and Secondary MOP Domains

Code[1]	Primary (Operational) Domains	Code[1]	Secondary (Post Mining Land Use) Domains
1	Infrastructure Area	A	Infrastructure
3	Water Management Area	B	Water Management Area
4	Waste Rock Emplacement Area	E	Woodland
5	Stockpiled Material	G	Rural Land Capability Classification I to VIII
6	Void (Open cut void)	J	Conservation and Biodiversity Offset Area
9	Conservation and Biodiversity Offset Area		
10	Rural Land		
Note 1: Sourced from ESG3: Mining Operation Plan Guidelines, September 2013 – Table 4.			

Domain 3 – Water Management Areas

This domain includes all void, clean and dirty water dams, diversion drains and associated infrastructure.

Domain 4 – Waste Rock Emplacement Area

This domain would include all overburden emplacement areas both in-pit and out-of-pit, as well as the Acoustic and Visual Amenity Bund.

Domain 5 – Stockpiled Material

This domain would include remaining stockpiles of soil or other materials set-aside for rehabilitation but not required.

Domain 6 – Void (Open Cut Void)

The final void area would include the post-mining void and perimeter required for creation of the final landform, low wall, high wall and any associated access.

Domain 9 – Conservation and Biodiversity Offset Area

This domain includes those areas of the Mine Site included within the approved Biodiversity Offset Area.

Domain 10 – Rural Land

This domain is limited to areas where agricultural operations would continue during the life of the Mine. In summary, this domain would not be impacted by Mine-related activities and land management would be similar to the pre-mining land management operations.

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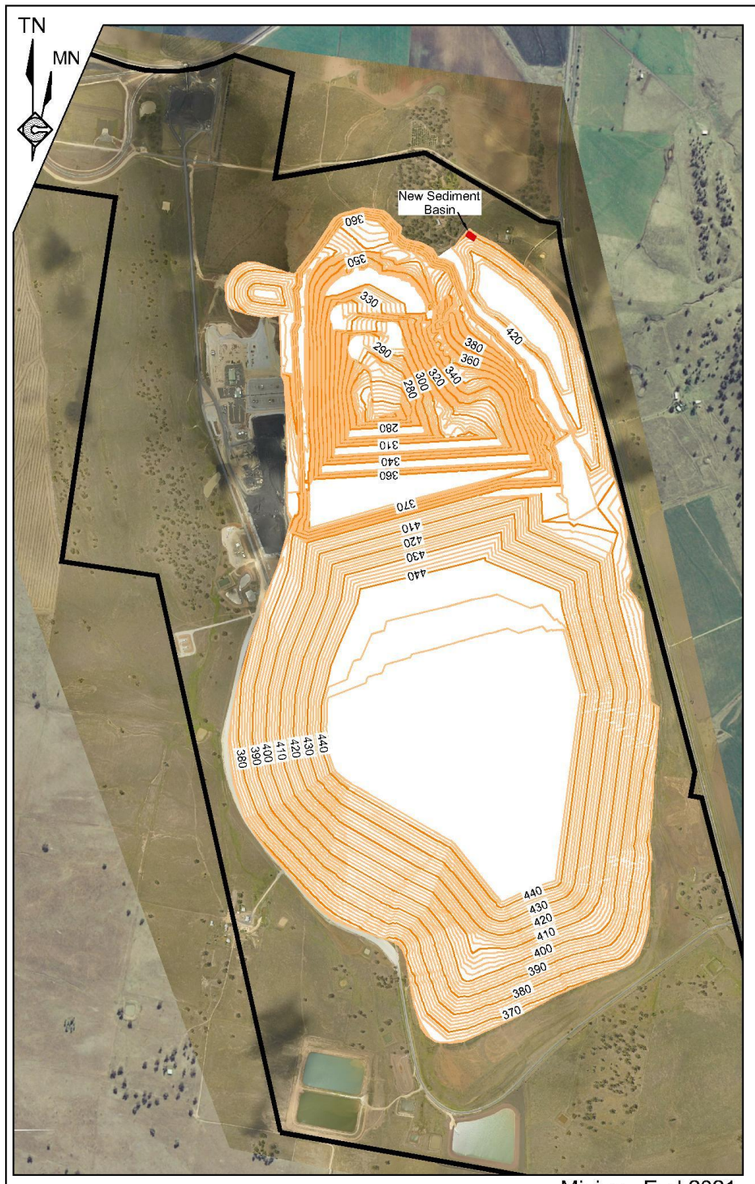
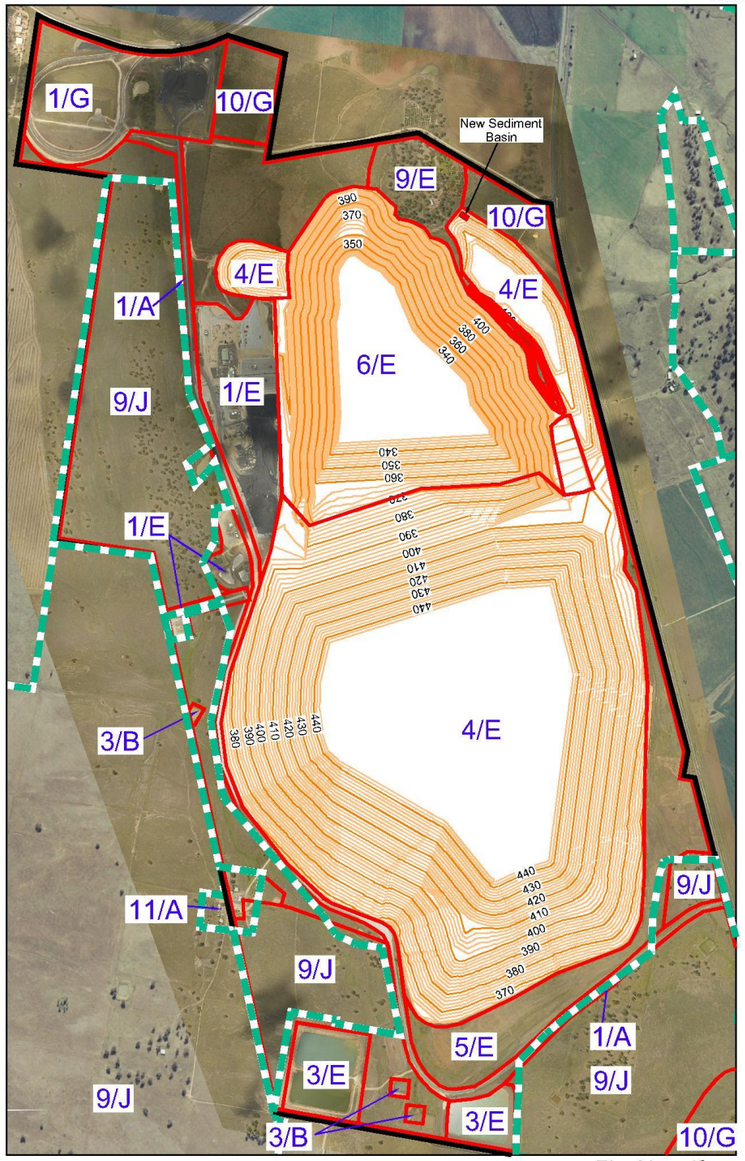
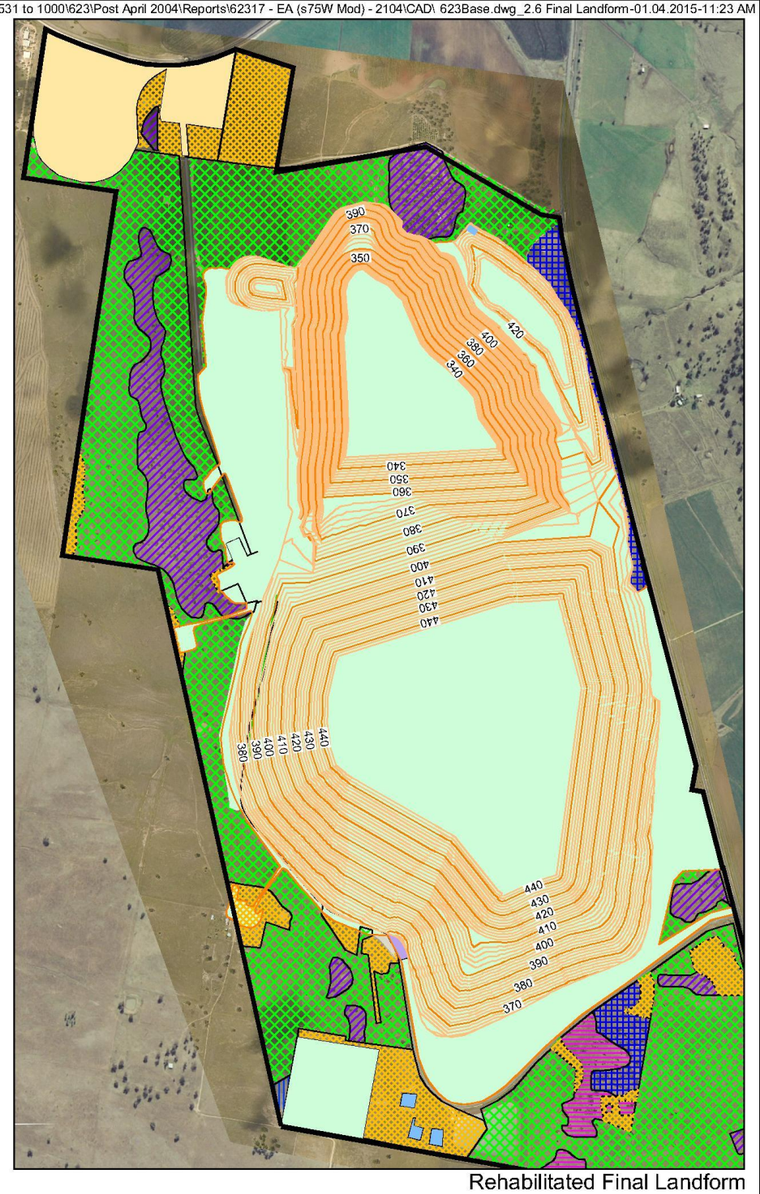


Mining - End 2021



Final Landform
(including Rehabilitation Domains)



Rehabilitated Final Landform

REFERENCE
- Mine Site Boundary
- 390 Proposed Contour (m AHD)
- Biodiversity Offset Area
- Domain Boundary
- 3/B Primary Domain / Secondary Domain (refer to Section 2.10.5.1)

Vegetation Communities (ELA, 2010)
- White Box Grassy Woodland - Condition Class 4
- White Box Grassy Woodland and Derived Native Grassland - Condition Class 3a
- White Box Grassy Woodland and Derived Native Grassland - Condition Class 3b
- Bluegrass - Speargrass - Redleg Grass Derived Grassland - Class 3
- Yellow Box - Blakely's Red Gum Grassy Woodland - Condition Class 4
- Cleared and Cultivated Land

Proposed Rehabilitated Vegetation
- Water Storage
- Class III Agricultural Land
- Native Woodland

SCALE 1:25 000 (A3)

250 0 250 500 750 1000 1250 m

Base Photograph Source: Werris Creek Coal Pty Limited (2014)

Figure 2.6
MODIFIED FINAL LANDFORM
AND REHABILITATION

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2.10.5.3 Secondary Domains

Domain A – Infrastructure

This domain includes those items of infrastructure that would remain following mine closure for a lawful land use, namely a land use permitted without consent or following granting of development consent.

Domain B – Water Management Areas

This domain includes those water management structures that would remain in place following mine closure, including:

- diversion drains aligned around the overburden emplacement;
- sediment basins down-slope of previous areas of disturbance; and
- the clean water (farm) dams located to the south of the Site Access Road.

Domain E – Woodland

This domain includes those areas of the Mine Site that would be rehabilitated to woodland vegetation communities.

Domain G – Rural Land Capability Classification I to VIIII

This domain includes those areas of the Mine Site that would be rehabilitated in a manner suitable for agricultural purposes, including grazing and cropping. This domain is predominantly associated with the Product Coal, Storage Area, Rail Load-out Facility and Rail Loop.

Domain J – Conservation and Biodiversity Offset Areas

This domain includes those areas of the Mine Site included within the approved Biodiversity Offset Area.

2.10.5.4 Rehabilitation Hierarchy

The rehabilitation hierarchy for the Mine is aligned to the rehabilitation objectives in Section 2.10.2 and outlined in the MOP, Rehabilitation Management Plan (RMP) and *Biodiversity and Offset Management Plan* (BOMP) (WCC, 2013). This hierarchy aligns with *ESG3: Mining Operations Plan (MOP) Guidelines, September 2013* (DRE, 2013) and will form the basis for an amended MOP to be prepared following determination of the Proposal. A summary of each phase on which the rehabilitation hierarchy is based is as follows. Specific activities associated with each phase of rehabilitation relevant to the Proposal, and not identified in the current MOP, are outlined in Section 2.10.6.

Decommissioning

Decommissioning is not specifically covered in the MOP, as only a small percentage of land is disturbed by infrastructure. Specific details of decommissioning completion criteria would be covered in the *Mine Closure Plan*. In general, the decommissioning phase of the rehabilitation hierarchy involves the cessation of usage of infrastructure, as well as its demolition, removal and any remediation of the land that may be required.

Integrated Landscapes

The integrated landscapes phase of the rehabilitation hierarchy (which is equivalent to the *Landform Establishment* phase under DRE, 2013) involves the earthworks required to cover and/or profile all or part of each domain to create a landform suitable for the proposed final land use and is sympathetic to the adjacent topography. This stage would also include the construction of any drainage structures needed for the area.

Sustainable Growth and Development

This phase is equivalent to the growth medium development and ecosystem and land use establishment phases of DRE (2013). In summary these phases of rehabilitation incorporate the following.

- The growth medium development phase involves the placement of weathered overburden, subsoil and topsoil on the final landform and preparation of the surface for revegetation. Soil preparation may include fertiliser or ameliorant application and ripping or scarifying the surface.
- The ecosystem and land use establishment phase involves the establishment and maintenance of vegetation on the completed landform. On completion of ecosystem and land use establishment for a final land use of native vegetation on the constructed landform, an initial cover of native ground cover (grasses) will be established. Revegetation will then comprise of planting native trees, commensurate with the target vegetation community. The criteria for completion of ecosystem and land use establishment in areas identified for agricultural use will depend on the type of agriculture to be undertaken and may include establishment of suitable pasture or planting of an initial crop.

Final Land Use

The final land use phase (equivalent to the ecosystem and land use sustainability phase of DRE, 2013) of the rehabilitation hierarchy occurs once monitoring shows that there is adequate vegetation over the area. An area may be in this stage for a long period of time, depending on what the final land use outcome is.

2.10.5.5 Rehabilitation Completion Criteria, Associated Performance Indicators and Monitoring Strategy

The strategic rehabilitation completion criteria, associated performance indicators and monitoring strategy for each rehabilitation phase are summarised in **Table 2.7**.

Table 2.7
Strategic Rehabilitation Completion Criteria, Associated Performance Indicators and Monitoring Strategy

Rehabilitation Objective	Completion Criteria	Performance Indicator	Monitoring Strategy
Integrated Landscapes	The landform morphology fits in with the surrounding landscape.	Slopes are at or less than 10° for out-of-pit emplacement area and less than18° for final void.	*Annual Rehabilitation Plan* prepared by mine surveyors.
	The rehabilitated area does not represent an erosion hazard.	Erosion does not exceed 0.3m (gully) deep.	Quarterly visual inspection by Environmental Officer.
Sustainable Growth Development – Woodland Ecological Community	Appropriate native plant species richness is present for the restored ecological community.	Native plant species numbers (per 400m²) to approximate: • White Box Grassy Woodland*: 23 • White Cypress Pine – Silver-leaved Ironbark Tumbledown Gum open forest: 30 • Rough-barked Apple riparian forb/grass open forest: 25 • Brigalow Woodland: 20 • White Box – White Cypress Pine shrubby open forest: 26 • Rusty Fig – Wild Quince – Native Olive dry rainforest: 35 • Plains Grass Grassland: 17 or analogue site as established.	Vegetation monitoring by ecologist to determine native plant species richness.
	Appropriate density/structure of native overstorey species is present.	Over Storey cover range between: • Box Gum Woodland: 0-25% • White Cypress Pine – Silver-leaved Ironbark Tumbledown Gum open forest: 6-40% • Brigalow Woodland: 0-25% or analogue site as established.	Vegetation monitoring by ecologist to determine over storey structure.
	Appropriate density/structure of native mid storey species is present.	Mid Storey cover range between: • Box Gum Woodland: 0-5% • White Cypress Pine – Silver-leaved Ironbark Tumbledown Gum open forest: 6-25% • Brigalow Woodland: 0-5% or analogue site as established.	Vegetation monitoring by ecologist to determine mid storey structure.
	Appropriate native groundcover is present.	Bare ground and litter does not exceed: • Box Gum Woodland: 55% • White Cypress Pine – Silver-leaved Ironbark Tumbledown Gum open forest: 55% • Brigalow Woodland: 65% • Plains Grass Grassland: 50% or analogue site as established.	Vegetation monitoring by ecologist to determine native plant species richness.

Table 2.7 (Cont'd)
Strategic Rehabilitation Completion Criteria, Associated Performance Indicators and Monitoring Strategy

Rehabilitation Objective	Completion Criteria	Performance Indicator	Monitoring Strategy
Sustainable Growth Development – Agricultural Land	The existing pasture/crop meets the required land capability class.	Land capability for pasture achieves at least Class III Land Capability.	Land capability assessment by an Agronomist.
Land Use	The area and its sustainability is consistent with the intended land use.	Establish areas of rehabilitation consistent with approved final land form/use outlined in this document.	*Biodiversity and Offset Management Plan* to be audited every 3 years. Land capability assessment by an agronomist.
	There are no potential hazards that are not consistent with the intended land use.	The site is free of safety or environmental hazards including: • holes, tunnels or unstable areas; • mining infrastructure or debris; or • hazardous materials.	Quarterly visual inspection by Environmental Officer.
	The soil pH is representative of the intended land use.	pH levels are within the range generally acceptable for plant growth (5.0 to 8.5) until data from analogue sites is available.	Annual soil analyses by Environmental Officer.
	Exotic weeds or vegetation is not competing or impacting on the intended land use.	Noxious weeds within rehabilitation or biodiversity offset areas are being managed until data from analogue sites is available.	Quarterly visual inspection by Environmental Officer.
	Feral pests are not impacting on the intended land use.	Feral pests within rehabilitation or biodiversity offset areas are being managed until data from analogue sites is available.	Quarterly visual inspection by Environmental Officer.

Source: Modified after WCC (2011) - Table 10

The rehabilitation criteria have been broadly defined to align with the rehabilitation objectives outlined in Section 2.10.2 and the rehabilitation hierarchy discussed in Section 2.10.3.4. The rehabilitation criteria aim to achieve the following.

- The ongoing refinement of completion criteria and monitoring programs that would facilitate lease relinquishment following mine closure.
- Alignment with rehabilitation and biodiversity offset area objectives.
- The facilitation of continuous improvement in restoration management practices of the rehabilitation and biodiversity offset areas.

The completion criteria and performance indicators are to be reviewed and revised in accordance with DRE (2013) following determination of the Proposal as part of the preparation of a MOP amendment. The rehabilitation monitoring strategy is likely to remain generally be in accordance with the current monitoring program, the purpose of which is to ensure the sustainable re-colonisation and ongoing management of native flora and fauna, and a guide to continual improvement of rehabilitation practises.

2.10.6 Rehabilitation Methods and Procedures

2.10.6.1 Introduction

The rehabilitation procedures to be implemented would not vary significantly from those currently implemented and documented in the BOMP, MOP and annually updated in AEMR for the mine. The following sub-sections identify those components of the Mine where rehabilitation would be modified as a result of the Proposal and provides a summary of the methods to meet the objectives described in Section 2.10.2, principal land uses described in Section 2.10.3 and final landform described in Section 2.10.4 (see **Figure 2.6**) by following the rehabilitation hierarchy set out in Section 2.10.5.

2.10.6.2 Decommissioning Activities

Decommissioning activities would be undertaken upon cessation of mining and processing activities. The only additional structure or facility requiring decommissioning and removal prior to final rehabilitation of the Mine would be the Dry Separation Plant.

The re-use at another site or sale of the Dry Separation Plant would be the preference of the Proponent. Should such a relocation or sale not eventuate, the structure would be separated into smaller sections with parts on-sold as scrap metal and any useable elements transported to a storage facility off site.

2.10.6.3 Integrated Landscapes

The Proposal would result in a variation to the area of the overburden emplacement, however, this would still be profiled so as to integrate with the surrounding landforms and the rehabilitated final void, Mine Infrastructure Area and MIA Bund (see **Figure 2.6**). The rehabilitation procedures would, however, remain the same as described in the current MOP.

- Materials suspected of being chemically unfavourable for revegetation would be buried a minimum of 2m below the final rehabilitated land surface.
- Where practicable, the exposure of large rocks on the final surface would be minimised by placing a layer of friable or weathered materials between the subsoil and topsoil and the more competent overburden and interburden materials below.
- The overburden emplacement would be profiled to create final slopes with gradients of 10°or less.

- The open cut void will be backfilled to 5m above the recovering groundwater table, currently estimated to be 330m AHD (RCA, 2010).
- The final faces of the open cut void would be left with a slope angle not exceeding 18°.
- The MIA and MIA Bund would be profiled to create final slopes with gradients of 10° or less.
- Where possible, the landform would be shaped to form undulating profiles, sympathetic to the natural landforms of the surrounding environment.
- Contour banks would continue to be progressively installed on the rehabilitated landform.

2.10.6.4 Sustainable Growth and Development

Soil Management

The rehabilitation procedures for soil management during the sustainable growth and development stage of the rehabilitation hierarchy would remain the same as current practice.

- Soil would be placed on the shaped landform. Soil would be preferentially sourced from areas being stripped in advance of mining or, if no such materials are available, from previously established stockpiles.
- The soil would be respread in accordance with the recommendations outlined in the MOP.
- Soil would not be respread when moist, to avoid excessive compaction, or too dry to avoid excessive dust and wind erosion.
- The subsoil would be first spread with topsoil then spread over the subsoil layer on an even but roughened surface which would be ripped along the line of the contour to break any compacted and/or smooth surfaces. Ripping would also assist the keying of the soil, maximise aeration and infiltration and minimise erosion.
- If required, soil would be ameliorated prior to revegetation to prevent surface crusting, increase moisture and organic content, and/or buffer surface temperatures to improve germination.
- Finally, previously cleared and stockpiled vegetation would then be spread over those areas designated for native woodland re-establishment as coarse woody debris and stag trees.

The thickness of subsoil and topsoil replaced has been determined based on the:

i) thicker soil layers being replaced in areas designated for agricultural land uses; and

ii) volumes of the various soils stripped on the Mine Site.

A comprehensive description of soil stripping and reapplication depths is provided in the MOP for the Mine.

An inventory of soils would continue to be maintained at the mine to ensure that adequate soil resources remain available for completion of mine rehabilitation.

Revegetation

The rehabilitation procedures for revegetation during the sustainable growth and development stage of the rehabilitation hierarchy would remain the same as current practice.

Agricultural Land

The areas designated for agricultural land (see Panel 3 of **Figure 2.6**) would be sown with a mixture of pasture species appropriate to the season. The seed mixture would be determined by the intended crop or agricultural activities proposed for the land.

Woodland Vegetation Communities

All areas of the final landform designated for the establishment of woodland vegetation communities (see Panel 3 of **Figure 2.6**), would be excluded from stock.

Woodland revegetation would be undertaken via a combination of direct seeding and planting. Seed and plants would, subject to commercial availability and seasons, be of local provenance. Species selection would include a combination of over-storey, middle-storey and under-storey strata and be selected from the species lists provided in the BOMP.

The Proponent has successfully commenced rehabilitation of the woodland vegetation communities on the southern and eastern slopes of the overburden emplacement (see **Figure 1.4**).

2.10.6.5 Final Land Use

During the final land use stage of the rehabilitation hierarchy, the established vegetation would be monitored in accordance with the procedures summarised in **Table 2.7** and the BOMP.

2.10.7 Rehabilitation Maintenance and Post-Mining Management

2.10.7.1 Rehabilitation Maintenance

The Proponent would maintain an ongoing rehabilitation monitoring program in accordance with existing procedures.

2.10.7.2 Post-Mining Management

The overall success of mine rehabilitation would continue to be measured by qualified ecologists who would be able to make comparisons of rehabilitated areas with control plots established in the Biodiversity Offset Area. This work has already commenced in accordance with the BOMP. This process is to be further defined in the *Mine Closure Plan* for the site which would be completed prior to mine cessation.

2.10.8 Noxious Weed Management

The Proponent would continue to monitor environmental and noxious weeds on a regular basis with an external weed spraying contractor engaged to undertake weed management campaigns across the site.

2.10.9 Biodiversity Offset

The Proposal, including the off-site irrigation areas, would not require any additional disturbance to native vegetation of threatened species habitat and therefore no additional biodiversity offsetting is required.

2.11 DEVELOPMENT ALTERNATIVES

2.11.1 Introduction

An analysis of any feasible alternatives to carrying out a proposed development is a required component of the *Environmental Assessment*. The fact that the Mine has been operating to a specific design for almost 10 years effectively reduces the range of alternatives that need to be considered given the knowledge and experience gained to date. The consideration of feasible alternatives to the activities proposed relate principally to:

- overburden emplacement design (Section 2.11.2);
- acoustic and visual amenity bund design (Section 2.11.3);
- alternate water management options (Section 2.11.4); and
- coal washing (Section 2.11.5).

2.11.2 Overburden Emplacement Design

The overburden emplacement has been designed to minimise the footprint of the mining operation by maximising the volume of overburden and interburden replaced within and over the open cut void. The visibility of the overburden emplacement from vantage points surrounding the Mine has always been a consideration in the design of this structure and some consideration was given to further extending the out-of-pit component of the emplacement to retain the 400m to 445m AHD section to its current extent.

Southerly or Westerly Extension

Consideration to increasing the disturbance footprint of the overburden emplacement to the south and west was considered by the Proponent. As noted above, this would have allowed the extent of the 400m to 445m AHD section of the overburden emplacement to remain at its currently designed northerly extent. In doing so, the visibility of the overburden emplacement from vantage points to the north would remain unchanged from those previously assessed.

However, by increasing the lateral extent of the overburden emplacement, additional disturbance to derived native grassland communities aligned with the Grassy White Box Woodland community would be required. Notably, these areas currently form a component of the approved Biodiversity Offset Area, creating both an ecological and an administrative

constraint (as restrictions on development associated with the BOA are to be included on the title of the relevant properties). Furthermore, the emplacement would have to move closer to properties and residences to the south of the Mine Site, with the resultant affect on visual amenity. Finally, the lateral extension of the overburden emplacement would require relocation of the Site Access Road.

The Proponent considers that the change in visibility of the overburden emplacement as a result of the northerly extent of the 400m to 445m AHD lifts would result in less significant impacts than a lateral extension, which would impact both on visual amenity and biodiversity. Impacts on visual amenity are assessed further in Section 4.5.

Alternative to Upper Plateau

The DRE has requested consideration be given to modifying the overburden emplacement design to limit the occurrence of an upper plateau as this style of landform is not a common feature of the local setting.

The Applicant has previously considered an alternative design to the upper lifts and advancing face of the overburden emplacement which would limit the area of upper plateau on the overburden emplacement. A more distinct 'hill-top' would be constructed adjacent to where the southeastern, southern and southwestern slopes of the overburden emplacement crest. This would then fall away gradually to the north with stabilised gullies constructed to divert runoff from the hilltop. **Figure 2.7** provides a conceptual illustration of this alternative overburden emplacement design.

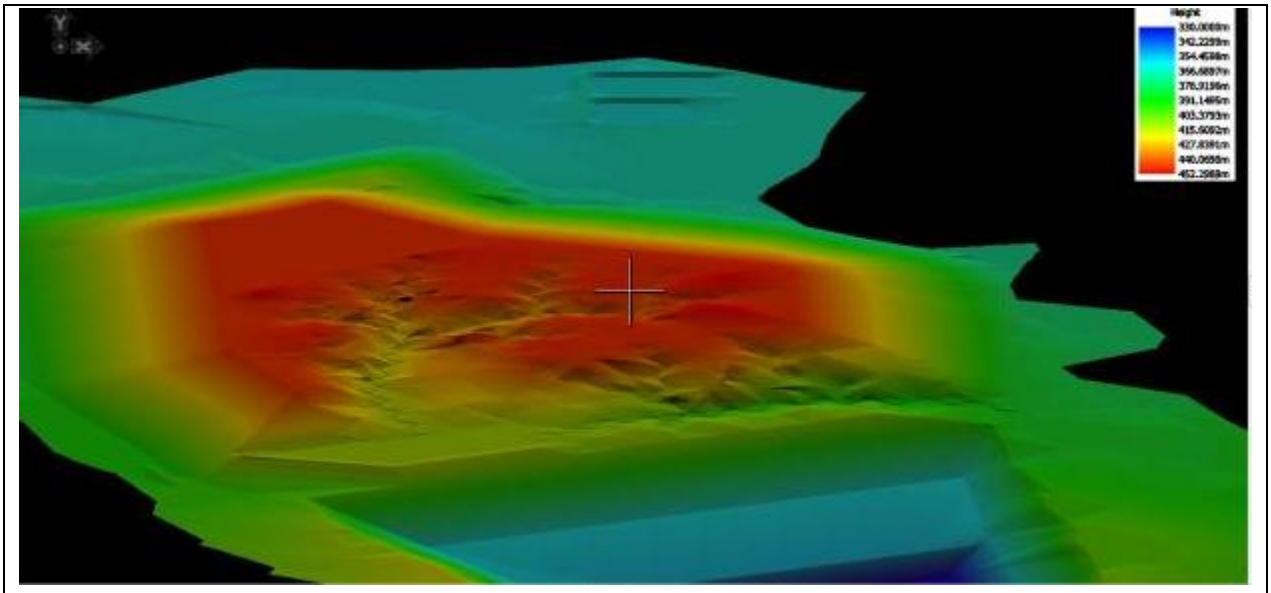

Figure 2.7
ALTERNATIVE OVERBURDEN EMPLACEMENT CONCEPT

Unfortunately, to accommodate this design, the overburden emplacement would require an increase in elevation of at least 10m. This contradicts commitments made in the 2010 EIS (RWC, 2010) on which PA 10_0059 was granted and plans approved by the DRE as part of the Mining Operations Plan for the Mine.

Furthermore, the appearance of the advancing face of the overburden emplacement would not appear significantly different to that of the current design given the distance between the overburden emplacement and residential vantage points to the north. That is, given most residential vantage points are below an elevation of 445m AHD, it is the northern slope of the overburden emplacement that is visible, not the upper plateau.

On the basis of the above, while a redesign of the overburden emplacement to minimise the occurrence of an upper plateau has been considered, it is not considered feasible given the constraints imposed by the height restriction on the overburden emplacement and limited effect on the views available from vantage points surrounding the Mine Site.

2.11.3 Acoustic and Visual Amenity Bund Extension

The DPE requested consideration of modification to the Acoustic and Visual Amenity Bund, either through lateral or vertical extension, as a means of possibly reducing noise levels received at receivers beyond the Mine Site.

Lateral extension to the northwest, effectively merging the bund with "Cintra Hill", would have little impact on the noise levels received at receivers to the east of the Mine Site as the existing bund design already provides for a noise barrier between mining noise sources and these residences. A lateral extension of the bund might have some effect in reducing noise levels at receivers to the north of the Mine Site, however, as is presented in Section 4.2, compliance with noise criterion at receivers to the north of the Mine Site has been achieved since 2010 and is predicted for the modified operations. Also of relevance is the fact that an extension onto "Cintra" Hill would require disturbance to native vegetation mapped as White Box Grassy Woodland (and Endangered Ecological Community) (Eco Logical, 2010). Therefore, on the basis that the extension would have limited benefit to the local noise environment, but detrimentally impact on biodiversity, this alternative modification has been rejected.

A vertical extension of the Acoustic and Visual Amenity Bund would potentially reduce the noise levels received to the east of the Mine Site, although the quantum of noise reduction during the maximum inversion conditions (12°/100m) is likely to be much less than under other conditions. The vertical extension of the bund is, however, constrained by the area available for construction between the open cut and Werris Creek Road. In order to maintain the gentle 10° slopes, a commitment made as part of the LOM Project (RWC, 2010), the bund would have to be constructed closer to Werris Creek Road (extension to the west is limited by the open cut itself). It is considered that the currently design set-back distance between the bund and the road (between 20m and 30m) has been minimised. Steepening the slopes of the bund (to enable an elevation increase without increasing the area of impact) would affect landform creation and rehabilitation (some of which has already been completed), reducing the amenity of the landform while under construction and when completed. It is considered that the minor benefit that would be achieved through a marginal reduction in occasional and seasonal maximum noise levels received at a handful of residential receivers, would be outweighed by the more permanent reduction in amenity generated by increasing the height and steepness of the created landform which occurs in a prominent location along Werris Creek Road.

On balance, it is assessed that there is no reason for the Acoustic and Visual Amenity Bund to be extended, as the benefits would be relatively minor, temporary and affect only selected receivers, whereas the consequential impacts would be more permanent and irreversible.

2.11.4 Water Management Options

2.11.4.1 Introduction

Several alternative strategies for managing excess void water have been considered by the Proponent. These are presented, along with the reason for rejection of each in favour of the current proposal to irrigate on lands adjacent to the Mine.

2.11.4.2 Additional Surface Void Water Dams

The construction of additional surface water dams was considered. The obvious advantage of this alternative would be that it provides a tangible increase in the storage capacity of the Mine Site.

However, a number of disadvantages or negative environmental impacts have been identified with this alternative.

- The disturbance footprint of the Mine Site would be increased. In order to provide for the storage of excess water generated by a 90th percentile rainfall year when mining is at the lowest point in the open cut, it has been estimated that an additional area of at least 15ha for the construction and management of a dam(s) would be required.
- These dams, as above ground structures without natural inflow, would have limited use post-mining and require rehabilitation.
- The construction of these dams could be redundant if high rainfall years are not encountered. Given the water balance presented and proposed continued water management strategy which maximises the use and evaporation of void water, if median rainfall years or less are encountered, there may not be a need for additional dams. This would result in disturbance without any notable benefit.

By contrast, the proposed irrigation method of managing excess water would not require any significant disturbance, could be undertaken without adverse impact on the soil and receiving catchment, provide a positive impact on the land use where would be applied, and allow for a more flexible approach to the management of excess void water. That is, the method need only be implemented in the event of high rainfall resulting in excess water.

2.11.4.3 Additional Evaporator Units

The use of additional evaporator units would potentially allow for the removal of surplus void water which accumulates within the open cut. This option has been considered, however, is considered a less preferred use of the water.

While the void water is marginally brackish (see Section 2.5.2), it remains a resource for agricultural activities, irrigation or stock watering. Therefore, the use of this water for irrigation or other off-site agricultural purposes, subject to ensuring no short or long-term impacts on soils or receiving waters, is considered more beneficial than removal through evaporation. Section 4.6.5 provides assessment of the likely impacts on soil and receiving waters.

2.11.4.4 In-pit Storage of Void Water

As is currently management practice, in the event that the capacity of the void water dams is reduced, void water may be retained in the base of the open cut. However, as the open cut approaches and mines through the lower coal seams at the base of the synclinal formation, the opportunity to store water within the open cut is significantly reduced as the active mining area occurs at the lowest points in the open cut. This would prevent access to the exposed coal seams, which in turn would affect coal recovery and mine progression.

2.11.4.5 Alternative Mine Site Water Use

The Applicant already maximises the use of void water on the Mine Site. In addition to the watering of roads, hardstands and other trafficked areas by water trucks, areas associated with the former underground mine and clearing ahead of mining (pre-strip) have sprinkler systems implemented to reduce the potential for dust lift-off.

The potential to use similar sprinklers to irrigate areas of the rehabilitated overburden emplacement has been considered. However, given the primary objective of rehabilitation is the reinstatement of a sustainable grassy woodland vegetation community, the watering of these areas is likely to be counter-productive to this objective for the following reasons.

- The additional water would promote the growth of weed species which may otherwise struggle to establish under the natural rainfall regime.
- The additional water may result in some dependence of the native vegetation on this additional water. On cessation of this irrigation towards or at the end of mining could then lead to significant die-off. This would be especially significant for native tree species.
- Runoff from rehabilitation areas would no longer be able to be discharged from dirty water dams significantly increasing the volume of water to be managed by the void water system.
- The void water is marginally brackish and exceeds the relevant trigger for stream water quality for a NSW upland stream (350µS/cm) (ANZECC, 2000). As the rehabilitation landform is not proposed for a land use of grazing or irrigation, this criterion is considered the most appropriate and would preclude the application of brackish void water.

2.11.4.6 Off-site Transfer of Water (via Pipeline)

The Proponent considered the construction of pipeline infrastructure to supply water to private properties adjacent to the Mine. This option was initially rejected on the basis that the volume of water likely to be taken by local properties would not be significant when considered against the large volumes of void water generated and maintained on the Mine Site.

The Applicant has recently been made aware of community discussions with the EPA regarding the potential for Mine supply of water local land owners. WCC has included in consideration the ability to supply water for agricultural use to adjacent privately owned properties in addition to land owned by the Mine.

2.11.4.7 Off-site Transfer of Water (via Road)

The Proponent also considered the possibility of providing the excess void water to other users which would be transferred from the Mine by road (water tankers). The relatively small volume of water likely to be taken was an important factor in rejecting this option, which would also:

- increase in the number of truck movements to and from the Mine; and
- increase the potential for contamination of roadside land and water in the event of a spillage or leakage from the truck.

2.11.4.8 Discharge to Quipolly Creek

The Proponent was approached by a local land owner who enquired as to the potential for water to be returned to Quipolly Creek. This option for managing excess water was considered and would simplify the management of the excess volume. This option will not proceed, however, on the basis that:

- the void water is marginally brackish (see **Table 2.2**) and exceeds the ANZECC (2000) default trigger for slightly disturbed ecosystems for upland rivers in southeast Australia (350µS/cm);
- the void water contains elevated concentrations of Nitrogen, in particular nitrate, which exceeds the ANZECC (2000) default trigger for slightly disturbed ecosystems for upland rivers in southeast Australia; and
- additional assessment of the affect of any release on the hydrology, chemistry and geomorphology of Quipolly Creek would be required for the consideration of the NSW Environment Protection Authority.

2.11.5 Coal Washing

An alternative to the dry separation process of removing impurities from the coal, a washing process could have been introduced to the Mine. This option has been rejected in favour of the dry separation process as by washing the coal, a new waste stream (coal tailings) would be introduced to the Mine Site. If tailings were to be co-disposed with overburden, further design work would be required to ensure that the overburden emplacement was of sufficient capacity (total and active) to accommodate the new waste stream. If to be disposed of separately, new areas of disturbance would be required and increased rehabilitation liabilities incurred for the construction of tailings dams.

3. ISSUE IDENTIFICATION AND PRIORITISATION

3.1 INTRODUCTION

In order to undertake a comprehensive *Environmental Assessment* of the Proposal, 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.

Issue identification was completed through a combination of the following methods.

- Targeted community and government consultation in order to identify environmental issues of concern or relevance.
- A review of environmental planning documentation in order to identify relevant environmental constraints and/or issues.
- A review of the environmental performance at the Mine in order to identify those aspects of the environment that are, have been or are likely to be affected by mining operations.
- The experience of Mine personnel and the authors of this *Environmental Assessment* in relation to the likely impacts.

Section 3.2 provides the results of the issue identification.

On identification of those environmental issues that could be affected by the Proposal, an analysis of the potential for impact on each of these has been undertaken in order to identify the priority and scale of assessment required (see Section 3.3).

3.2 ISSUE IDENTIFICATION

3.2.1 Consultation

3.2.1.1 Community Consultation

The 2010 *Environmental Assessment* for the Werris Creek Coal Mine LOM Project (RWC, 2010) documents the comprehensive community consultation program undertaken prior to the continuation of operations at the Mine to identify the issues of greatest concern to the local community. Issues associated with noise, blasting, air quality, visual amenity (including lighting) and affects on transport infrastructure (road and rail) were common issues raised and identified as part of that consultation. It is notable that a number of respondents to consultation either noted no issues with the Mine or referred to the positive benefits of the operations.

Werris Creek Community Consultative Committee

The Proponent maintains an ongoing dialogue with the local community. A Community Consultative Committee (CCC) has been established and meets quarterly. The function of the CCC is to provide a forum for the Proponent to inform the local community of ongoing or notable operations and provide the local community an opportunity to raise issues of concern or relevance. The most notable issues raised are generally in relation to Mine noise, blasting, groundwater and dust emissions.

The Proposal was raised at the September 2014 CCC Meeting, however, no specific issues were raised. It is noted that at the September 2014 CCC Meeting, the potential for water currently evaporated at the Mine to be returned to Quipolly Creek.

At the most recent CCC Meeting (26 February 2015), a motion was carried by the CCC to support the Proponent's application to use void water for beneficial agricultural purposes.

Werris Creek Community Meetings

The Proponent also hosts 6 monthly meetings with the community, with attendance open to any interested parties. Issues related to noise, blasting and dust emissions are regularly raised.

The most recent community meeting was held on 17 September 2014 where the Proposal was identified. No specific issues were raised, however, the Proponent is aware of the communities general concerns over noise, blasting and dust emissions.

Werris Creek Coal Mine Open Inspection

The Proponent is conscious of maintaining transparency over operations with the local community. With this in mind, an inspection of the Mine, in the form of a bus tour, was held on 11 October 2014. A general overview of the operations was provided and an opportunity given to those attending to ask questions about operations and performance. The Proposal was identified during the inspection, however, again no specific issues were raised.

Other Community Consultation

The Proponent regularly corresponds with, either by email, phone or face to face, local land owners and others in the Werris Creek community. As noted in Section 2.9, a large proportion of the Mine workforce reside locally and socialise within the Werris Creek area. As would be expected, a variety of views and opinions of the Mine and its impact and performance are held and expressed to those who work at the Mine (formally and informally). As is the case with the more formal consultation channels, the primary issues of concern relate to noise, blasting and dust, however, equally the overall benefits of the Mine to the local economy, services and facilities is recognised and noted.

3.2.1.2 Government Agency Consultation

Following discussions with NSW Department of Planning and Environment, it was determined that a formal request for *Secretary Environmental Assessment Requirements* (SEAR's) was not required for the Proposal.

On the basis of the modifications proposed, the government agencies and public authorities identified as having a role in the assessment of the Proposal are as follows.

- Liverpool Plains Shire Council.
- Environment Protection Authority.
- Department of Primary Industries (NSW Office of Water).
- Division of Resources and Energy (within the Department of Trade & Investment, Regional Infrastructure & Services).

Given the longevity of operations at the Mine and regular correspondence with these government agencies, it was not deemed necessary to request formal assessment requirements from each. Rather, following the completion of preliminary assessments relevant to the regulatory role of each agency the Applicant contacted each to confirm the area and scale of assessment was satisfactory. Responses received from the agencies or authorities consulted are summarised as follows.

Liverpool Plains Shire Council

When contacted, the Council queried whether an additional road traffic assessment was warranted. As discussed in Section 4.2.5, reliance has been placed on the road noise traffic assessment completed in 2010 (Spectrum, 2010) given the number of truck movements would not increase and remain within the day time period for road noise assessment (7:00am to 10:00pm).

Environment Protection Authority

The EPA has requested consideration be given to the salt balance for the proposed irrigation. The modelling included in the Void Water Irrigation Assessment (refer to **Appendix 5**) and summarised in Section 4.6 uses an EPA endorsed model and provides sufficient information to satisfy this request. It is further noted that the EPA is responsible for the regulation of pollution under the Protection of the Environment Operations Act 1995 and accordingly, this Environmental Assessment considers noise emissions, emissions to air and discharge of water to land.

NSW Office of Water

NOW indicated a four to five week timeframe to respond. Given there is no additional impact proposed on groundwater resources and very minimal changes to the management of surface water, the involvement of NOW is considered likely to be minor.

Division of Resources and Energy

The DRE noted the standard of rehabilitation at the Mine was generally good and would be unlikely to require detailed review. A review of the current overburden emplacement design of was requested to address the large upper 'plateau' feature and this is addressed in Section 2.11.2. Any changes to proposed rehabilitation would be considered primarily as part of a new Mining Operations Plan to be submitted to account for the minor modifications proposed.

3.2.2 Review of Planning Issues

3.2.2.1 Introduction

A number of State and regional planning instruments apply to the Proposal. These planning instruments were reviewed to identify environmental aspects requiring consideration in this document. This subsection provides a brief summary of each relevant planning instrument.

3.2.2.2 State Planning Issues

Application of Part 3A of the Environmental Planning and Assessment Act 1979

In accordance with transitional arrangements of Schedule 6A of the EP&A Act, Part 3A of the EP&A Act continues to apply to development approved under this part of the Act (NSW Department of Planning & Infrastructure, 2011).

Modification to a 'Part 3A Approval' is therefore made under Section 75W of the EP&A Act which is as follows.

> ***75W Modification of Minister's approval***
>
> *(1) In this section:*
>
> *Minister's approval means an approval to carry out a project under this Part, and includes an approval of a concept plan.*
>
> *Modification of approval means changing the terms of a Minister's approval, including:*
> *(a) revoking or varying a condition of the approval or imposing an additional condition of the approval, and*
>
> *(b) changing the terms of any determination made by the Minister under Division 3 in connection with the approval.*
>
> *(2) The proponent may request the Minister to modify the Minister's approval for a project. The Minister's approval for a modification is not required if the project as modified will be consistent with the existing approval under this Part.*
>
> *(3) The request for the Minister's approval is to be lodged with the Director- General. The Director-General may notify the proponent of environmental assessment requirements with respect to the proposed modification that the proponent must comply with before the matter will be considered by the Minister.*
>
> *(4) The Minister may modify the approval (with or without conditions) or disapprove of the modification.*

Mining SEPP

This SEPP was gazetted on 17 February 2007 in recognition of the importance to NSW of mining, petroleum production and extractive industries. The SEPP specifies matters requiring consideration in the assessment of any mining, petroleum production and extractive industry development as defined in NSW legislation.

Table 3.1 presents a summary of the matters that the Minister or his/her delegate may consider when assessing a modified Proposal (Part 3 – Clauses 12 to 17 of the SEPP) and a reference to the section(s) in this or the 2010 *Environmental Assessment* where each relevant element of the SEPP is or has been addressed.

Table 3.1
Application of the Mining SEPP

Relevant SEPP Clause	Description	Section	
		RWC (2010a)	This document
12: Compatibility with other land uses	Consideration is given to:		
	• the existing uses and approved uses of land in the vicinity of the development;	1.5.5	N/A
	• the potential impact on the preferred land uses (as considered by the consent authority) in the vicinity of the development; and	N/A	N/A
	• any ways in which the development may be incompatible with any of those existing, approved or preferred land uses.	N/A	N/A
	The respective public benefits of the development and the existing, approved or preferred land uses are evaluated and compared.	4.11 & 5.2.3	5.3
	Measures proposed to avoid or minimise any incompatibility are considered.	NA	N/A
12AA: Significance of resource	Consideration is given to the significance of the resource that is the subject of the application, having regard to: • the economic benefits, both to the State and the region; and • the advice provided by the DG of DTIRIS as to the relative significance of the resource in comparison with other mineral resources across the State.	The application represents a modification to an approved State Significant Development. Significance of the resource has therefore already been confirmed.	
12AB: Non-discretionary development standards for mining	Consideration is given to development standards that, if complied with, prevents the consent authority from requiring more onerous standards for those matters	Noted	
13: Compatibility with mining, petroleum production or extractive industry	Consideration is given to whether the development is likely to have a significant impact on current or future mining, petroleum production or extractive industry and ways in which the development may be incompatible.	N/A	N/A
	Measures taken by the Proponent to avoid or minimise any incompatibility are considered.	N/A	N/A
	The public benefits of the development and any existing or approved mining, petroleum production or extractive industry must be evaluated and compared.	N/A	N/A
14: Natural resource and environmental management	Consideration is given to ensuring that the development is undertaken in an environmentally responsible manner, including conditions to ensure:		
	• impacts on significant water resources, including surface and groundwater resources, are avoided or minimised;	4.2, 4.7	4.5.3
	• impacts on threatened species and biodiversity are avoided or minimised; and	4.3	N/A
	• greenhouse gas emissions are minimised and an assessment of the greenhouse gas emissions (including downstream emissions) of the development is provided.	N/A	N/A

Table 3.1 (Cont'd)
Application of the Mining SEPP

Relevant SEPP Clause	Description	Section	
		RWC (2010a)	This document
15: Resource recovery	The efficiency of resource recovery, including the reuse or recycling of material and minimisation of the creation of waste, is considered.	2.3.2 & 2.3.3	N/A
16: Transportation	The following transport related issued are considered.		
	• The transport of some or all of the materials from the site by means other than public road.	2.6	N/A
	• Limitation of the number of truck movements that occur on roads within residential areas or roads near to schools.	2.6	N/A
	• The preparation of a code of conduct for the transport of materials on public roads.	N/A	N/A
17: Rehabilitation	The rehabilitation of the land affected by the development is considered including:		
	• the preparation of a plan that identifies the proposed end use and landform of the land once rehabilitated;	N/A	**Figure 2.6**
	• the appropriate management of development generated waste;	N/A	N/A
	• remediation of any soil contaminated by the development; and	N/A	N/A
	• the steps to be taken to ensure that the state of the land does not jeopardize public safety, while being rehabilitated or at the completion of rehabilitation.	2.10	N/A

Note 1: This is a matter for the Department of Planning to determine N/A = Not Applicable

Infrastructure SEPP

The *State Environmental Planning Policy (Infrastructure) 2007* (Infrastructure SEPP) identifies, amongst other things, the matters to be considered in the assessment of development adjacent to particular types of infrastructure.

The Proposal does not seek to amend any activities in the vicinity of the classes of infrastructure identified by the Infrastructure SEPP. As a result, the Infrastructure SEPP does not apply to this modification.

SEPP 33 – Hazardous and Offensive Development

State Environmental Planning Policy No. 33 – Hazardous and Offensive Development (SEPP 33) identifies that hazardous and offensive industries, and potentially hazardous and offensive industries, relate to industries that, without the implementation of appropriate impact minimisation measures would, or potentially would, pose a significant risk in relation to the locality, to human health, life or property, or to the biophysical environment.

The Proposal would not result in any modifications to the types, volumes, storage or use of hazardous or dangerous goods within the Mine Site. As a result, SEPP 33 is not relevant to this application.

SEPP 44 – Koala Habitat Protection

The former Parry and Quirindi Local Government Area's, which form the Liverpool Plains Shire Council local government area includes the Mine Site and is identified in Schedule 1 of *State Environmental Planning Policy No. 44 – Koala Habitat Protection* (SEPP 44) as an area that could provide habitat for Koalas. As a result, the Minister is required to consider whether potential or core Koala habitat would be disturbed by the Proposal.

The Proposal would not result in disturbance of any additional areas of habitat suitable for Koala. As a result, the Applicant contends that no further assessment is required.

3.2.2.3 Regional and Local Planning Issues

Orana Regional Environmental Plan No 1 – Siding Spring

The Mine was originally included in the draft Orana Regional Environmental Plan (REP) No 1 – Siding Spring. The current boundary of the REP is defined as "*all land within the Shires of Coonabarabran, Coonamble and Gilgandra and the City of Dubbo, being part of the area declared on 14 April 1986*". The Mine Site is not situated within these areas and therefore the Orana Regional Environmental Plan No1 – Siding Spring is not relevant to this Project.

Liverpool Plains Local Environment Plan 2011

The Mine is located within the Liverpool Plains Local Government Area to which the *Liverpool Plains Local Environmental Plan (LEP) 2011* is relevant. The Mine Site is situated within the area defined as 'RU1 – Primary Production', to which 'open cut mining' is permissible with consent.

3.2.2.4 Environmental Performance

The Proponent maintains comprehensive records of the monitoring and management of emissions and discharges generated by the Mine. Furthermore, the Proponent records all complaints registered with the Mine's Environmental Officer or Manager and presents these in a report to the CCC each quarter. A complaints register is published monthly on the Whitehaven Coal Limited website, with a summary presented in the Mine's AEMR and Annual Return to the DRE and EPA respectively.

Over the life of the Mine, non-compliances against the noise criteria of EPL 12290 have been recorded and reported. Whilst noise non-compliances still occur on occasion, management of noise has improved over the life of the Mine, with noise attenuation of the mobile fleet especially significant in reducing noise non-compliances. Complaints have historically focussed on the following issues, in deceasing order of frequency.

- Blasting.
- Noise emissions.
- Dust emissions.

- Impacts on visual amenity (including lighting).
- Impacts on water resources.
- Other environmental impacts.

Each of these issues requires particular attention in this Environmental Assessment.

3.2.3 Summary

On the basis of the consultation undertaken, review of planning instruments and assessment of environmental performance, the environmental issues identified as requiring assessment are as follows.

- Noise.
- Air Quality (including greenhouse gases).
- Blasting.
- Visual Amenity.
- Water Resources (including erosion and sedimentation).
- Rehabilitation.
- Biodiversity.
- Transportation.
- Land Use.

The relative priority of each of these issues is considered in Section 3.3, with relevant assessment described and discussed in Section 4.

3.3 ISSUE PRIORITISATION AND COVERAGE

3.3.1 Introduction

For each of the environmental issues identified (refer to Section 3.2), an analysis of the possible impacts was undertaken to determine the specific assessment requirements and level of priority associated with each. This analysis was undertaken in conjunction with a review of the original *Environmental Assessment* for the LOM Project (RWC, 2010), to determine whether the Proposal would result in any material change to the impacts assessed originally (and therefore warrant further assessment).

3.3.2 Noise

It is noted that the Proposal would result in the introduction of a new source of noise emissions (Dry Separation Plant) and a change to the location of noises sources relative to surrounding receivers (Northern Extension of the 400m to 445m AHD section of the overburden emplacement). Considering the proximity of surrounding receivers to the Mine (see **Figure 3.1**), it is possible that the Proposal would result in a change to the noise level received at some or all of these receivers.

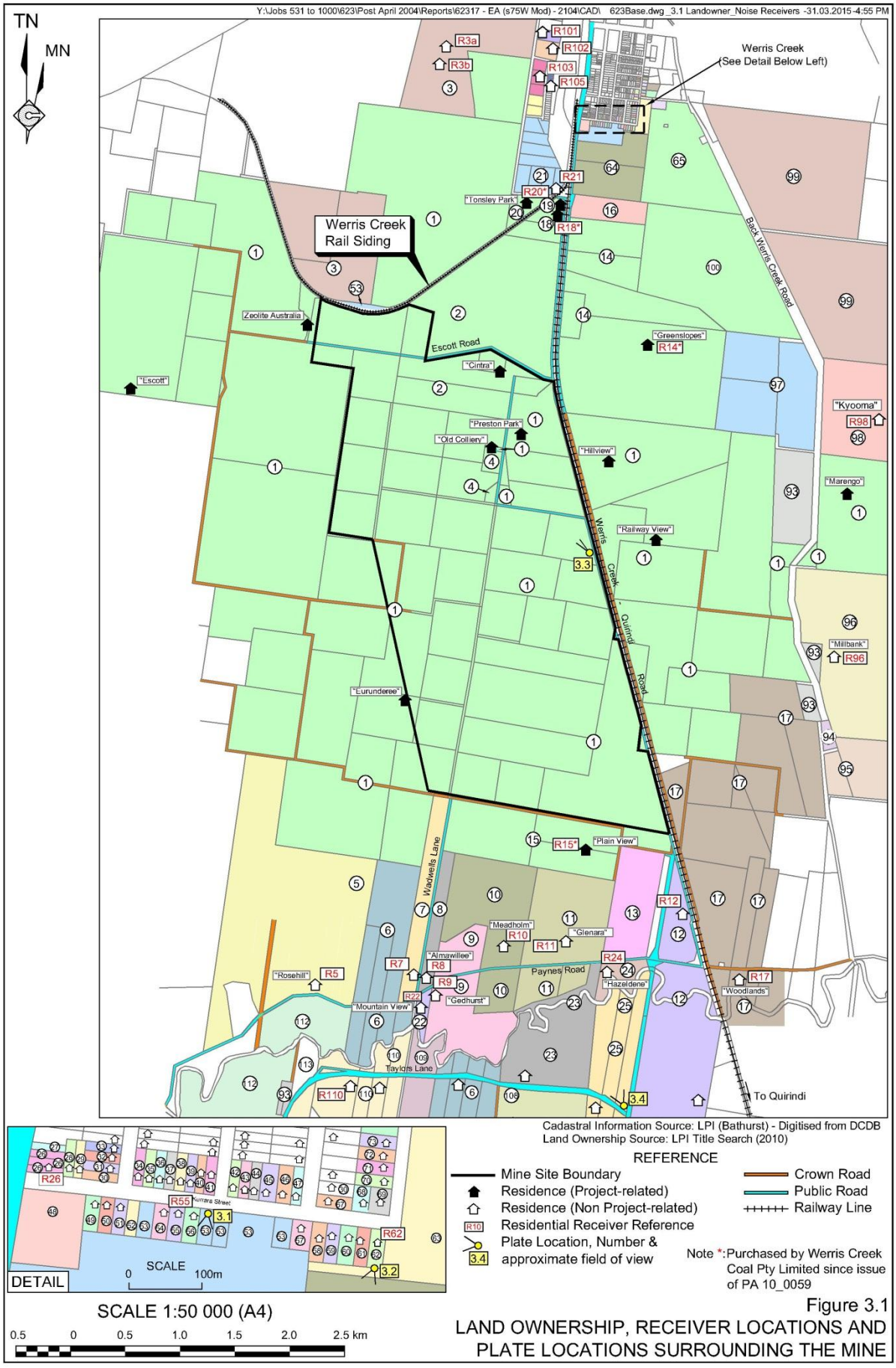

Figure 3.1
LAND OWNERSHIP, RECEIVER LOCATIONS AND PLATE LOCATIONS SURROUNDING THE MINE

An extension to the hours of operation of road transport is proposed which would result in some truck movements between the Mine Site and Gunnedah CHPP between 6:00pm and 10:00pm. While this remains within the nominated daytime period for road traffic noise, it could affect owners of land adjoining the principal transport route as a result of additional truck pass-by noise of an evening.

*On the basis of the completed issue identification and prioritisation, noise is considered to be a **high priority** issue with further assessment to include.*

- *the potential noise impacts associated with the new and relocated noise sources;*
- *the likely effectiveness of any additional mitigation measures or controls; and*
- *the effect of evening truck movements on road traffic noise.*

3.3.3 Air Quality

Similar to the assessment of possible noise impacts, the Proposal would introduce a new source of dust emissions (Dry Separation Plant) and change to the location of dust emitting activities relative to surrounding receivers (Northern Extension of the 400m to 445m AHD section of the overburden emplacement). Considering the proximity of surrounding receivers to the Mine (see **Figure 3.1**), it is possible that the Proposal would result in a change to the concentration of particulate matter (dust) received at some or all of these receivers.

*On the basis of the completed issue identification and prioritisation, air quality is considered to be a **high priority** issue with further assessment to include.*

- *the potential impacts associated with the new and relocated dust emitting activities; and*
- *the likely effectiveness of any additional mitigation measures or operational controls.*

3.3.4 Blasting

The Proposal would not result in any change to blasting operations at the Mine.

No further assessment is warranted.

3.3.5 Visual Amenity

The established or advancing overburden emplacement is currently visible from properties at the southern edge of Werris Creek (Kurrara Street), from Werris Creek Road and the rural properties to the east of the Mine, and properties to the south of the Mine (off Paynes Road and Taylors Lane) in the Quipolly locality. **Plates 3.1** to **3.4** provide the current views of the Mine from Werris Creek to the north, Werris Creak Road to the east and Quipolly to the south.

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Plate 3.1: View from Kurrara Street (Southern Werris Creek) adjoining Property 56 towards the Mine (Ref: 623H161214_443)

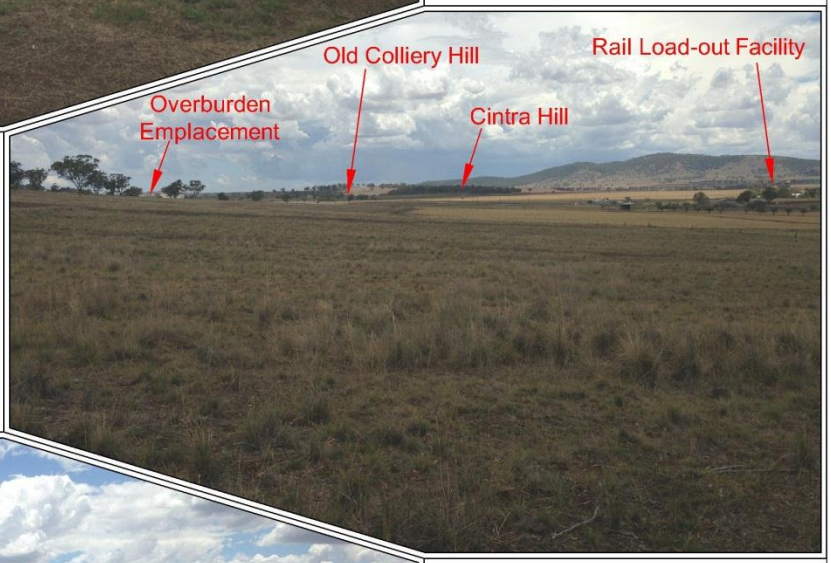


Plate 3.2: View from Kurrara Street (Southern Werris Creek) adjoining Property 62 towards the Mine (Ref: 623H161214_445)

Plate 3.3: View from Werris Creek Road (northbound) with the Mine to the West (Ref: 623H161214_442)

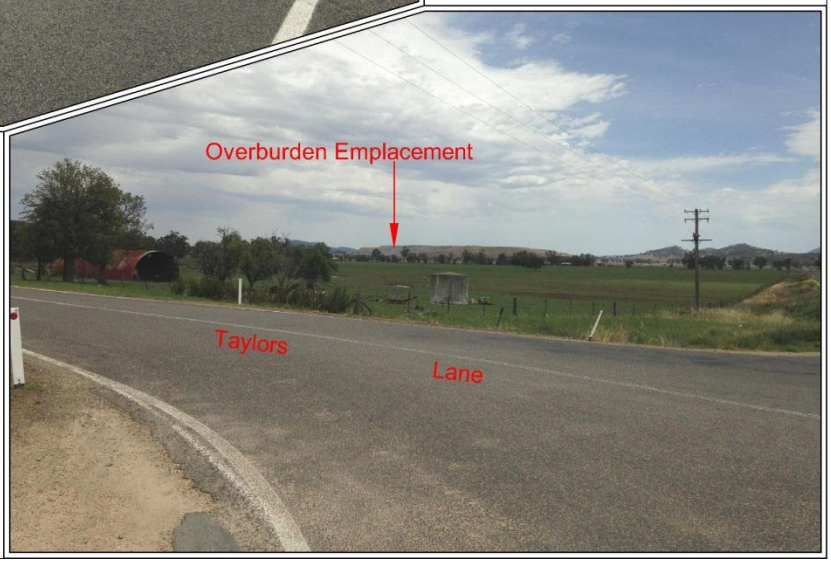


Plate 3.4: View from Quipolly Locality (corner Werris Creek Road and Taylors Lane) (Ref: 623H161214_554)

The plates, which identify key features of the Mine and surrounding topography, illustrate that the overburden emplacement is the most visible feature of the Mine. With respect to the effect of this feature on local visual amenity, the following is noted.

- The overburden emplacement has almost been completed to its full extent when viewed from the south. Progressive rehabilitation of the southern slopes of the overburden emplacement has reduced the visual intrusion of this feature from receivers to the south (see **Plate 3.4**). It is expected that by the end of 2016, the western portion of the overburden dump will be completed to its full extent with rehabilitation to grassy woodland close to completion (see **Figure 2.2**)
- The effectiveness of progressive rehabilitation on views of the Mine from Werris Creek Road is clearly evident. Not only does the overburden emplacement and Acoustic and Visual Amenity Bund screen mining and processing operations to the west, the established grass cover and developing overstorey (tree) component is itself a relatively unobtrusive landform.
- Views of the overburden emplacement when viewed from the southern edge of Werris Creek remains relatively distant. The completion of the Visual Amenity and Noise Bund in advance of overburden emplacement development will provide a visual screen of open cut mining operations as Old Colliery Hill is removed, however, it is acknowledged that the overburden emplacement will become more visible towards the end of mine life.

No other modifications to the Mine are proposed which would result in a change to the visual impact of the operation. It is noted, however, that the proposed and approved extension of the Product Coal Stockpile Area to the east of the Rail Load-out Facility, is now unlikely to proceed and as a result the view of this component of the Mine will remain unchanged.

*On the basis of the above, Visual Amenity is considered to be of **moderate priority** with further assessment to include interpretation of the likely change in the visual amenity, review of acceptability and consideration of further mitigation.*

3.3.6 Water Resources

3.3.6.1 Surface Water

The Mine currently operates in accordance with the Site Water Management Plan (SWMP). As the Proposal would result in changes to the area of disturbance on the Mine Site, this would likely result in a slight modification to the catchments considered in the design, construction and management of the various features of the SWMP, e.g. diversion drains, sediment basins.

Also relevant to surface water management of the Mine is the water balance assessment completed for the approved mining operations (refer to Section 2.5.3). This assessment concludes that under average to high rainfall conditions the quantity of void water will exceed the capacity of the existing void water dams requiring the water to be stored within the open cut. As a result, there is the potential that the additional storage of water within the open cut could compromise access to coal resources in the lower sections of the open cut.

*On the basis of the potential for current storage capacity within the void water management system to be exceeded, the management of surface water is considered to be of **moderate to high priority**. Identification of modified or additional surface water management controls is required (for incorporation into an updated SWMP for the Mine). An assessment of the proposed off-site irrigation to provide the void water storage requirements, and residual impacts on the land to which irrigation is proposed, is required.*

3.3.6.2 Groundwater

The Proposal would not result in any further impact on groundwater than previously assessed and approved. The management of groundwater seepage as a component of void water has been identified as an issue for surface water management and discussed in Section 3.3.6.1.

On the basis that the Proposal would not result in any changes to the mining operations likely to impact on groundwater, no further assessment is warranted.

3.3.7 Rehabilitation

As a result of the changes to the overburden emplacement and MIA Bund, the final landform would be slightly modified from that presented in the 2010 *Environmental Assessment* (RWC, 2011) and *Mining Operations Plan* (WCC, 2011). As discussed in Section 2.10, however, no changes to the proposed rehabilitation objectives and methods or anticipated final land use would result.

*On the basis of the above, rehabilitation is considered to be of **low to moderate priority**, with consideration and assessment completed in Section 2.10.*

3.3.8 Biodiversity

Figure 3.2 illustrates the extent of the proposed modified operations in relation to native vegetation mapped on the Mine Site and surrounds. No additional impacts on biodiversity are considered likely as a result of the Proposal[10] and no change to the Biodiversity Offset Strategy for the Mine required.

No further assessment is warranted.

3.3.9 Transportation

No change to the overall number of truck movements from the Mine is proposed, however, it is proposed to allow for the movement of trucks between 6:00pm and 10:00pm. The effect of this modification on road traffic noise is to be considered as part of the noise assessment, however, some consideration of the impact of evening traffic on the roads and road users is potentially warranted.

*On the basis of the above, transportation is considered to be of **low priority**, with consideration to be given to the potential for adverse affects on the local traffic environment as a result of evening truck movements.*

[10] The western extension of the out-of-pit overburden emplacement occurs over an area currently used for soil stockpiling.

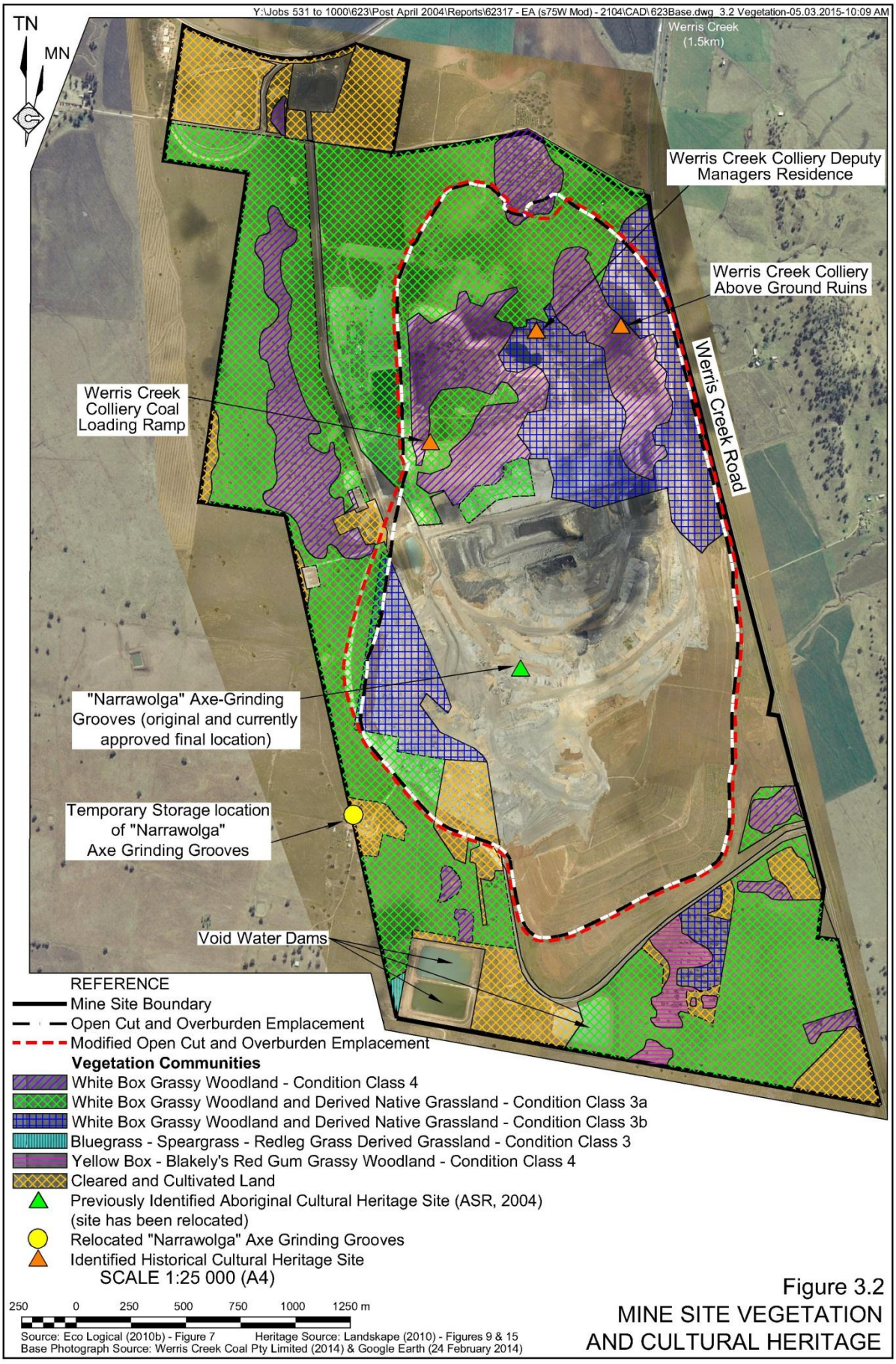


Figure 3.2
MINE SITE VEGETATION AND CULTURAL HERITAGE

3.3.10 Soils, Land Capability and Land Use

Soil resources would be managed in accordance with an approved *Mining Operations Plan* (MOP)[11] (WCC, 2011). On the basis that the operational controls and management measures nominated in the *MOP* are adhered to, the Proposal would not result in any additional impacts on the soils of the Mine Site.

The minor modifications to the final landform of the Mine could influence the final land capability of the rehabilitated final landform. However, on the basis of the proposed rehabilitation methods, monitoring and management, it is considered unlikely that the Proposal would result in any significant change to the land capabilities of the final landform.

The most likely cause of impacts on soils and land capability, and subsequently land use, as a consequence of the Proposal would be as a result of the proposed irrigation of void water to lands adjacent to the Mine. The void water is marginally brackish with elevated concentrations of Nitrogen, in particular nitrate, and some samples had electrical conductivity and sodium concentration which exceeded (marginally) the Short-term Exposure Limit criteria of ANZECC (2000) for irrigation (see **Table 2.2**). While the void water would appear to be similar in quality to that used in the locality for irrigation, it is possible that detrimental impacts on the soils to which the water is applied to, or waterways to which runoff flows, could occur if not managed appropriately.

On the basis of the potential impacts on the land to which void water is applied, Soils, Land Capability and Land Use is considered an issue of ***moderate to high priority****. Further assessment is to include:*

- *An assessment as to the impact on irrigation on local soil resources; and*
- *Calculation of maximum application rates to the targeted areas of adjoining properties.*

3.3.11 Cultural Heritage

Figure 3.2 illustrates the extent of the proposed modified operations in relation to the only identified site of Aboriginal heritage, namely the relocated Narrawolga Axe Grinding Grooves (Landskape, 2010). The Proposal would not result in disturbance to the relocated site. Furthermore, the Proponent is cognisant of its responsibilities to protect Aboriginal heritage under the *National Parks and Wildlife Act 1974* and instructs its workforce accordingly. Several surface sites associated with the former Werris Creek Colliery previously occurred within the approved disturbance footprint of the Mine (see **Figure 3.2**). The Proposal would not require any change in the proposed management of these sites as described in the Heritage Management Plan.

The Proponent notes that a change in the final location of the Narrawolga Axe Grinding Grooves, from the rehabilitated landform of the overburden emplacement to the Willow Tree Visitor Information Centre (at Willow Tree), has been agreed to by the local Aboriginal stakeholders and Liverpool Plains Shire Council. This has been nominated in the Mine

[11] An updated MOP to replace that approved for the period July 2011 to December 2018 (WCC (2011) is in preparation.

Heritage Management Plan and approved by DPE. OEH has approved a care agreement transferring the responsibility from Werris Creek Coal to Nungaroo LALC for the management of the Narrawolga Axe Grinding Groove rocks.

On the basis that no additional surface disturbance is require on the Mine Site, no further assessment is warranted. It is noted, however, that modification to the Statement of Commitments currently appended to PA 10_0059 is required to ensure that the agreed relocation does not result in the Proponent becoming non-compliant with the project approval.

3.3.12 Bushfire

RWC (2010) concluded that while mining and ancillary activities associated with the Mine would increase the number and type of ignition sources in the local area, the proposed controls and safeguards and general clearing activities outlined in the BOMP would ensure that the potential for fire initiation and spread on the Mine Site and adjacent BOA is minimised. The Proposal would not introduce any new ignition sources nor impact on the controls in place and therefore would not have any affect on the bushfire hazard of the Mine.

No further assessment is warranted.

3.3.13 Socio-Economic Setting

The Proposal has the potential for minor impacts upon the socio-economic setting of the surrounding environment, primarily as a result of impacts associated with visual amenity, noise and dust emissions.

In the event that impacts associated with visual amenity, noise and dust emissions can be managed to comply with environmental criteria and reasonable community expectations, the impact on the socio-economic setting would be minimal as a result of the Proposal. Impacts associated with socio-economic setting are considered to be of ***low priority*** *with further assessment to review the residual impacts of the Proposal on the biophysical environment against the positive impacts of the Mine on the local community and region.*

4. ASSESSMENT OF KEY ENVIRONMENTAL ISSUES

4.1 INTRODUCTION

This section provides an assessment of the impacts associated with those features of the local environment which could potentially be affected by the Proposal. The proposed design and/or operational safeguards and an assessment of the level of impact the Proposal may have after implementation of these safeguards is also described.

4.2 NOISE

4.2.1 Introduction

As noted in Section 3.3.2, the proposed modifications to the Mine would introduce a new source of noise (Dry Separation Plant) and place noise sources on the upper lifts of the overburden emplacement approximately 250m closer to receivers to the north, e.g. the town of Werris Creek. In order to confirm that the introduction of a new noise source and modification to the operating locations could be undertaken without exceeding current noise criteria, the Applicant commissioned Spectrum Acoustics Pty Limited (Spectrum) to complete a noise assessment. Notably, Spectrum has undertaken the noise modelling, assessment and monitoring at the Mine since the original development application was lodged in December 2004 and has an excellent understanding of local conditions. The following sub-sections summarise the *Noise Assessment* of Spectrum (2015), a complete copy of which is provided as **Appendix 3**.

4.2.2 Existing Setting, Noise Criteria and Environmental Performance

4.2.2.1 Mine Site Noise

The Mine has operated in close proximity to rural land owners and the town of Werris Creek since 2005. In that time, concerns over noise have been raised, however, notably since progression to operations under PA 10_0059 the number of non-compliances with noise criteria and noise complaints has reduced.

This reduction in non-compliances reflects the Applicant's more detailed understanding of local meteorological conditions. Through analyses of data collected from the Mine Site weather station and targeted studies of temperature inversion conditions as part of the *Environmental Assessment* for the LOM Project (RWC, 2010), the accuracy of the model used to predict noise levels received surrounding the Mine was increased. As a result, the scale of required noise attenuation was better understood and more accurate predictions of noise levels following the application of all reasonable and feasible mitigation measures able to be predicted. The noise criteria established at receivers surrounding the Mine (see **Box 1**) are therefore more appropriate than might otherwise have been established. The Applicant does also acknowledge that reduction in non-compliances and noise complaints has been positively influenced by ongoing purchases of properties surrounding the Mine Site (subject to the highest noise levels) as well as noise attenuation of the truck fleets reducing overall Mine noise emissions.

Figure 4.1 identifies the locations of the residential receivers identified in Box 1, including those referenced as 'All other privately-owned land'.

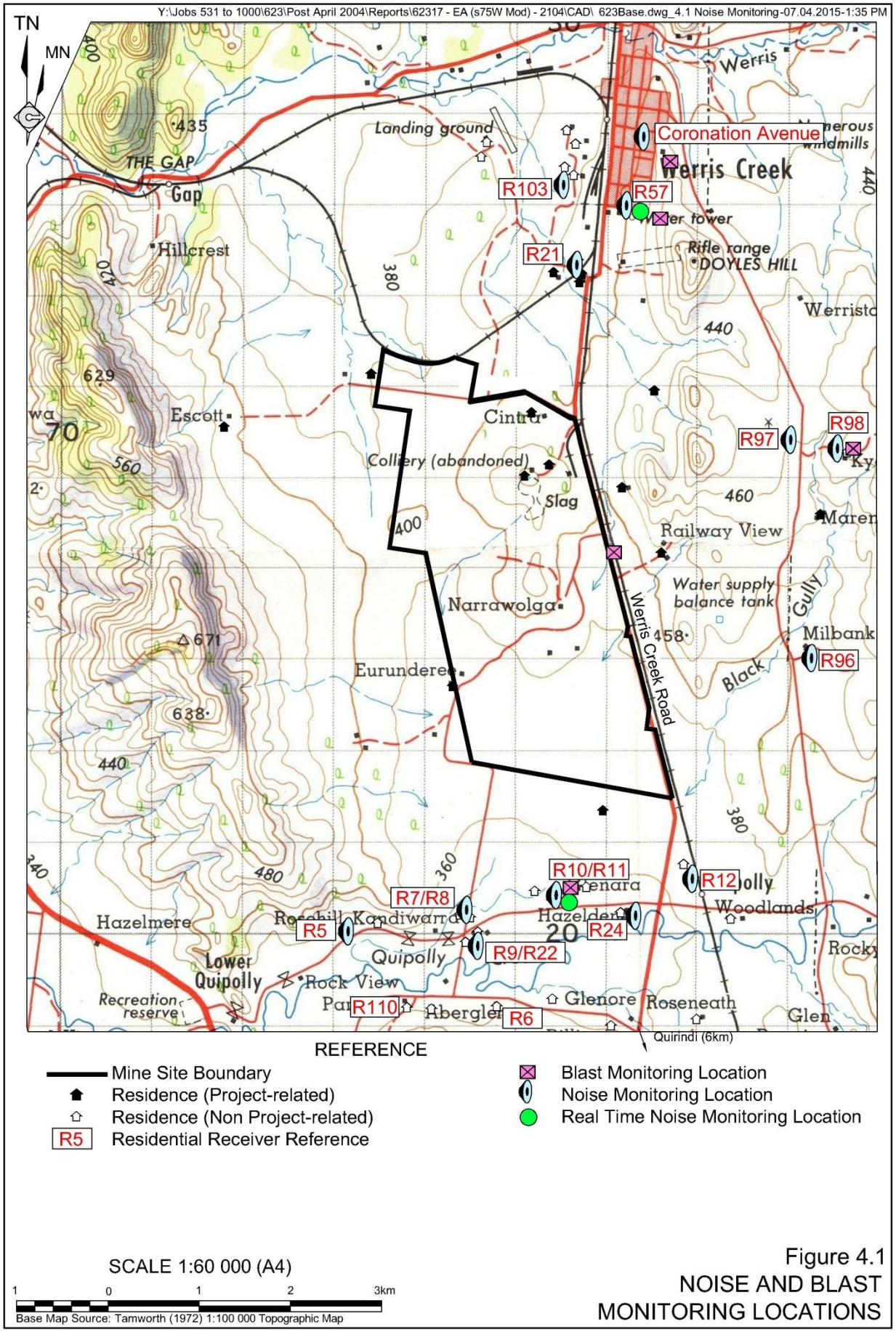


Figure 4.1
NOISE AND BLAST MONITORING LOCATIONS

Noise Criteria

1. The Proponent shall ensure that the noise generated by the project (including noise generated on the Werris Creek Rail Spur) does not exceed the criteria in Table 1 at any residence on privately-owned land or on more than 25 percent of any privately-owned land.

Table 1: Noise criteria

Location	Day dB(A) $L_{Aeq(15\ min)}$	Evening & Night dB(A) $L_{Aeq(15\ min)}$	Night dB(A) $L_{A1\ (1\ min)}$
R18	40	37	45
R10, R11, R14	39	39	45
R20, R21	39	37	45
R12	38	38	45
R96	38	37	45
R7, R8, R9, R24	37	37	45
R22, R98	36	36	45
All other privately-owned land	35	35	45

Notes:
- *To interpret the locations referred to in Table 1, see the applicable figure in Appendix 3; and*
- *Noise generated by the project is to be measured in accordance with the relevant requirements and exemptions (including certain meteorological conditions) of the NSW Industrial Noise Policy.*

However, these criteria do not apply if the Proponent has an agreement with the relevant owner/s of these residences/land to generate higher noise levels, and the Proponent has advised the Department in writing of the terms of this agreement.

Note: Locations R14, R18 & R20 have since been purchased by Werris Creek Coal Pty Limited and noise criteria no longer apply

Source: PA 10_0059

Box 1
PA 10_0059: SCHEDULE 3, CONDITION 1 – NOISE CRITERIA

Since the issue of the noise criteria identified in **Box 1**, compliance has generally been confirmed through monthly attended noise monitoring. Since 2011 there have been five minor noise exceedances at residential receivers.

- 1db(A) exceedance of night time noise criterion (35dB(A)) at R5 in July 2013.
- 3db(A) exceedance of night time noise criterion (36dB(A)) at R22 in July 2013.
- 2db(A) exceedance of night time noise criterion (37dB(A)) at R9 in July 2013.
- 1db(A) exceedance of night time noise criterion (37dB(A)) at R96 in September 2014.

This represents less than 1% of the over 500 individual monitoring events undertaken at each noise monitoring location since PA 10_0059 was approved.

It is noted that noise monitoring is also undertaken, at the request of the landowner, at the boundary of property 97. In September 2014 a noise level of 39dB(A) was recorded and in October 2014 a noise level of 38dB(A) was recorded, 3 and 4dB(A) higher than the default noise criteria for privately owned land. Given this location is closer to the Mine Site than R98, which is assigned an elevated noise criterion, it is considered appropriate that this location is assigned a noise criterion reflecting the achievable noise level under noise enhancing conditions when all reasonable and feasible mitigation measures are applied.

Compliance with noise criteria is also attributable to the effective implementation of noise mitigation, attenuation and management measures at the Mine. These measures are documented in the Werris Creek Coal Mine Noise Management Plan (WCC, 2014), and would continue to be implemented, are described in Section 4.2.3.

4.2.2.2 Road Traffic Noise

Taylors Lane already carries heavy vehicle traffic as it is the heavy vehicle by-pass for Quirindi township. In 2010, ambient noise levels were measured at R110 (see **Figure 4.1**) to identify ambient (L_{eq}) and background (L_{90}) nose levels). **Table 4.1** presents the results of this monitoring.

Table 4.1
Summary of Ambient Noise Levels (R110) – 2010

Date	L_{eq} (day)	L_{eq} (evening)	L_{eq} (night)	L_{90} (day)	L_{90} (evening)	L_{90} (night)
31-May-10	45.3	41.8	41.7	29.4	29.5	26.0
1-Jun-10	46.6	44.6	39.5	29.7	26.5	26.0
2-Jun-10	48.5	47.1	43.2	29.0	30.0	25.5
3-Jun-10	46.9	43.9	38.9	31.0	25.9	24.1
4-Jun-10	47.6	46.6	43.4	27.5	27.3	23.8
5-Jun-10	46.2			28.8	25.2	
L_{Aeq}	**47**	**45**	**42**	**--**	**--**	**--**
L90	**--**	**--**	**--**	**29**	**27**	**26**
Note: Day = 7:00am – 6:00pm, Evening = 6:00pm – 10:00pm, Night = 10:00pm – 6:00am						
Source: Modified after Spectrum (2010) – Table 4						

Noise criteria for off-site traffic noise criteria have been established for PA 10_0059, based on the *NSW Environmental Criteria for Road Traffic Noise* (ECRTN). The *NSW Road Noise Policy* (DECCW, 2011) supersedes the ECRTN although the development type and noise criteria are identical (see **Table 4.2**)

Table 4.2
Road Traffic Noise Criteria

Type of Development	Recommended Criteria – dB(A)	
	Day (7:00am to 10:00pm)	Night (10:00pm to 7:00am)
11. Land use developments with potential to create additional traffic on existing local roads.	$L_{Aeq(1hr)}$55	$L_{Aeq(1hr)}$50

4.2.3 Design Features, Operational Controls and Management Measures

The following provides a summary of the key design features, operational controls and management measures implemented at the Mine.

- MIA Bund. The MIA Bund has been constructed to a height greater than 5m to attenuate noise emissions from the Mine Infrastructure Area.
- Haul Truck Replacement. More than half the CAT 785 haul trucks have been replaced by CAT 793XQ (eXtra Quiet) trucks which operate 1 to 2dB quieter than the CAT 785's (Spectrum, 2015).
- Attenuation of Haul Trucks. Noise assessment undertaken in accordance with ISO 6395 by Spectrum (2015) confirms the revised target noise attenuation level of 117.7dB(A) has been achieved for the CAT 785 haul trucks. The revised target was established due to the additional noise reduction achieved by the CAT 793XQ fleet so that the geometric sound power level of the entire truck fleet still achieves 116db(A).
- Real time noise monitoring. Monitoring of noise levels in real time is undertaken at the locations to the north and south of the Mine Site (see **Figure 4.1**). A dedicated 'Noise Control Operator' is employed to continually monitor real time noise levels and inform the Open Cut Examiner (OCE) if the dominant noise source is mining. Under these circumstances, the OCE would modify or partially suspend mining operations to achieve the nominated noise criteria[12]. As an illustration of the application of the real time noise monitoring and management, a total of 976.3 hours of production time was lost during the 2013/2014 AEMR period as a result of modified operations to accommodate noise issues.
- Real time meteorological monitoring. This is used to identify adverse weather conditions such wind direction/speed and temperature inversions with operations to be modified accordingly.
- Noise reduction planning. Noise reduction measures are discussed at the daily meeting based on the current location of mining activities and forecast weather conditions.
- Equipment Testing and Maintenance. Routine testing to confirm that the sound power levels of plant achieves the nominated targets is undertaken. Regular maintenance is undertaken to ensure noise attenuation on plant operates in accordance with manufacturer specifications.
- Bunding. Natural mine features or constructed bunds are utilised close to noise sources to create barriers to the propagation of noise towards receivers.

[12] This monitoring based administrative control has been implemented in preference to previously nominated and prescriptive controls on mobile equipment operation. On the basis of being more recently approved, the commitments and controls provided for in the Mine Noise Management Plan take precedence over those presented in RWC (2010). Section 5 includes a revised Statement of Commitments to provide consistency between the Project Approval and management plans.

- Rail spur noise mitigation. Measures including restricting train speeds to 15kph, minimising coal drop heights into wagons and maintaining coal within the loading bin at all times are enforced.

As a final resort, private agreements or property acquisition is negotiated with landholders.

4.2.4 Assessment Methodology

4.2.4.1 Mine Site Noise

The assessment of noise emissions was conducted by Spectrum (2015) using RTA Technology's Environmental Noise Model (ENM v3.06). Major noise producing items were modelled as point sources for a worst-case operating scenario towards the end of Mine life (when mining operations approach the northern extent of the open cut and overburden is being placed on the upper lifts of the extended overburden emplacement).

Figure 4.2 provides the locations of the equipment for this scenario and **Table 4.3** provides the sound power level for each noise source.

Table 4.3
Noise Source Sound Power Levels

Item	No. on Site	Function	Sound Power Level (LW) (dB(A))
Excavator (540t)	1	Overburden Excavation/Loading	116
Excavator (360t)	1		115
Excavator (190t)	3	Overburden/Coal Excavation/Loading	115
Haul trucks (Cat 785)[1]	9[2]	Overburden/Coal Haulage	117
Haul trucks (Cat 793XQ)[3]	10		115
Bulldozer (D11)	3	Overburden Prime Push, Overburden/Coal Rip/Push, Final Landform Development Clearing, Overburden Emplacement/Road Maintenance, Coal Stockpile Maintenance	116
Bulldozer (D10)	4		116
Bulldozer (D9)	1		116
Bulldozer (D6)	1	Campaign Rehabilitation	109
Bulldozer (D5)	1		109
Grader	1	Road/Overburden Emplacement Maintenance	110
Fuel/Service Truck	1	Equipment Refuelling/Servicing	107
Scraper	4	Campaign Topsoil/Subsoil Removal and Replacement	113
Drill Rig	3	Blast hole Drilling	107-108
Front-end Loader (FEL)	3	Screening Plant/Product Coal Loading	112
Water Cart	4	Dust Suppression	114-118
Fixed Coal (Crushing) Plant	1	Coal Crushing and Screening	118
Dry Separation Plant	1	Coal Screening and Separation	112

Note 1: Incorporates noise attenuation.
Note 2: Up to 3 additional operating trucks required when mining occurs at deepest point within open cut. Typically an extra two trucks are retained on the Mine Site as replacement for maintenance and repairs of operating trucks.
Note 3: XQ refers to Extra Quiet.
Source: Spectrum (2015) – Table 1

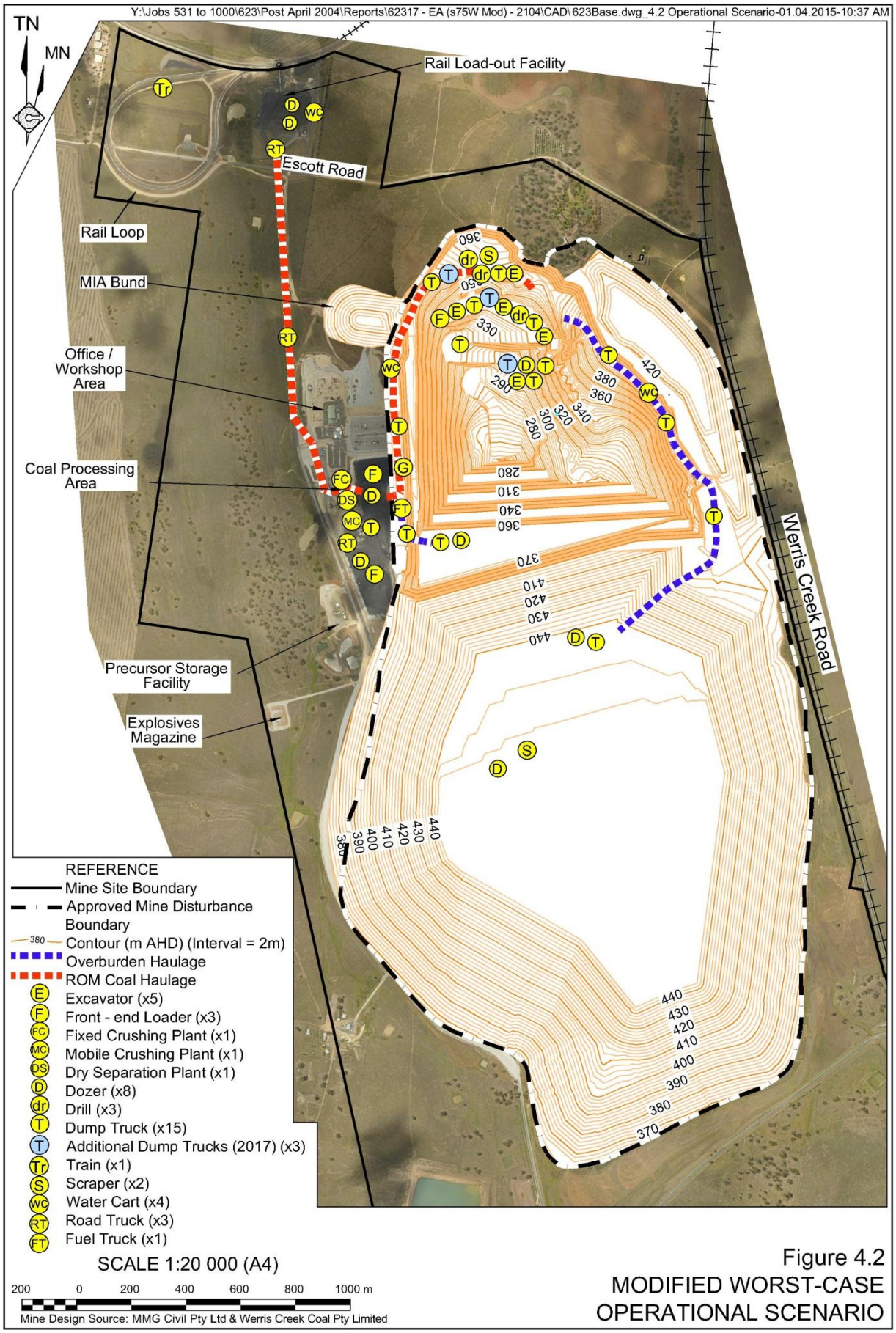


Figure 4.2
MODIFIED WORST-CASE OPERATIONAL SCENARIO

The noise model was conducted assuming the following adverse atmospheric conditions:

- *Adverse winds* – Air temperature 10°C, 70% RH, 3m/s wind from north west and south south-east; and
- *Inversion* – Air temperature 5°C, 85% RH, +12°C/100m vertical temperature gradient.

Noise contours were generated along with point calculations at critical receivers surrounding the Mine Site. It is noted that where apparent conflict between the noise contours and point calculations, the point calculation is the more accurate.

As identified in Section 2.2.4 and **Table 4.1**, the Proponent has advised that an additional three haul trucks could be required when mining the deepest sections of the open cut. To assess the impact of these additional noise sources, Spectrum (2015) modelled the mining operation with three additional trucks (both unattenuated [sound power level of 124dB(A)] and attenuated [sound power level of 117dB(A)]) (see **Figure 4.2**) and compared the results.

4.2.4.2 Road Traffic Noise

Road traffic noise is assessed as an equivalent (average) (L_{eq}) noise level over a defined period, with criteria provided for the day period (7:00am to 10:00pm) and night period (10:00pm to 7:00am) (refer to **Table 4.4**). Spectrum (2015) applied the methodology described in the document *Information on Levels of Noise Requisite to Protect Public Health and Welfare with an Adequate Margin of Safety, March 1974* published by the US Environmental Protection Agency which relies upon the following equation.

$$L_{eq},T = L_b + 10\log\left[1+\frac{n\tau}{T}\left(\frac{10^{\frac{\Delta L}{10}}-1}{2.3}-\left(\frac{\Delta L}{10}\right)\right)\right]$$

Where:

L_{max} = maximum vehicle noise at residence (108dB(A));
L_b = ambient equivalent noise level, dB(A);
ΔL = $L_{max} - L_b$;
T = assessment period (minutes);
τ = "10dB-down" duration per vehicle; and
n = number of vehicles during assessment period.

Spectrum (2015) compared the L_{eq} noise level calculated for the 2010 LOM Project (noting this considered transport of 100 000tpa), to that of the current 50 000tpa proposal over the current 'day' period of 7:00am to 6:00pm and the proposed extended period of 7:00am to 10:00pm.

The L_{eq} road traffic noise level was then compared to the road noise criteria as well as the Leq noise level previously measured at a residence R110 located on Taylors Lane.

4.2.5 Assessment of Impacts

4.2.5.1 Mine Site Noise

Table 4.4 presents the predicted noise levels at receivers surrounding the Mine Site under the modelled worst-case scenarios. Inversion conditions represent by far the highest predicted noise levels and **Figure 4.3** presents the noise contours generated under 12°C/100m inversion conditions.

Table 4.4
Predicted Operational Noise Levels dB(A),$L_{eq(15minute)}$

Receiver[1]	Meteorological Condition			Criteria (night)	Maximum Differential
	Inversion (12°C/100m)	Wind (3m/s)			
		NW	SSE		
R3a	34	<20	29	35[3]	-1
R3b	35	<20	30	35[3]	0
R5	32	25	<20	35[3]	-3
R7	37	32	<20	37	0
R8	37	32	<20	37	0
R9	37	32	<20	37	0
R10	38	34	<20	39	-1
R11	38	36	<20	39	-1
R12	38	38	<20	38	0
R17	35	35	<20	35[3]	0
R21	37	23	27	37	0
R22	37	31	<20	36	**+1**
R24	37	35	<20	37	0
R26	35	<20	28	35[3]	0
R55	35	22	27	35[3]	0
R62	35	23	27	35[3]	0
R96	38	34	<20	37	**+1**
16, 64 & 97[2]	38	NA	NA	35[3]	**+3**
R98[4]	38	30	20	36	**+2**
R101	33	<20	27	35[3]	-2
R102	33	<20	27	35[3]	-2
R103	34	<20	27	35[3]	-1
R105	34	20	27	35[3]	-1

Note 1: see **Figure 4.2**
Note 2: As there is no residence, R prefix not provided. Noise exceeded on greater than 25% of the property
Note 3: Default criterion of PA 10_0059 applies
Note 4: The Applicant holds an agreement with the owner of R98 for noise levels up to 40dB(A)

Source: Spectrum (2015) – Table 2

After including three additional attenuated trucks in the noise model (at locations presented on **Figure 4.2**), as discussed in Section 4.2.4.1, Spectrum (2015) confirms that this would not increase the noise levels received and presented in **Table 4.4**.

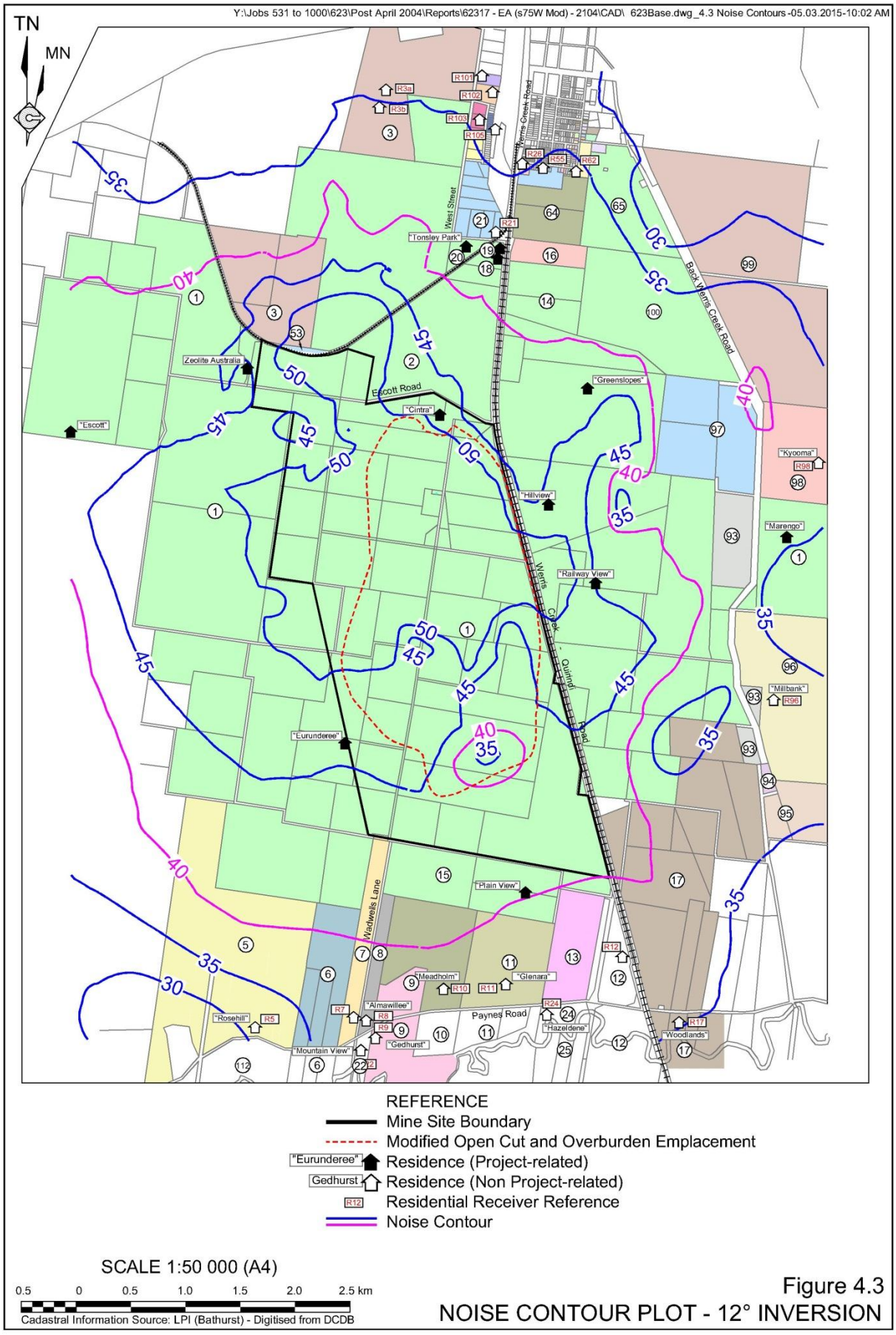


Figure 4.3
NOISE CONTOUR PLOT - 12° INVERSION

The modelling indicates that with the exception of R22, R96 and R98 compliance with the current noise criteria for residential receivers could be achieved for the modified operations. The modelling results support the evidence provided by recent monitoring which has identified exceedances of the current noise criteria at R22 (July 2013), R96 (September 2014) and R98 (September 2013).

The modelling results presented in **Table 4.4** support modification of the noise criteria of PA 10_0059 from 36dB(A) to 37dB(A) at R22, from 37dB(A) to 38dB(A) at R96 and 36dB(A) to 38dB(A) at R98. This is considered appropriate on the basis of the following.

- Noise criteria of 38dB and higher have been established at other receivers.
- The Applicant has demonstrated implementation of all reasonable and feasible noise mitigation measures (refer to Section 4.2.3).
- The noise model used for the current assessment has been reviewed and updated based on noise monitoring results and is therefore considered more accurate than previous noise models used for assessment and criteria establishment.
- The Applicant holds an agreement with the owners of R98 and R22 which requires the Applicant to implement additional noise mitigation measures at the residence in the event noise levels exceed 40dB and acquire the property in the event that noise levels exceed 45dB.

Additional to the residential receivers, the expected noise levels received on vacant land with building entitlement, namely properties 97, 16 and 64 have been assessed through review of the noise contours generated by the noise model (see **Figure 4.3**). Under worst case inversion conditions, the noise level that is predicted to be exceeded on greater than 25% of each property is 38dB(A).

Given the implementation of all reasonable and feasible noise mitigation measures (refer to Section 4.2.3), Spectrum (2015) recommend 38dB(A) be adopted as the noise criteria for Property 97, 16 and 64. It is noted that the EPA has advised that a noise limit should not be applied to a vacant property, however, the DPE has not yet advised whether a noise limit under PA 10_0059 should apply to such properties.

Finally, given Properties 14, 15, 18 and 20 have been purchased by the Applicant since PA 10_0059 was issued, it is recommended that Condition 1 of Schedule 3 be modified to remove reference to R14, R18 and R20 (see Section 5).

4.2.5.2 Road Traffic Noise

Spectrum (2015) calculated the equivalent noise level as noted in Section 4.2.4.2, with the results presented in **Table 4.5**.

The distance from the receiver to the centre line of the road was nominated as 42m, which is the approximate distance of the closest residential receiver to Taylors Lane (R6 – see **Figure 4.1**). Notably, the equivalent hourly noise level under the proposed modified road transport operations would be reduced and remain well below (-8.6dB) the RNP road noise criteria (refer to **Table 4.2**).

Table 4.5
Predicted Road Traffic Noise Levels (at R6)

	Hours of Transport	Movements/hr	Noise Level ($L_{Aeq(1hour)}$)
Proposed Road Transport (LOM Project) (RWC, 2010)	7:00am – 6:00pm	10	48.4
Approved Road Transport (PA 10_0059)	7:00am – 6:00pm	8.5	47.4
Proposed Road Transport	7:00am – 10:00pm	6.3	46.4
Source: Modified after Spectrum (2015) – Section 4.5			

Comparison to ambient evening noise levels of residences on Taylors Lane ($L_{Aeg(1\ hour)}$ of 45dB) (refer to Section 4.2.2.2 and **Table 4.1**) illustrates that the noise attributable to heavy vehicle transport would only marginally exceed ambient evening noise levels.

On the basis of compliance with relevant criteria and equivalence to ambient noise levels, it is assessed that the proposed increased in road transport hours of operation could be undertaken in compliance with road noise criteria and with no additional impact on local residents of Taylors Lane.

4.2.6 Monitoring

A continuation of the monitoring currently undertaken on and surrounding the Mine Site would be sufficient to confirm ongoing compliance and enable performance to be continually improved.

4.3 AIR QUALITY

4.3.1 Introduction

An *Air Quality Assessment* was undertaken by Heggies Pty Limited (Heggies) in 2010 to support a development application for the LOM Project (RWC, 2010) and confirmed mining could be undertaken without unacceptable impact (with respect to relevant criteria) on the air quality at surrounding residences. The results of these studies are provided in RWC (2010) and Heggies (2010). As noted in Section 3.3.3, the Proposal has the potential to impact upon air quality as a result of the additional sources of air emissions (dry separation plant) and changes to the location of dust emitting activities relative to surrounding receivers (Northern Extension of the 400m to 445m AHD section of the overburden emplacement).

SLR Consulting (SLR) was engaged to review the results of Heggies (2010) and complete an assessment of the anticipated impacts on local particulate levels associated with the proposed operational changes. The following subsections consider the previous air quality predictions, the results of ongoing air quality monitoring, as well as outlining potential impacts resulting from the proposal and any management measures proposed to be maintained and/or implemented. A copy of SLR's letter report is provided in full as **Appendix 4** and referred to as SLR (2015), with the following information summarising their report.

4.3.2 Existing Setting and Environmental Performance

4.3.2.1 Introduction

Since the commencement of mining operations in 2005, an air quality monitoring program has been undertaken on and surrounding the Mine Site to review the impact of the Mine on local air quality. **Figure 4.4** identifies the locations of air quality monitoring sites which include:

- 20 dust gauges (prefix DG) monitoring for dust deposition;
- a Tapered Element Oscillating Microbalance (prefix TEOM) which collects samples which can be analysed to determine particulate matter (measured as PM_{10} and $PM_{2.5}$) concentration; and
- a High Volume Air Sampler (prefix HVAS) for the monitoring of PM_{10} and total suspended particulates (TSP).

While historically, the Applicant has received complaints from local residents in relation to dust emissions (45 out of a total of 460 complaints since 2005), the results of monitoring have generally demonstrated compliance with the air quality criteria nominated in **Table 4.6**. It is noted that these criteria levels are also outlined in *Condition 3(16)* of PA10_0059, with the exception of annual and 24 hour averaged $PM_{2.5}$ levels.

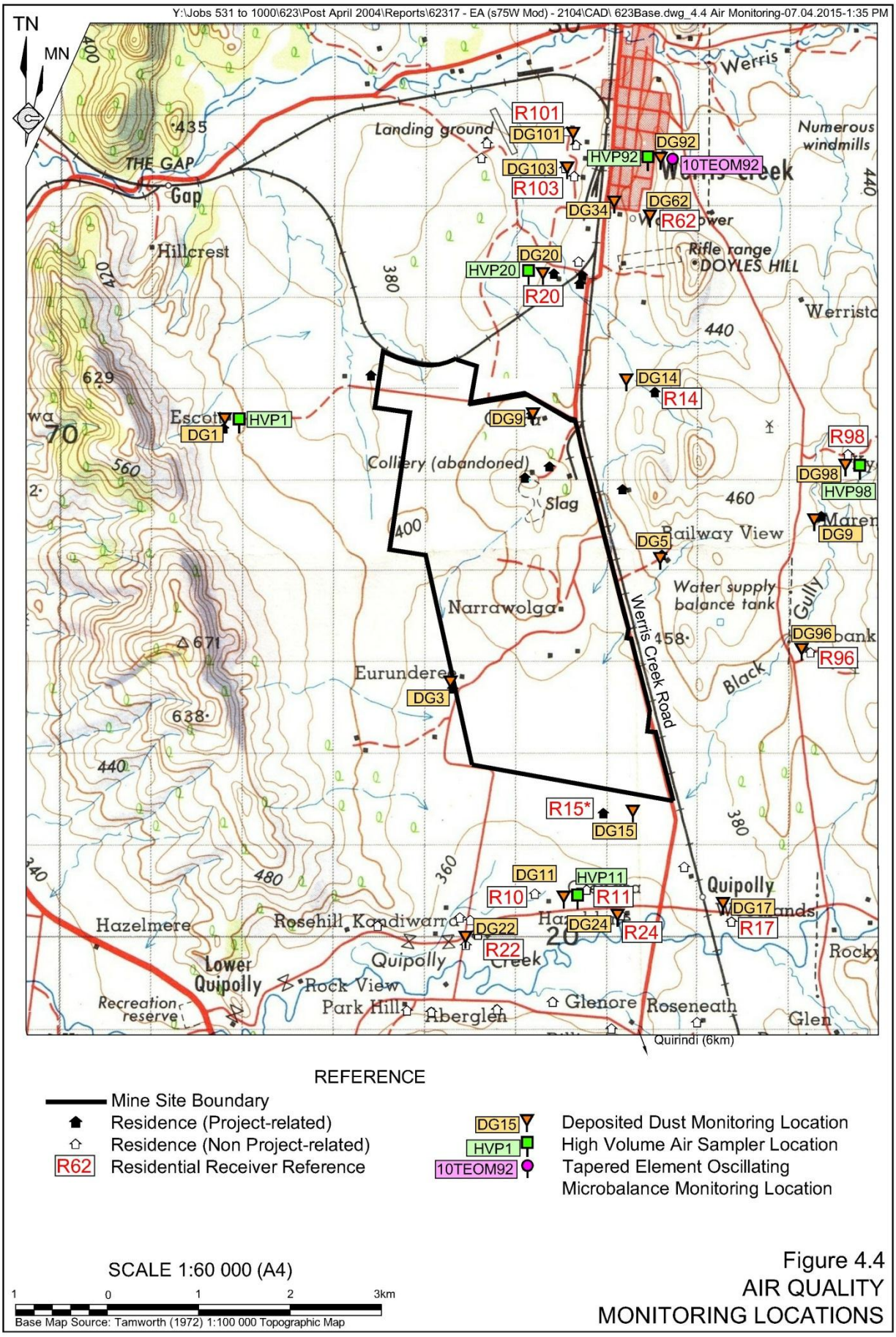
Table 4.6
Air Quality Criteria

Pollutant	Averaging Period	Criteria[1]
Total Suspended Particulate (TSP) Matter	Annual	90µg/m^3
Particulate Matter < 10 microns (PM_{10})	Annual	30µg/m^3
	24-hours	50µg/m^3
Particulate Matter < 2.5 microns ($PM_{2.5}$)	Annual	8µg/m^3
	24-hours	25µg/m^3
Deposited Dust (total)	Annual	4g/m^2/month
Deposited Dust (incremental increase)	Annual	2g/m^2/month
Note 1: TSP, PM_{10} and deposited dust from *Condition 3(16)* of PA10_0059. $PM_{2.5}$ from Air Quality and Greenhouse Gas Management Plan		
Source: Modified after SLR (2015) – Table 1		

Results from the 2013/2014 reporting period, which most closely reflects Scenario 1 of Heggies (2010), are discussed below to illustrate the general compliance of mining operations with the air quality criteria of **Table 4.6** (as predicted by Heggies, 2010).

4.3.2.2 Deposited Dust

With the exception of "Glenara" (DG24 – see **Figure 4.4**), the annual average dust concentrations recorded by the other monitoring locations during 2013/2014 were below the predicted levels in the Heggies (2010) for Scenario 1. The dust levels at "Glenara" are not considered to be significant with the drier and dustier conditions due to below average rainfall since 2013 and localized agricultural activities affecting the air quality more than dust generated from mining operations during the 2013/2014 period.


Y:\Jobs 531 to 1000\623\Post April 2004\Reports\62317 - EA (s75W Mod) - 2104\CAD\ 623Base.dwg_4.4 Air Monitoring-07.04.2015-1:35 PM
TN
MN
R101
DG101
DG103
R103
DG92
HVP92
10TEOM92
DG62
R62
DG34
DG20
HVP20
R20
DG14
R14
DG9
DG1
HVP1
R98
DG98
HVP98
DG5
DG9
DG96
R96
DG3
R15*
DG15
DG11
HVP11
R10
R11
DG17
R17
DG22
R22
DG24
R24
Landing ground
Numerous windmills
THE GAP
Gap
Hillcrest
Rifle range
DOYLES HILL
Colliery (abandoned)
Slag
Railway View
Water supply balance tank
Narrawolga
Werris Creek Road
Eurundere
Hazelmere
Rosehill
Kandiwarra
Quipolly
Lower Quipolly
Rock View
Park Hill
Aberglen
Glenore
Roseneath
Recreation reserve
Quirindi (6km)
REFERENCE
Mine Site Boundary
Residence (Project-related)
Residence (Non Project-related)
R62 Residential Receiver Reference
DG15 Deposited Dust Monitoring Location
HVP1 High Volume Air Sampler Location
10TEOM92 Tapered Element Oscillating Microbalance Monitoring Location
SCALE 1:60 000 (A4)
1 0 1 2 3km
Base Map Source: Tamworth (1972) 1:100 000 Topographic Map
Figure 4.4
AIR QUALITY
MONITORING LOCATIONS

With the exception of a single dust gauge located at 8 Kurrara Street, Werris Creek (DG34 – see **Figure 4.4**), all results were compliant with the 4g/m^2/month criteria. SLR (2015) concludes that the elevated results at this location are unrelated to the Mine and, given the significant difference to other surrounding dust gauges also in Werris Creek, most likely resultant from conditions in the immediate vicinity of this dust gauge, e.g. high organic matter levels.

Since deposited dust monitoring commenced in 2005, an increasing trend in deposited dust levels has only been identified at a single deposited dust gauge (DG2 on the Applicant-owned "Cintra" property). The results at all other deposited dust monitoring locations have fluctuated within the criteria guidelines (when averaged over an annual period). Further, SLR (2015) note that the average monthly dust deposition levels for the 2013/2014 period at half the monitoring locations (10 of 20) reduced from the previous period. Both the long-term trends and recent results are indicative of good dust management practices at the Mine, especially given the prevailing meteorological conditions during the 2013/2014 period (below average rainfall) were not conducive to reduced dust emissions.

4.3.2.3 Airborne Particulate Matter (PM_{10} and $PM_{2.5}$)

TEOM Monitoring Data (PM_{10} and $PM_{2.5}$)

Monitoring of PM_{10} and $PM_{2.5}$ is undertaken by a TEOM, located in the township of Werris Creek (10TEOM92 – see **Figure 4.4**), providing real-time air quality information for PM_{10} since April 2012 and $PM_{2.5}$ since September 2012.

During the 2013/2014 period, PM_{10} concentrations were as follows.

- Annual average concentration of 13.7µg/m^3, which is well below the 30µg/m^3 criteria and less than the predicted level of 15.1µg/m^3 predicted for Scenario 1 of Heggies (2010).
- A maximum 24-hour average of 43.7µg/m^3, which is below the 50µg/m^3 criterion and reflective of predictions of 24 hour concentrations for Scenario 1 of Heggies (2010).

During the 2013/2014 period, $PM_{2.5}$ concentrations were as follows.

- Annual average concentration of 8.1µg/m^3, fractionally above the 8µg/m^3 guideline level outlined within the AQGHGMP.
- The maximum daily $PM_{2.5}$ levels of 25µg/m^3 were exceeded on three occasions, however, on each occasions it was shown that these elevated levels were not attributable to mining operations.

High Volume Air Sampler Data (TSP and PM_{10})

The annual average PM_{10} and TSP concentrations at the four HVAS locations (located to the north [HVP20], east [HVP98 and HVT98], south [HVP11] and west [HVP1] of the Mine – see **Figure 4.4**) were below the relevant annual criteria (see **Table 4.5**).

A single 24 hour average result exceeding the 24 hour maximum criteria was recorded, 56.4µg/m^3 at HVP11 "Glenara". Through analysis of monitoring data from upwind locations unaffected by mining operations, SLR (2015) have estimated that the Mine contribution to this level was at most 42.8µg/m^3 (below criteria). SLR (2015) contend that the primary driver for elevated airborne particulate matter concentrations locally during the 2013/2014 period was below average rainfall as opposed to mining operations.

Notably, with the exception of the HVAS monitor at "Glenara" (HVP11), the recorded annual average particulate matter concentrations during 2013/2014 were below the predicted levels for Scenario 1 of Heggies (2010).

4.3.2.4 Meteorology

While wind data collected during the 2013/2014 period illustrated some minor differences to the wind patterns established from the long term meteorological dataset and used by Heggies (2010) for dispersion modelling purposes, SLR (2015) consider these differences not to be significant enough so as to invalidate the dispersion modelling predictions of Heggies (2010).

4.3.2.5 Validation of Heggies (2010) Modelling

As noted above, the operations for the 2013/2014 period most closely reflect Scenario 1 of Heggies (2010) for which dispersion modelling was completed. **Table 4.7** provides a comparison of activity levels against the modelled scenario.

Table 4.7
Comparison of Modelled (Scenario 1) and Actual Activity Levels

Parameter	Scenario 1[1]	2013/2014[2]
Annual coal extraction rate (tpa)	2,500,000	2,076,806
Coal transported to product stockpile by trucks (tpa)	2,400,000	1,893,180
Coal transported to domestic market by trucks (tpa)	100,000	3,481
Overburden production rate (bcm)	23,500,000	16,121,382
Water usage on roads (ML)	289	339.7
Note 1: Heggies (2010) Note 2: WCC (2014)		
Source: Modified after SLR (2015) – Table 3		

On the basis that the approximate 20% reduction in activity level is reflected in the reduced dust levels recorded, the dispersion model used by Heggies (2010) is considered to provide for accurate predictions of dust dispersion.

4.3.2.6 Summary and Conclusion

The results of air quality monitoring at the Mine indicate that, despite the prevalence of air quality-related complaints over the life of the Mine, compliance with air quality criteria has consistently been achieved. In fact, a general reduction in the concentration of deposited dust and airborne particulate matter has been observed at most locations indicating continuous improvement in the management of dust emissions. Monitoring has demonstrated that mining operations at WCC has little influence compared to the effects of prevailing climatic conditions on local dust levels.

Of particular importance, the results of monitoring for the 2013/2014 period, which closely reflects Scenario 1 of Heggies (2010), validates the dispersion model used by Heggies (2010) to predict dust dispersion.

4.3.3 Assessment Methodology

On the basis that the dispersion model used by Heggies (2010) has been validated, SLR (2015) updated the emission inventory to provide an estimate of TSP, PM_{10} and $PM_{2.5}$ emission rates for the Proposal. This update was based on the following.

- Modifications to the number and type of dust emissions sources (mobile and fixed plant) for a worst-case scenario (see **Figure 4.2**).
- The proposed activity areas nominated for the worst-case operating scenario (see **Figure 4.2**). Notably, the nominated operating scenario provides for a reduction in active disturbance areas as operations move closer to Werris Creek, however, incorporates a longer haul road length.
- A review of emission factors and calculation methodologies to comply with current best practice emission estimation techniques.

The modified emission rates were compared to the emission rates used for Scenarios 1, 2 and 3 of Heggies (2010), for which compliance with the air quality criteria of **Table 4.6** was predicted, to establish the potential for exceedance based on the modified operations. **Table 4.8** provides a comparison of activity levels against the modelled scenario.

Table 4.8
Comparison of Emission Rates

Scenario		Total Annual Estimated Emissions (tpa)			Percentage Increase in Estimated Emissions		
		TSP	PM_{10}	$PM_{2.5}$	TSP	PM_{10}	$PM_{2.5}$
Proposal[1]		**2,073**	**568**	**62**			
Heggies (2010)	Scenario 1	1,538	426	63	35%	33%	-2%
	Scenario 2	1,445	500	74	43%	14%	-16%
	Scenario 3	1,553	592	85	33%	-4%	-27%
Note 1: see **Figure 4.2**							
Source: Modified after SLR (2015) – Table 4							

4.3.4 Assessment of Impacts

Table 4.8 indicates that PM_{10} emissions for the Proposal would be equivalent to those estimated in the Heggies (2010) (for Scenario 3). This is expected given the operating scenario considered in the establishment of emissions rates for the Proposal most closely reflects Scenario 3. TSP and $PM_{2.5}$ emissions for the Proposal are, however, estimated to be higher than those used by Heggies (2010), primarily as a result of updates in the emission factors used for key sources (SLR, 2015).

On the basis that 24-hour PM_{10} concentrations are the constraining factor for air quality compliance, and that Scenario 3 (of Heggies, 2010) gave the highest off-site predictions, the results presented for Scenario 3 of Heggies (2010) were considered by SLR (2015) when assessing the likely compliance of the proposed modified operations against the air quality criteria (see **Table 4.6**).

Table 4.9 provides the predicted emissions received as a result of operations at the Mine equivalent to that modelled as Scenario 3 (Heggies, 2010). The following provides an assessment of likely compliance with air quality criteria based on the predicted emissions of **Table 4.9** and comparison of emission rates provided by **Table 4.8**.

$PM_{2.5}$

At the worst affected receptor (21), the maximum 24-hour and annual average concentrations predicted for Scenario 3 were 15.1µg/m^3 and 4.3µg/m^3 respectively. As the revised emission inventory for the Proposal provides for a lower $PM_{2.5}$ emission rate than the comparison scenario (see **Table 4.8**), and the locations of dust producing activities are not significantly different to those assumed for this scenario, SLR (2015) conclude that the worst case off-site concentrations would likely to be lower for the Proposal than those presented in **Table 4.9**, which are well below the relevant air quality criteria (see **Table 4.6**).

PM_{10}

At the worst affected receptor (21), the maximum 24-hour and annual average concentrations predicted for Scenario 3 were 42.2µg/m^3 and 19.1µg/m^3 respectively. Based on the same rationale as applied to likely $PM_{2.5}$, SLR (2015) conclude that the worst case off-site concentrations would not be significantly different for the Proposal than those presented in **Table 4.9**, which are well below the relevant air quality criteria (see **Table 4.6**).

TSP

The emissions estimated for the Proposal are 33% higher than the emissions used by Heggies (2010) (for Scenario 3). If the maximum annual average TSP concentration predicted at the worst affected receiver (21 - 40.6µg/m^3) was increased by 33%, the maximum predicted concentration would be around 54µg/m^3, which is still well below the assessment criterion of 90µg/m^3.

Deposited Dust

Given the predicted incremental and cumulative deposited dust levels at surrounding receivers are predicted to be well-below criteria, which is confirmed by annual monitoring results, and relatively small changes to proposed emission sources, locations and rates, it is considered unlikely that an increase in emission above the nominated criteria would be likely under the Proposal.

4.3.5 Monitoring

A continuation of the monitoring currently undertaken on and surrounding the Mine Site would be sufficient to confirm ongoing compliance and enable performance to be continually improved.

Table 4.9
Predicted Emissions (Heggies, 2010 – Scenario 3)

Receiver[1,2]		Annual Average TSP (µg/m³)		Annual Average PM_{10} (µg/m³)		24-Hour PM_{10} (µg/m³)		Annual Average $PM_{2.5}$ (µg/m³)	24-Hour Average $PM_{2.5}$ (µg/m³)	Annual Average Deposited Dust (g/m²/month)	
ID	Ownership	Increment	Cumulative	Increment	Cumulative	Increment	Cumulative	Increment	Increment	Increment	Cumulative
5	R. & A. George	0.7	30.9	0.3	15.4	3.5	32.0	0.4	6.2	<0.1	0.6
7	P.R. & J.S. Andrews	1.2	31.4	0.5	15.6	4.4	32.1	0.6	7.6	<0.1	0.6
8	P.A. & T.M. Hird	1.2	31.4	0.5	15.6	4.4	32.1	0.6	7.5	<0.1	0.6
9	B.R. & A.J. Smith	1.2	31.4	0.5	15.6	4.2	32.1	0.6	7.3	<0.1	0.6
10	A. Blackwell	1.9	32.1	0.8	15.9	5.2	34.6	0.8	8.3	0.1	0.7
11	W.H. & S.I. Ryan	2.0	32.2	0.8	15.9	5.5	34.6	0.8	8.3	0.1	0.7
12		3.4	33.6	1.5	16.6	7.5	32.8	0.9	7.9	0.1	0.7
17	M.M. Doolan & A.E. Hogan	1.6	31.8	0.7	15.8	5.0	32.0	0.7	6.5	0.1	0.7
21	G.J. Currey	10.4	40.6	4.0	19.1	18.4	42.2	2.3	15.1	0.4	1.0
22	L.F. & R.M. Parkes	1.1	31.3	0.5	15.6	4.2	32.1	0.6	7.2	<0.1	0.6
24	P. George	1.9	32.1	0.8	15.9	6.5	34.0	0.8	7.7	0.1	0.7
96		4.2	34.4	1.6	16.7	11.2	33.9	1.4	10.0	0.2	0.8
98	J. Colville	2.0	32.2	0.8	15.9	5.8	32.2	1.1	8.4	0.1	0.7
99	J. Colville	1.8	32.0	0.7	15.8	6.8	32.6	1.0	7.0	0.1	0.7
Criteria		***-***	***90***	***-***	***30***	***-***	***50***	***8***	***25***	***2***	***4***

Note 1: see **Figure 4.1** Note 2: Project-related Residences 14, 15, 18 & 20 included in Heggies (2010) excluded

4.4 VISUAL AMENITY

4.4.1 Introduction

As noted in Section 3.3.5, the Proposal has the potential to impact upon visual amenity from vantage points to the north of the Mine Site. It should be noted that the Proposal represents an extension of an existing feature of the Mine, which itself is now an established aspect of the local setting, rather than a new disturbance.

4.4.2 Design Features and Other Visual Controls

As discussed in Section 3.3.5, the Mine is visible from a number of publically accessible or privately owned vantage points of the Werris Creek / Quipolly locality (see **Plates 3.1** to **3.4**). Mitigation of this visual impact has been carefully considered by the Applicant in the past with the following controls included as part of Mine operation.

- An Acoustic and Visual Amenity Bund has been designed and follows the eastern perimeter of the open cut to "Cintra" Hill at the northern end of the open cut. This bund, which reaches an elevation of 425m AHD, is under construction and provides for the screening of the open cut and lower faces of the overburden emplacement from Werris Creek Road and Werris Creek town.
- Operations within the Mine Infrastructure Area are largely screened from vantage points within Werris Creek by "Cintra" Hill, which is to be retained for the life of the Mine. The MIA Bund has been constructed to provide additional visual screens of the processing operations from vantage points to the north.
- The maximum height of the overburden emplacement (445m AHD) was specifically chosen as this is equivalent to highest point of the pre-mining Mine Site topography, "Old Colliery" Hill, which is to be removed.
- The design of the overburden emplacement and Acoustic and Visual Amenity Bund incorporates the following design controls to mitigate against the impact of these structures.
  - The slope of the created landform would not exceed 10º. This is similar to the slopes of the existing "Old Colliery" Hill (of up to 7º). **Plates 3.3** and **3.4** provide an illustration of a completed 10º slope when viewed from Werris Creek Road and the Quipolly area.
  - A tree screen would be planted between the road reserve and the toe of the overburden emplacement and Acoustic and Visual Amenity Bund. These plantings have already been commenced (see Plate 3.3) and screen/obstruct views of the Mine from passing cars.
  - The closest distance between the toe of the overburden emplacement or Acoustic and Visual Amenity Bund and the road shoulder will remain at least 35m.
- Areas of disturbance would continue to be progressively rehabilitated once they are no longer required for mining purposes.

In 2012, in response to concerns raised by a local Werris Creek resident over night time lighting, the Applicant commissioned a *Visual Impact Mitigation Assessment*[13] (RWC, 2012) to review options for further mitigation of impacts. The assessment recommended either the construction of a fence or bund beyond the affected residence or an increase in height to the Acoustic and Visual Amenity Bund. While ultimately the recommended mitigation measures were not implemented, as implementation required the agreement of the affected resident, it illustrates the approach of the Applicant to identifying and resolving issues associated with the visibility of the Mine. It is understood that night time lighting related complaints are now rarely received as administrative controls around the use of lighting plants become more entrenched. Notwithstanding, the discussion above, the Applicant implements the following administrative controls on the operation of lights at the Mine.

- Where the use of lighting plants are required in locations visible from vantage points external to the Mine Site, lights would not shine above horizontal and where practicable, will be generally orientated in a westerly direction away from Werris Creek Road and adjacent communities.
- All fixed lights visible from offsite locations will comply with Australian Standard AS4282 (INT) 1995 – Control of Obtrusive Effects of Outdoor Lighting.
- A lighting camera located adjacent to R62 on southern edge of Werris Creek orientated towards the Mine monitors in near real time night lighting impacts from the Open Cut and Rail Load Out facility allowing operations to be monitored and managed as required.

4.4.3 Potential Changes to Visibility of the Mine

Views of the Mine from the south are unlikely to change as a consequence of the Proposal with the overburden emplacement having reached the full extent to the south.

Views of the Mine from the elevated vantage points on properties to the east of the Mine would continue to change as the open cut and overburden emplacement are progressively developed to the north. Notably, the construction of the Acoustic and Visual Amenity Bund ensures that views of the open cut are screened from Werris Creek Road.

The extension of the upper lifts of the overburden emplacement will result in this visible component of the Mine Site encroaching approximately 250m closer to Werris Creek. Notably, this distance would remain greater than 3.7km from Kurrara Street Werris Creek, the most southerly residential street of Werris Creek.

Effects of night time lighting are unlikely to change significantly given it is not proposed to increase the number of lighting plants operated, the implementation of the administrative controls noted in Section 4.4.2, and the fact that the operation of these lights on the more elevated sections of the overburden emplacement would only encroach an additional 250m towards residents in Werris Creek (still remaining at least 3.7km away).

[13] In accordance with *Condition 3(38)* of PA 10_0059.

4.4.4 Assessment of Impacts

Figures 4.5 and **4.6** identify the visibility arc and selected cross-sections illustrating the small increase in the visible area of the overburden emplacement from receivers at the southern edge of Werris Creek (Kurrara Street). It is noted that some residences located on the more elevated areas of the eastern edge of Werris Creek would have an equivalent visibility arc and line of sight. The cross-sections illustrate that the Acoustic and Visual Amenity Bund would ensure that only that section of the overburden emplacement above 420m AHD would be visible (see **Figure 4.6**).

Notably, the visible area of the overburden emplacement would remain more than 3.7km from Kurrara Street, with the distinction between views at 3.7km and 4.0km likely to be practically imperceptible. On the basis of this very minor change to the visibility of the overburden emplacement, the preparation of modified montages of potential views has been deemed unnecessary.

Given the Applicant has demonstrated its ability to minimise and mitigate the visual impact of the overburden emplacement, the most prominent feature of the Mine, through a design sympathetic to the surrounding rural setting, e.g. set-back from Werris Creek Road, reduced slope (10°), and successful progressive rehabilitation, the additional impact on local visual amenity of this minor modification is unlikely to be significant.

4.5 SURFACE WATER RESOURCES

4.5.1 Introduction

As illustrated by **Figure 4.7**, the Proposal would require some minor adjustment to the design and construction of surface water management features around the northern perimeter of the Acoustic and Visual Amenity Bund.

It is notable, however, that as the Proposal does not extend the overall Mine impact footprint, there would be no change to the catchments and drainage external to the Mine Site. As a result, the assessment completed as part of the original *Surface Water Assessment for the Werris Creek LOM Project* (GSSE, 2010) remains valid.

The following sub-sections provide a brief overview of the approach to be taken by the Proponent to ensure that appropriate modifications to the *Site Water Management Plan* are completed.

4.5.2 Design Features, Operational Controls and Management Measures

Acoustic and Visual Amenity Bund Drainage

Rather than divert all runoff to the north, then west and then south around "Cintra" Hill (as originally proposed in the *Environmental Assessment* for the LOM Project, RWC 2010) which would require significant earthworks to flow, it is proposed to drain the northern section of the Acoustic and Visual Amenity Bund to a new sediment basin (SB18) (see **Figure 4.7**).

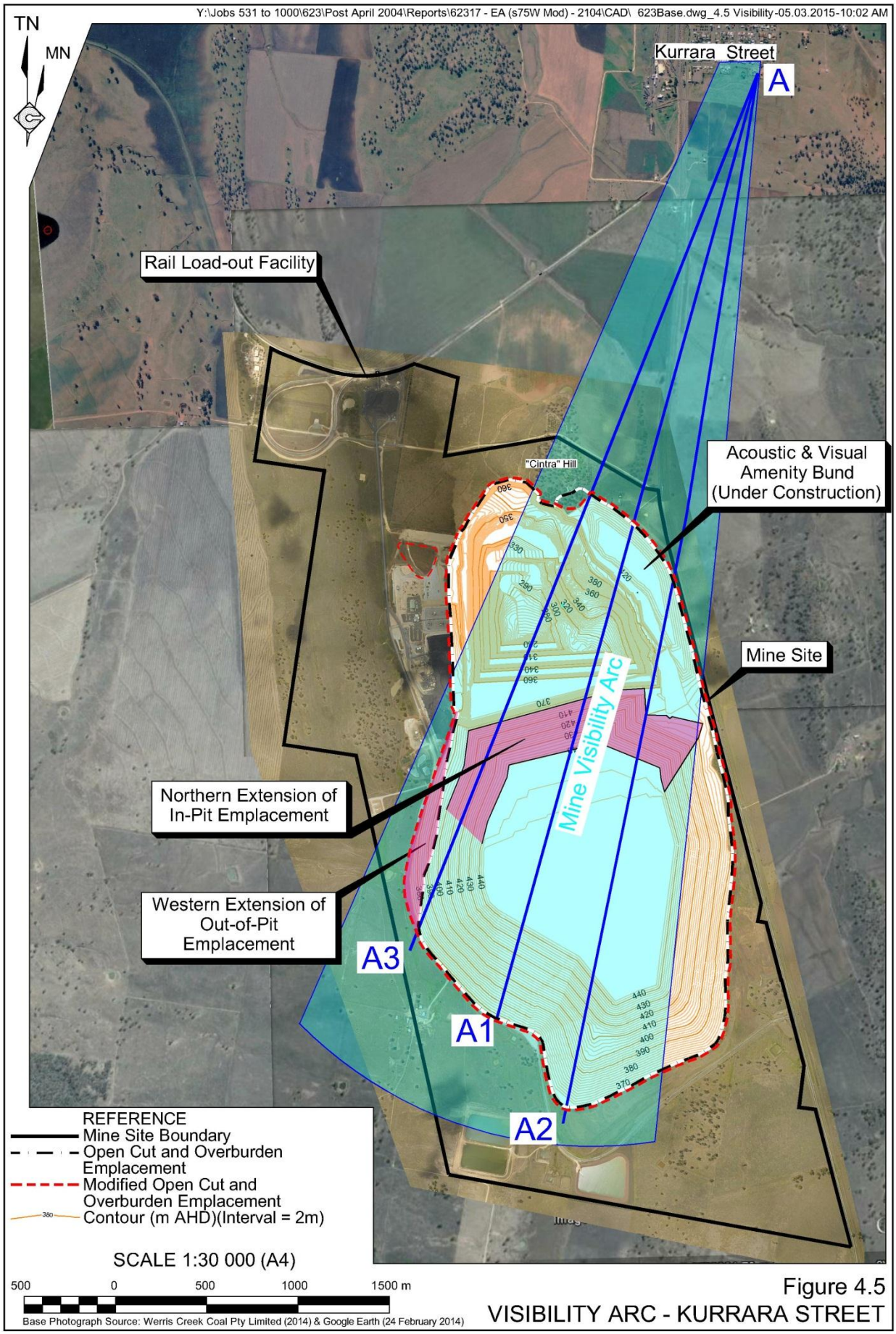


Figure 4.5
VISIBILITY ARC - KURRARA STREET

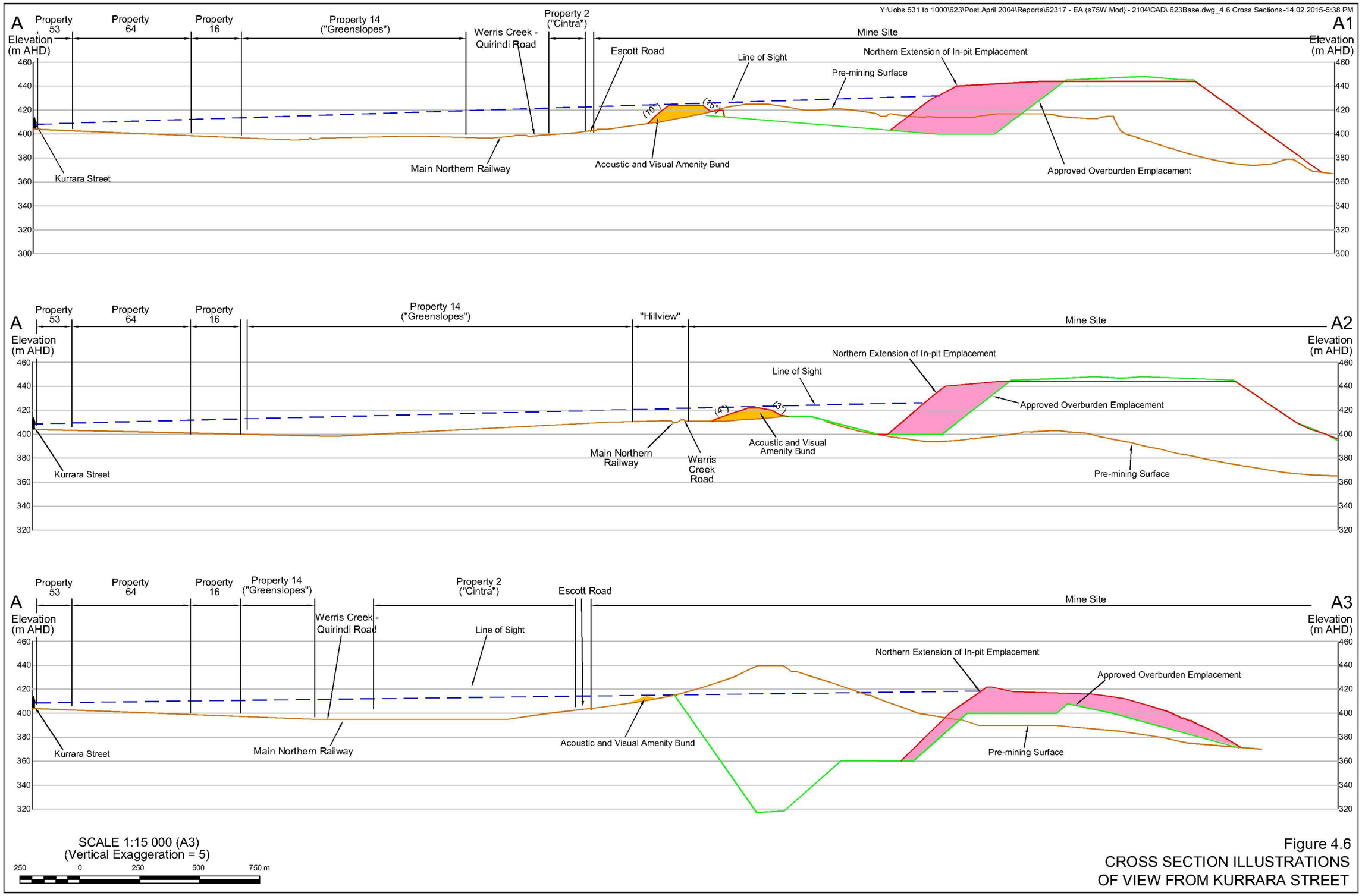


Figure 4.6
CROSS SECTION ILLUSTRATIONS
OF VIEW FROM KURRARA STREET

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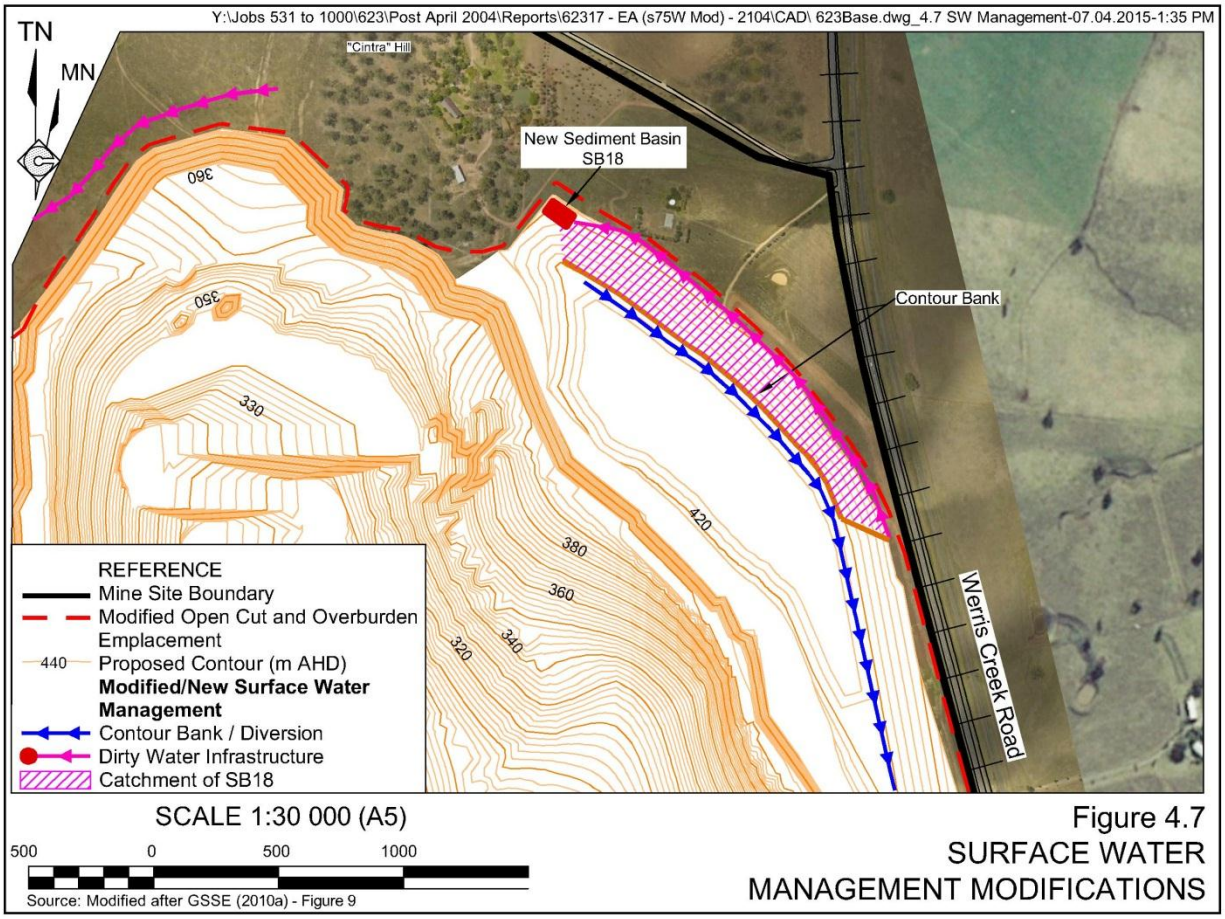


It is proposed to locate SB18 within the approved impact footprint of the Acoustic and Visual Amenity Bund to provide storage capacity for at least 2 000m^3 of sediment and water. This capacity, if appropriately managed would provide the necessary sediment storage and water settling zone capacity requirement for a 5-day 90th percentile rainfall event (39.2mm) and design features in accordance with Standard Drawing (SD) 6-4 of *Managing Urban Stormwater: Soils and Construction Vol. 1 4th Eds.* (Landcom, 2004) ("the Blue Book")the Blue Book.

The minimum sediment storage capacity has been calculated using the Revised Universal Soil Loss Equation (RUSLE) (Equation 1) to calculate 2 months soil loss.

$$(1)\quad S = \frac{0.17 \times A(R \times K \times LS \times P \times C)}{1.3}$$

Where:

- 0.17 = one sixth of the computed average annual soil loss
- 1.3 = the bulk density of the deposited sediment.
- A = the disturbed catchment area (<3ha).
- R = rainfall erosivity for the location (1500).
- K = soil erodibility (0.02).
- LS = length/gradient factor (9.05).
- P = erosion control practice factor (1.3).
- C= groundcover factor (1.0).

Using Equation 1, the minimum sediment storage capacity requirement for the catchment of SB18 is 138m^3.

To estimate the volume of runoff for a design rainfall event (5-day 90th percentile), Equation 2 was applied.

(2) $V = 10 \times C_v \times A \times R_{5\text{-day, }90\text{-\%ile}}$ (m^3)

Where:

10 = a unit conversion factor.

C_v = volumetric runoff coefficient for the design rainfall. Hydrologic Group D, as defined by Landcom (2004) as fine-textured (clay), surface sealed soils with high runoff potential, has been assumed (0.64).

A = the catchment (5ha).

$R_{5\text{-day, }90\text{-\%ile}}$ = rainfall for the design rainfall event (39.2mm).

Using Equation 2, the minimum water settlement capacity requirement for the catchment of SB18 is 753m^3.

A marker would be installed in SB18 to identify the water level above which less than 900m^3 storage capacity remains. Within 5 days of this level being exceeded, the water would either be pumped to another on-site structure or treated to achieve the water quality criteria of EPL 12290 assigned to other discharge points prior to discharge. Accumulated sediment would also be periodically excavated and placed with other overburden to maximise storage capacity. In the event of rainfall exceeding the design event (39.2mm in five days), water would overflow via a spillway designed in accordance with SD 6-4 of the Blue Book to the vegetated agricultural land to the north.

Overburden Emplacement Drainage

The design of drains, which provide for a fall of 1.2% to move runoff from the slopes of the overburden emplacement, would be reviewed and revised as required to ensure sufficient capacity for rainfall events up to a 1 in 20 ARI rainfall event.

4.5.3 Assessment of Impact

Acoustic and Visual Amenity Bund Drainage

SB18 has been designed and would be managed to collect runoff from the northerly portion of the Acoustic and Visual Amenity Bund within the existing approved impact footprint of this structure. If managed appropriately to retain the design storage capacity, and treat water prior to controlled discharge, any controlled discharge would be likely to comply with the water quality criteria of EPL 12290.

As the new sediment basin will be located within an already approved impact footprint, there will be no additional impacts on biodiversity or heritage features of the local setting.

Overburden Emplacement Drainage

Given the very small increase in catchment to the 1.2% drains which carry runoff off the surface of the overburden emplacement, it is considered unlikely these would require modification to maintain performance up to a 1 in 20 ARI rainfall event. Confirmation of this, or revision to design, would be included in an updated *Site Water Management Plan* for the Mine.

4.6 VOID WATER

4.6.1 Introduction

In order to cater for a possible surplus of void water under high rainfall conditions, the Applicant proposes to make this water available for beneficial agricultural uses on land surrounding the Mine Site. To confirm that irrigation could be undertaken without adverse effect on this agricultural land, the Applicant commissioned Strategic Environmental and Engineering Consultants (SEEC) to:

- assess the suitability of the void water for irrigation;
- review local soil parameters; and
- model the application of void water to local land in order to:
  - provide an indication of the area and application rate required to remove the predicted void water surplus; and
  - assess whether this irrigation would impact adversely on the receiving soils and catchment.

A complete version of the *Void Water Impact Assessment* of SEEC (2015) is provided as **Appendix 5**.

The following sub-sections provide a review of those features of the local setting critical to the assessment of irrigation potential (local topography, soil properties and void water quality), the assessment methodology, an overview of operational safeguards and management measures to be implemented, and an assessment of the potential impact of irrigation should it be undertaken.

4.6.2 Local Setting and Suitability

4.6.2.1 Topography and Drainage

Advice provided by SEEC (pers. comm. A. McLeod of SEEC) indicates that with the exception of poorly drained areas with slopes of less than 3%, the topography and drainage of the land surrounding the Mine Site would be conducive to irrigation. Two properties adjacent to the Mine were further investigated ("Escott" and "Cintra") as being representative of the landforms and soil types of the wider area and therefore able to be used for assessment as to the feasibility of irrigation of the Mine void water to agricultural lands in the local setting.

The topography of the "Escott" property to the west of the Mine Site rises gently to the west with some area of almost flat terrain (<3%) rising to moderately slopes approaching 10%. Surface drainage is to the north towards Werris Creek which flows at least 4km to the north.

The topography of the "Cintra" property to the north has relatively minor undulations with slopes generally between 3% and 5%. Surface drainage is also to Werris Creek approximately 3.5km to the north.

4.6.2.2 Water Quality

Table 2.2 provides a detailed summary of the quality of water sampled from the open cut void and void water dams. These results illustrated each of the analytes tested, generally comply with the Short Term Exposure (STE) trigger level for irrigation of ANZECC (2000). In particular, the concentration of metals was generally undetectable or present at very low concentrations (several orders of magnitude below the trigger levels).

SEEC (2015) reviewed these water quality results and summarised those parameters required as inputs to the irrigation model (ERIM) (see **Table 4.10**).

Table 4.10
Void Water Quality for Input to Irrigation Model

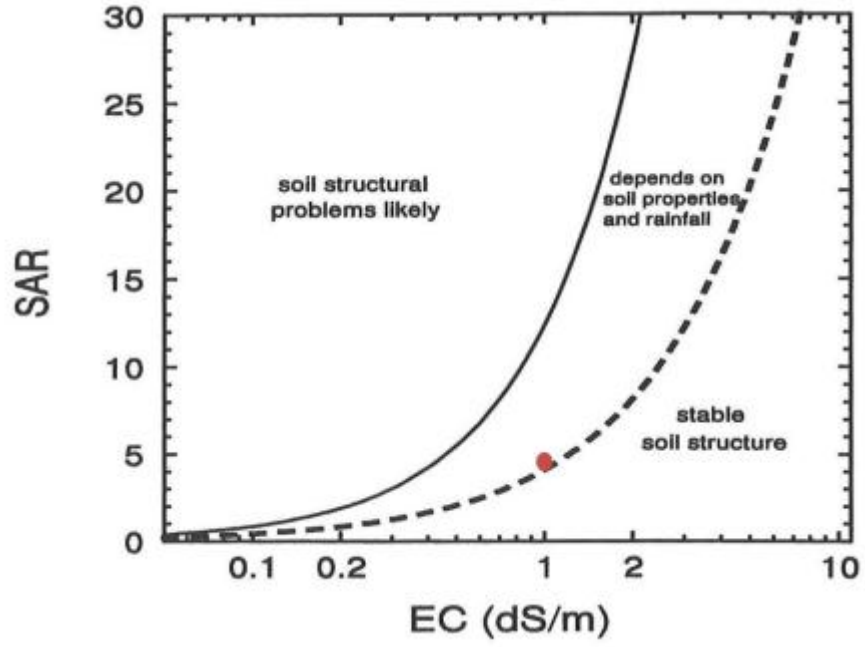
Sample Location	Electrical Conductivity µS/cm	pH	Sodium Absorption Ration (SAR)	Nitrate mg/L	Nitrite mg/L	Total Nitrogen (as N) mg/L	Total Phosphorous mg/L	BOD mg/L
VWD1	1 100	8.35	4.59	2.29	0.03	2.8	0	ND
VWD2	1 070	8.41	-	4.86	0.05	5.6	0	-
VWD3	994	8.74	4.82	2.48	0.07	3.6	0.06	-
VWD4	1 030	8.97	4.74	4.78	0.07	5.8	0	ND
Void (wet)	921	8.02	3.03	6.23	0.07	7.3	0.01	ND
Void (dry)	929	7.92	3.24	6.13	0.08	7.5	<0.01	<2
Mean	1 023	-	4.3	4.1	0.05	5.0	0.01	ND
Median	-	8.41	-	-	-	-	-	-

VWD = Void Water Dam
Source: Modified after SEEC (2015) – Table 3

Considering the void water quality, SEEC (2015) calculated the root zone salinity and plotted this against sodium absorption ratio (SAR). The root zone salinity (EC_{se} in dS/m) is calculated as EC_i (salinity of the water) divided by (2.2 x the root zone leaching fraction [LF]). Based on the texture of the soil, SEEC (2015) applies a LF of 0.3, therefore:

Root Zone Salinity = 1.02 / (2.2 x 0.3) = 1.55

The red circle on **Figure 4.8** represents the plotted root zone salinity against the SAR of 4.3 (see **Table 4.10**) over a base graph from ANZECC (2000) which defines the relationship between salinity, sodicity and affects on soil structure. This plot indicates that the void water would be suitable for irrigating common pasture without affecting soil structural stability.



Source: SEEC (2015) – Figure 2 / ANZECC (2000) – Figure 4.2.2

Figure 4.8
REVIEW OF VOID WATER SUITABILITY

4.6.2.3 Soils

A review of the soil landscape mapping of the Tamworth 1:100 000 map sheet (Banks, 2001) indicates that three soil landscapes are common on the land surrounding the Mine Site (see **Figure 4.9**), namely:

- 'The Siphon' Soil Landscape to the west;
- 'Escott' Soil Landscape to the north; and
- 'Duffs Gully' Soil Landscape to the north and south.

Banks (2001) notes that the 'Escott' Soil Landscape is derived from sandstone whilst 'The Siphon' and 'Duffs Gully' Soil Landscapes are of volcanic origin and derived from the Werrie Basalt. Anecdotal evidence provided by the Applicant with respect to land use suggests that the soils of the "Cintra" property to the north of Escott Road are in fact derived from Werrie Basalt and therefore more indicative of 'Duffs Gully' Soil Landscape. However, in order to remain consistent with previous soil and land capability assessments conducted on the Mine Site (GCNRC, 2004, GSSE, 2010), reference to the Escott Soil Landscape is retained. In any event, soil sampling and analyses completed for this assessment provide a more accurate representation of soil characteristics.

In order to identify the specific soil properties of the land of the local setting, for modelling and assessment purposes, soil samples from four locations were taken and analysed. **Figure 4.9** identifies the four soil sampling locations and **Table 4.11** presents the results of soil analyses.

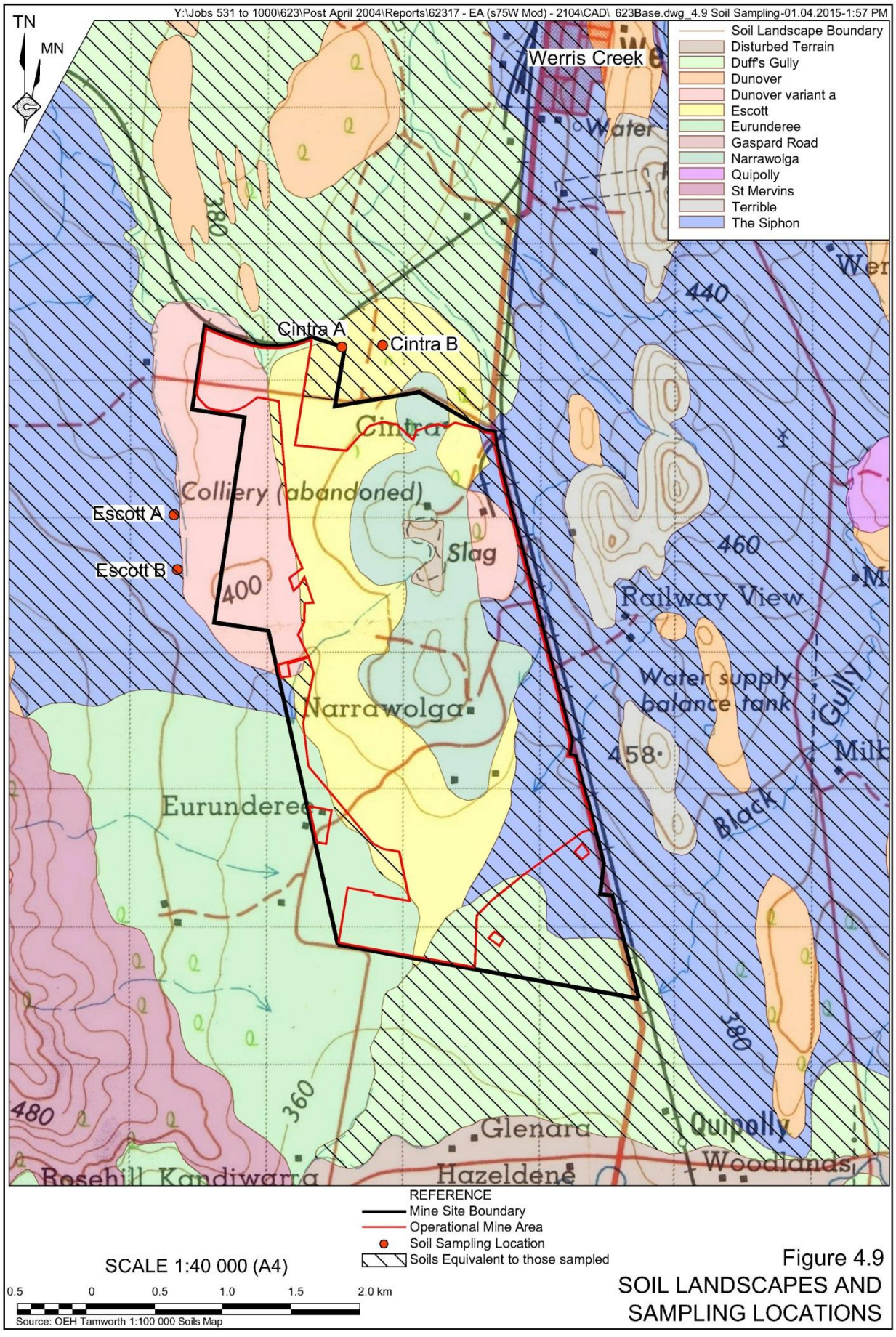


Figure 4.9
SOIL LANDSCAPES AND SAMPLING LOCATIONS

Table 4.11
Soil Properties

Sample Location and layer[1]	Texture	pH	Electrical Conductivity (µS/cm)	Cation Exchange Capacity (meq/100g)	Phosphorous Sorption (mg/kg)	Emerson Aggregate Test	Total carbon (%)
Cintra A1	Silty clay	6.6	55	30.7	1210	4	1.15
Cintra A2	Silty clay	7.9	40	43.4	1700	4	0.24
Cintra A3	Sandy clay	8.5	129	57.6	2480	4	0.25
Cintra B1	Silty clay	5.9	113	19.9	1400	4	0.9
Cintra B2	Silty clay	6.5	121	32.5	2410	4	0.46
Cintra B3	Sandy clay	7.2	73	36	1680	4	0.22
	Mean	7.1	88	36	1 813	4	**1.03**[2]
Escott A1	Silty clay	7.2	23	49.9	1340	4	1.09
Escott A2	Silty clay	7	46	54.1	1460	4	1.22
Escott A3	Silty clay	9.4	123	90.5	988	4	0.25
Escott B1	Silty clay	7.5	20	52.1	1660	4	0.94
Escott B2	Silty clay	8.1	26	48.7	2270	4	0.73
Escott B3	Clay loam	8	30	44.4	4670	4	0.4
	Mean	7.9	41	56.6	2065	4	**1.02**[2]
Note 1: See **Figure 4.9** Note 2: Topsoil							
Source: Modified after SEEC (2015) – Table 5							

SEEC (2015) provides a review of these results which suggest some small differences between the soils of the two properties. Most notably, the soils of the "Cintra" property are sandier at depth and have a lower Cation Exchange Capacity (CEC) (although in both cases the CEC is identified as high by SEEC, 2015).

Based on the observations of the Applicant noted above, the samples taken to the north of Escott Road, while mapped as 'Escott' Soil Landscape, are considered indicative of the 'Duffs Gully' soils which are mapped further to the north, as well as south of the Mine Site. On the basis of the soil sampling being representative of soils from the volcanic origin 'The Siphon' and 'Duffs Gully' Soil Landscapes, **Figure 4.9** also identifies (indicatively) the areas of land within the local setting to which the modelling described in Section 4.7.3 is directly relevant.

4.6.3 Assessment Methodology

As noted in Section 2.5.4, modelling the ability of land to accept void water without adversely impacting on soil properties or receiving waters has been undertaken by SEEC (2015) using the EPA endorsed *Effluent Reuse Irrigation Model* (ERIM)[14]. The model inputs, derived from the void water quality and soils sampling and analyses described in Sections 4.7.2.2 and 4.7.2.3, are provided in *Section 5.2.2.2* of SEEC (2015) and are not repeated here.

[14] The void water is not effluent as described in the POEO Act, however, the salinity of the void water exceeds the relevant trigger for stream water quality for a NSW upland stream (350µS/cm) (ANZECC, 2000). For this reason, SEEC (2015) took a conservative approach to assessment by treating the water as effluent and applying the *Environmental Guidelines: Use of Effluent by Irrigation* (DEC, 2004).

4.6.4 Operational Controls and Management Measures

As discussed in Sections 2.5.4.3 and 2.5.4.4, prior to the commencement of irrigation an assessment of the specifically nominated irrigation area(s) soils would be completed using ERIM. Based on the information obtained on specific location, additional sampling would be undertaken (unless samples taken and presented in **Table 4.11** are suitable based on location) to establish site specific parameters including soil texture, soil structure, effective root zone and those included in **Table 4.11**. Additionally, more detailed information on application method and crop type[15] would be available to enable these factors, which will influence the rate of water uptake, to be applied.

Following the confirmation of suitability of the land for irrigation, a site specific irrigation impact assessment would be prepared. **Table 4.12** presents an example of an Irrigation Schedule Protocol based on the soil samples of the local area to the Mine to demonstrate the practical application of void water to land by irrigation with the following information provided to aid interpretation of the protocol.

- Day 0 represents a rainfall day that produces runoff or previous irrigation, i.e. when the soil is saturated. On this date the soil water storage is set to the maximum permissible.
- Irrigation commences when soil water storage reaches zero, or alternatively a lighter irrigation could occur for a defined soil water storage value between 0 and the maximum.
- The amount of water applied (mm/m^2) is presented as effective rainfall. Once irrigation replenishes soil water storage back to the maximum allowable value again (soil is saturated) resets the protocol (i.e. starts back at Day 0).

4.6.5 Assessment of Impact

4.6.5.1 Introduction

It is noted that the impacts are assessed based on the ERIM outputs of SEEC (2015) which consider the more general evaluation of irrigating void water to the lands characterized by the soil sampling (see Section 4.7.2.3).

4.6.5.2 Irrigation Area / Rate

SEEC (2015) reviewed the graphs produced by ERIM comparing storage requirement versus land area. These graphs (presented as *Figures 3* and *4* in SEEC, 2015), illustrate that given the available storage for void water would exceed 600ML for the life of the Mine, the land area required for irrigation could be kept low (32ha if 200ML to be irrigated and 80ha if 500ML to be irrigated). This represents an indicative irrigation rate of 6.25ML/ha/year.

[15] On the basis of the recorded sodium concentration of void water, it is recommended that sensitive crops (as defined by ANZECC, 2000) are avoided.

Table 4.12
Irrigation Schedule Protocol Spreadsheet (Example)

Date	Evaporation (mm)[1]	Crop Factor[2]	Crop water Use (mm)[3]	Effective Rainfall (mm/m^2)[4]	Soil Water Storage (mm)
Day 0				Irrigated	70[5]
Day 1	3	0.9	2.7	0	67.3
Day 2	2.3	0.9	2.07	0	65.23
Day 3	5	0.9	4.5	0	60.73
Day 4	8	0.9	7.2	0	53.53
Day 5	6	0.9	5.4	0	48.13
Day 6	5.5	0.9	4.95	0	43.18
Day 7	7.5	0.9	6.75	0	36.43
Day 8	8.5	0.9	7.65	0	28.78
Day 9	0	0.9	0	5	33.78
Day 10	0	0.9	0	5	38.78
Day 11	9	0.9	8.1	0	30.68
Day 12	5	0.9	4.5	0	26.18
Day 13	3	0.9	2.7	0	23.48
Day 14	0	0.9	0	5	28.48
Day 15	5	0.9	4.5	0	23.98
Day 16	8	0.9	7.2	0	16.78
Day 17	3	0.9	2.7	0	14.08
Day 18	2.3	0.9	2.07	0	12.01
Day 19	5	0.9	4.5	0	7.51
Day 20	8	0.9	7.2	0	0.31
Day 21	6	0.9	5.4	Irrigate	

Note 1: Evaporation may be obtained for a nearby locality from the Bureau of meteorology

Note 2: This will vary depending on the crop and time of year. Advice from a qualified agronomist would be sought.

Note 3: Refers to Evaporation x Crop Factor

Note 4: Effective rainfall assumes the first 5 mm of any rainfall event in spring, summer and autumn is ignored. Daily rainfall would be measured on site.

Note 5: This is the estimated allowable water depletion (70 mm for silty clay). Advice from a qualified agronomist should be sought.

Source: Modified after SEEC (2015) – Table 6

4.6.5.3 Nutrient Concentration

SEEC (2015) note that as nutrient concentrations in the water are very low, they would not match crop demand and so the model predicts they would not increase in the soil over time (refer to *Figures 5* and *6* of SEEC, 2015).

4.6.5.4 Other Contaminants

As noted in Section 4.6.2.2, the concentration of metals and other analytes tested were generally undetectable or present at very low concentrations (several orders of magnitude below the trigger levels).

4.6.5.5 Salinity

On the basis of the relatively low salinity of the water, and the low percolation rate adopted, SEEC (2015) report that salt should not build up in the soil nor become entrained in surface runoff or leach to groundwater. Therefore, there should be no discernible impact on the overall salt load in the Namoi Catchment and the completion of a quantified salt balance is not considered necessary.

4.6.6 Monitoring

Monitoring of void water quality, for the parameters identified in **Table 4.10**, would be included in the quarterly surface water monitoring program of the Mine. Ongoing sampling and analysis of soils representative of land being irrigated would be undertaken to quantify potential soil impacts.

4.7 TRANSPORTATION

4.7.1 Introduction

As noted in Section 3.3.9, the Proposal has the potential to change traffic conditions on Werris Creek Road and Taylors Lane between the hours of 6:00pm and 10:00pm. As discussed in Section 4.2.4, this would have no influence on compliance with road noise criteria, however, could affect local road users.

4.7.2 Design Features, Operational Controls and Management Measures

4.7.2.1 Design Features

Mine Access – Werris Creek Road Intersection

This intersection has been constructed as a Modified Basic Right (BAR) intersection and remains appropriate for the relatively small number of trucks which would enter and exit the Mine Site on any one day (refer to Section 2.6.3) and low numbers of traffic using Werris Creek Road. Sight distance is extensive in both directions and local gradients allow trucks to accelerate to local speed limits quickly.

Werris Creek Road – Taylors Lane Intersection

As reported in RWC (2010), the Auxiliary Right Turn (AUR) and the Auxiliary Left Turn (AUL) treatment of the Werris Creek Road – Taylors Lane Intersection assists in achieving the dimensional capacity to improve B-Double manoeuvres onto and off Werris Creek Road. While the current storage zone for right turning traffic is restricted, it does provide for the storage of the configuration of trucks used for coal haulage.

Given coal carrying trucks from the Werris Creek Coal Mine would continue to represent only a small proportion of vehicles using this intersection (which was constructed for the purpose of providing a by-pass for heavy vehicles around Quirindi), and no increase in the number of trucks emanating from the Mine is proposed, there is no need for any modification to this intersection.

Taylors Lane – Kamilaroi Highway Intersection

This intersection does not meet the appropriate Austroads Standard. However, given the use of this intersection by Mine generated traffic would remain a relatively small proportion of total vehicle traffic (6%), and the fact that the intersection falls below the Austroads Standard regardless of Mine traffic, it has been previously assessed (Constructive Solutions, 2010) that the intersection upgrade remains the responsibility of the road authority.

4.7.2.2 Operational Safeguards and Management Measures

The truck configurations that would be used for the road haulage of the coal would be the same as those currently used, namely: Truck and Stag; Truck and Superdog; and 25m B-Double configurations.

Existing management of road haulage from the Mine would continue to be implemented including the processes for:

- Convoying of trucks exiting the Mine Site would be avoided.
- Drivers would be instructed to obey all speed restrictions, other road rules and always operate in an appropriate and courteous manner to other road users.

4.7.3 Assessment of Impacts

The volume of truck movements from the Mine Site would be restricted by the limit on road transport imposed by PA 10_0059. Therefore, road traffic from the Mine Site would continue to be undertaken as periodic campaigns to supply specific domestic customers, the largest of which is the Whitehaven CHPP.

Considering the records of road transportation maintained by the Applicant (see Section 2.6.3), even on the heaviest traffic days, truck movements would generally be restricted to less than 86. When spread over the 15 hours proposed for road transport, this represents less than six movements per hour. This would have no noticeable impact on road capacity or intersection performance and considering the small number of trucks which would be operated, the movement of trucks could be easily schedule to avoid convoying.

There would be no change to previous assessments of road traffic noise which indicated road traffic levels well below criteria (refer to Section 4.2.5). As no road transport is proposed during the night time period, sleep disturbance does not require consideration.

It is the conclusion of this assessment that the proposed increase in hours of road transportation would allow for the concurrence of hours of operation between transport and the Whitehaven CHPP, the largest domestic customer of Werris Creek Coal, without any significant impact on road condition, intersection performance or noise. In fact, by allowing for evening transport of coal, the number of trucks travelling between the Mine and Whitehaven CHPP during the day when the majority of other road users are on the roads would be reduced.

5. SUMMARY OF PROPOSED MODIFICATIONS TO CONDITIONS OF PA 10_0059

As noted in Section 2.1.2, the Applicant proposes a range of minor administrative adjustments to the conditions of PA10_0059 to further clarify the intent of the conditions and remove conditions that are deemed no longer applicable. These are summarised as follows.

Schedule 2 Administrative Conditions

6. The Proponent shall not extract more than 2.5 million tonnes of ROM coal from the site in a ~~calendar~~ financial year.

Schedule 3 Environmental Performance Conditions

1. The Proponent shall ensure that the noise generated by the project (including noise generated on the Werris Creek Rail Spur) does not exceed the criteria in Table 1 at any residence on privately-owned land or on more than 25 percent of any privately-owned land.

Table 1: Noise criteria

Location	***Day dB(A)*** $L_{Aeq(15\ min)}$	***Evening & Night dB(A)*** $L_{Aeq(15\ min)}$	***Night dB(A)*** $L_{A1\ (1\ min}$
~~R18~~	~~40~~	~~37~~	~~45~~
R10, R11~~, R14~~	39	39	45
~~R20,~~ R21	39	37	45
R12, R96, 97, R98, 16, 64	38	38	45
R7, R8, R9, R22, R24	37	37	45
All other privately-owned land	35	35	45

3. Upon receiving a written request from the owner of the land listed in Table 3, the Proponent shall implement additional noise mitigation measures (such as double glazing, insulation, and/or air conditioning) at any residence on the land in consultation with the owner. These measures must be reasonable and feasible.

   If within 3 months of receiving this request from the owner, the Proponent and the owner cannot agree on the measures to be implemented, or there is a dispute about the implementation of these measures, then either party may refer the matter to the Director-General for resolution.

Table 3: Land subject to additional noise mitigation measures

R10	~~R18~~
R11	~~R20~~
R12	R21
~~R14~~	R96

~~33. Prior to the use of the Northern Site Access Road, the Proponent shall:~~
~~(a) construct the intersection of the Northern Site Access Road (see the figure in Appendix 2) to the satisfaction of Council;~~
~~(b) tar seal Escott Road from Werris Creek Road to the coal haul road to the satisfaction of Council;~~
~~(c) upgrade the intersection of Escott Road and Werris Creek Road to a CHR type intersection to the satisfaction of RTA and Council;~~
~~(d) install appropriate rail crossings at the rail loop on Escott Road; and~~
~~(e) install appropriate advance warning signs and lighting on Escott Road and at the intersection of the Northern Site Access Road to the satisfaction of Council.~~

~~34. Within 3 months of the commencement of coal transport from the Northern Site Access Road, the Proponent shall close the existing mine entrance on Werris Creek Road (see Figure 1 of Appendix 2) to coal transport (unless required in an emergency).~~

6. UPDATED STATEMENT OF COMMITMENTS

Since the completion of RWC (2010) and issue of PA 10_0059, the Applicant has prepared, implemented and in some cases updated a number of management plans with the objective of minimising and managing impacts on the local environment. As a consequence, some commitments included as *Appendix 6* of PA 10_0059 have been superseded by operational controls or management measures documented in the management plans.

Furthermore, this *Environmental Assessment* provides for several additional commitments in relation to environmental management of the Mine.

Table 6.1 provides an updated list of the commitments to environmental management applicable to the Mine, as currently operating and modified.

- Blue text represents new or modified commitments as a result of operations since the issue of PA 10_0059.
- Struck through ~~blue text~~ reflects commitments no longer relevant or superseded by controls or measures included in subsequently prepared and implemented management plans.
- Red text represents new or modified commitments provided for by this Proposal.
- Struck through ~~red text~~ reflects commitments no longer relevant as a result of this Proposal.

Table 6.1
Draft Statement of Commitments for Site Operations and Management

Page 1 of 17

Desired Outcome	Action	Timing
1. Environmental Management System		
A systematic set of documents are in place to guide the planning and implementation of all environmental management strategies.	1.1 Incorporate the environmental procedures in an on-site management system.	As required
	1.2 Implement the following management plans; • Mining Operations Plan (Rehabilitation Management Plan) • Heritage Management Plan • Site Water Management Plan • Noise Management Plan • Blast Management Plan • Air Quality and Greenhouse Gas Management Plan • Biodiversity and Offset Management Plan • Waste and Hydrocarbon Management Plan	Ongoing
	1.3 Incorporate relevant environmental data / information in Annual Environmental Management Reports.	Annually

Table 6.1 (Cont'd)
Draft Statement of Commitments for Site Operations and Management

Desired Outcome	Action	Timing
2. Groundwater		
~~Effective management of water dewatered from the former Werris Creek Colliery underground workings.~~[16]	~~2.1 Dewater water from the underground workings to the already approved groundwater storage cells Void Water Dams and use it preferentially for dust suppression activities.~~	~~Ongoing~~
Effective management of the potential contamination and/or reduction in availability of groundwater resources.[17]	2.2 Implement impact mitigation measures ~~associated with the contamination of groundwater due to a hydrocarbon spill~~ in accordance with ~~the~~ an approved Site Water Management Plan.	~~If contamination of groundwater due to a hydrocarbon spill occurs~~ As defined by the Site Water Management Plan
	2.3 Undertake ~~Increase the~~ groundwater monitoring in accordance an approved Site Water Management Plan ~~regime analytes monitored and/or frequency of sampling to confirm the magnitude and extent of any change in water chemistry and verify the change is a consequence of operations associated with the LOM Project~~.	~~If pH or EC trigger level exceeded~~ As defined by the Site Water Management Plan
	2.4 Implement additional assessment, land owner notification and contingency or compensatory measures in accordance with an approved Site Water Management Plan~~. In the event that routine monitoring indicates that a groundwater trigger has been reached, commission a hydrogeologist to review the data, and provide independent advice as to the cause of the trigger. The outcomes of that review, including any recommendations, will be subject to discussion and agreement with hydrogeologists from NOW.~~	~~In the event that routine monitoring indicates that a groundwater trigger has been reached~~ As defined by the approved Site Water management Plan
	~~2.5 If the saturated thickness in any bore is reduced below trigger level, notify the affected landowner(s).~~	~~If the saturated thickness trigger level is achieved in any bore~~
	~~2.6 If a reduction in the saturated thickness within any bore is in excess of the trigger level, and is determined to be as a consequence of operations associated with the LOM Project, negotiate with the affected landowner(s) with the intent of formulating an agreement in accordance with the *Site Water Management Plan.*~~	~~In the event that monitoring identifies a reduction in the saturated thickness and is determined to be a consequence of operations associated with the LOM Project~~

[16] Dewatering of the former Werris Creek Colliery underground workings has been completed.
[17] Groundwater management, monitoring and contingency measures are based upon but may supersede commitments included in assessment documentation.

Table 6.1 (Cont'd)
Draft Statement of Commitments for Site Operations and Management

Desired Outcome	Action		Timing
Prevent Accumulation of void water within the final landform which may impact on final land form and land use.[18]	2.7	Backfill overburden into the final void above the equilibrium water level ~~following the cessation of mining in order to avoid leaving a potentially saline water body~~.	Following the cessation of mining
3. Surface Water			
Effective management of the potential contamination and/or reduction in availability of surface water resources.[19]	3.1	Construct and maintain surface water management infrastructure of the Mine in accordance with an approved *Site Water Management Plan*.	Ongoing
	3.2	Implement impact mitigation measures in accordance with an approved *Site Water Management Plan.*	As defined by the Site Water Management Plan
	3.3	Undertake surface water monitoring in accordance an approved Site Water Management Plan.	As defined by the Site Water Management Plan
Prevention of void water discharge off site.	3.4	Operate void water dams with sufficient freeboard to prevent discharge during high rainfall events.	Ongoing
	3.5	Complete an irrigation assessment for specific irrigation campaigns in accordance with EPA requirements.	Prior to commencement of off-site irrigation
	3.6	Provide each irrigation assessment to the EPA for review and approval.	Prior to commencement of off-site irrigation
4. Biodiversity			
Avoid, minimise, mitigate or offset impacts (in that hierarchical order) on native vegetation (including the two identified EECs), native fauna (including threatened species) and their habitat.[20]	~~4.1~~	~~Ensure disturbance associated with the relocation of site infrastructure occurs in the locations specified on **Figure 2.1**, i.e. on cleared and cultivated land (Condition Class 1), or derived native grassland without native tree overstorey (Condition Class 3).~~[21]	~~Ongoing~~
	4.2	Implement the impact avoidance, minimisation, mitigation and offset measures of an approved Biodiversity Offset Strategy and Biodiversity and Offset Management Plan (BOMP) for the Mine in consultation with the ~~DECCW~~ OEH, ~~DoP~~ DPE and ~~DSEWPaC~~ DoE.	Ongoing

[18] This commitment is additional to measures included in the Site Water Management Plan.
[19] Groundwater management, monitoring and contingency measures are based upon but may supersede commitments included in assessment documentation.
[20] Biodiversity management, monitoring and contingency measures are based upon but may supersede commitments included in assessment documentation.
[21] Relocation of the Mine Infrastructure Area has been completed.

Table 6.1 (Cont'd)
Draft Statement of Commitments for Site Operations and Management

Desired Outcome	Action	Timing
Avoid, minimise, mitigate or offset impacts (in that hierarchical order) on native vegetation (including the two identified EECs), native fauna (including threatened species) and their habitat.[22] (Cont'd)	4.3 Include detail on the following activities in the BOMP. • Identification and demarcation of areas to be cleared. • Retention of felled trees for subsequent use during rehabilitation activities • Identification of ~~Identify, as part of the Pre-start Clearing Inspection,~~ biological resources within the disturbance area including habitat resources such as hollows, stag trees and coarse woody debris, and the availability of endemic seed. • Seed collection. • Monitoring and inspection programs. • Noxious weed management.	As defined within the BOMP
	~~4.4 Limit vegetation clearing each year to an area required for the following 12 months mine development.~~	~~Annual~~
	~~4.5 Undertake vegetation clearing during a single campaign each year (except when there are extenuating circumstances), preferably during seasons that minimise the risk of impacting on hibernating microbats or breeding woodland birds, i.e. Autumn.~~	~~Vegetation clearing and ongoing~~
	~~4.6 Commission a Pre-start Clearing Inspection of the proposed disturbance area by an ecologist to identify the presence of native fauna (including threatened species such as the Koala and microbats).~~	~~Vegetation clearing and ongoing~~
	~~4.7 Suspend all clearing activities, in the event a koala (or other threatened fauna species) is present in the trees to be cleared, until it moves away from the subject area or is relocated by a suitably qualified person.~~	~~Prior to clearing operations within areas of remnant vegetation.~~
	~~4.8 Clearly mark / peg areas required for surface infrastructure establishment and mining.~~	~~Ongoing~~
	~~4.9 Retain felled trees on the Project Site for subsequent use during rehabilitation activities.~~	~~Site establishment and rehabilitation phases~~

[22] Biodiversity management, monitoring and contingency measures are based upon but may supersede commitments included in assessment documentation.

Table 6.1 (Cont'd)
Draft Statement of Commitments for Site Operations and Management

Desired Outcome	Action	Timing
~~Mitigate unavoidable disturbance to native vegetation and fauna habitat.~~	4.10 ~~Implement a seed collection strategy and program to harvest endemic seed from local vegetation to either directly sow or propagate for tube stock planting in either biodiversity offset or rehabilitation areas.~~	~~Ongoing~~
	~~4.11 Complete monitoring and inspection programs to review the progress of rehabilitation against criteria based on vegetation community benchmark data.~~	~~Annual~~
Rehabilitate disturbed areas to create a final landform that maintains or improves biodiversity values of the Mine Site.[23]	4.12 Complete rehabilitation in accordance with an approved Rehabilitation Management Plan (RMP) or Mining Operations Plan (MOP). ~~Create a final landform generally similar to that of the pre-mining landform, i.e. approximating the conceptual final landform provided by **Figure 2.18**.~~	Ongoing
	~~4.13 Revegetate the final landform as nominated by **Figure 2.18** **Figure 2.**6 (or subsequent Rehabilitation Management Mining Operations Plan), i.e. predominantly native woodland vegetation which will supplement the LOM Project BOS and improve the linkage between remnant areas of native woodland vegetation to the east and west.~~	~~Ongoing~~
	~~4.14 Designate approximately 3.7ha of the final landform as Brigalow woodland to replace the 0.35ha of this vegetation type removed.~~	~~During rehabilitation~~
~~Rehabilitate disturbed areas to create a final landform that maintains or improves biodiversity values of the Project Site.~~	~~4.15 Augment habitat through the placement of previously cleared timber (on the ground as well as upright 'stags') to provide important habitat value for arboreal and ground hollow dependant fauna and perching sites.~~	~~During rehabilitation operations~~
~~Manage the impacts of noxious weeds~~	~~4.16 Monitor noxious weeds on a regular basis, and if required, conduct weed management campaigns to manage weed outbreaks.~~	~~Ongoing~~
~~Minimise or avoid impacts on native fauna ()~~	~~4.17 Undertake vegetation clearing during a single campaign each year (except when there are extenuating circumstances), preferably during seasons that minimise the risk of impacting on hibernating microbats or breeding woodland birds, i.e. Autumn.~~	~~Vegetation clearing and ongoing~~
	~~4.18 Commission a Pre-start Clearing Inspection of the proposed disturbance area by an ecologist to identify the presence of native fauna (including threatened species such as the Koala and microbats).~~	~~Vegetation clearing and ongoing~~

[23] Rehabilitation measures contained within the Rehabilitation Management Plan are based upon but may supersede commitments included in assessment documentation.

Table 6.1 (Cont'd)
Draft Statement of Commitments for Site Operations and Management

Desired Outcome	Action	Timing
~~Minimise or avoid impacts on native fauna ()~~ (Cont'd)	~~4.19 Suspend all clearing activities, in the event a koala (or other threatened fauna species) is present in the trees to be cleared, until it moves away from the subject area or is relocated by a suitably qualified person.~~	~~Prior to clearing operations within areas of remnant vegetation.~~
~~Offset residual impact of the Mine LOM Project~~	~~4.20 Develop and implement, in consultation with the DECCW OEH, DoP DPE and DSEWPaC DoE, a Biodiversity Offset Strategy and Management Plan for the LOM Project.~~	~~Ongoing.~~
5. Heritage		
Maintain Aboriginal heritage values on site.	5.1 Implement the Heritage Management Plan for the Mine in consultation with OEH and DPE.	Ongoing
	5.2 Relocate ~~Re-instate~~ the Narrawolga Axe Grinding Grooves to ~~a position as close as possible to their original location following rehabilitation of the Project Site~~ the Willow Tree Visitor Information Centre (at Willow Tree), as nominated in the Mine Heritage Management Plan, and in accordance with a care agreement transferring the responsibility from Werris Creek Coal to Nungaroo LALC ~~consultation with local Aboriginal community representatives~~.	~~Following mine closure~~ Timing to be negotiated with Nungaroo LALC and Liverpool Plains Shire Council
	~~5.3 Continue awareness training of staff and contractors for cultural heritage matters~~	~~Ongoing~~
	~~5.4 In the event the Project Site disturbance footprint changes, ensure that appropriate consultation and field survey is undertaken to confirm no sites or objects of Aboriginal heritage significance are impacted.~~	~~If the disturbance footprint changes~~
~~Maintain Aboriginal heritage values on site.~~	~~5.5 In the event any previously unidentified 'objects' or other Aboriginal sites (such as burials) are uncovered, ensure that work in that area is suspended and the OEH Western Regional Archaeologist (Dubbo Office) and local Aboriginal community are contacted to discuss how to proceed.~~[24]	~~If a previously unidentified object or Aboriginal site is uncovered~~
~~Develop an historic context for the Project Site particularly in reference to the operation of the former Werris Creek Colliery.~~	~~5.6 Salvage the concrete marked with the hand and footprints of the former Deputy Mine Manager's daughter at the residence and provide to Ms Dora Koops (one of the daughters) for posterity.~~	~~Prior to the demolition of the residence~~
	~~5.7 Provide the photo record held by the Proponent and its consultants to the Werris Creek Historical Society (or other similar community group) as a record of the remnant features at the time of removal.~~	~~Once available~~

[24] Commitments 5.3 – 5.5 may be superseded by the Mine Heritage Management Plan

Table 6.1 (Cont'd)
Draft Statement of Commitments for Site Operations and Management

Desired Outcome	Action	Timing
~~Develop an historic context for the Project Site particularly in reference to the operation of the former Werris Creek Colliery.~~ (Cont'd)	~~5.8 Provide a copy of the Cultural Heritage Assessment (Landskape, 2010) to the Werris Creek Historical Society (or other similar community group) as a record of the remnant features at the time of removal.~~[25]	~~Once available~~
6. Transport Aspects		
Product haulage by public road is conducted in an appropriate and safe manner.[26]	~~6.1 Design all recommended road and intersection upgrades to accommodate B-Double use and to the satisfaction of the relevant road authority.~~	~~In designing road and intersection upgrades~~
	~~6.2 Complete all intersections to a standard providing appropriate dimensional capacity and signage and to the satisfaction of the relevant road authority.~~	~~During road and intersection construction~~
	6.3 Prevent spillage from the trucks through the continuation of a 'covered load' policy.	Ongoing
~~Accommodate the increased volume of traffic using Escott Road.~~	~~6.4 Upgrade the intersection between Escott Road and Werris Creek Road as recommended by Constructive Solutions (2010) to the satisfaction of the relevant road authority.~~	~~During the construction phase of the Project~~
	~~6.5 Upgrade Escott Road as recommended by Constructive Solutions (2010) to the satisfaction of the relevant road authority.~~	~~During the construction phase of the Project~~
~~Maintain access across the rail turn-around loop.~~	~~6.6 Construct two level crossings across the rail turn-around loop.~~[27]	~~During construction of the rail turn-around loop~~
	~~6.7 Construct an emergency side track around the rail loop to allow emergency access should the road be blocked by a train.~~[28]	~~During construction of the rail turn-around loop~~
~~Contribute to the maintenance of Taylors Lane.~~	~~6.8 Provide ongoing funding for maintenance of Taylors Lane on a per tonne basis (in the form of section 94 contributions).~~[29]	~~Ongoing~~
7. Noise		
Attenuate mining noise sources to ensure compliance with Project Specific Noise Criteria.	7.1 Construct an Acoustic and Visual Amenity Bund at the northern extent of mining operations.	~~Once~~ Prior to mining through the "Old Colliery" Hill
	7.2 Implement noise mitigation and management measures in accordance with an approved Noise Management Plan (NMP).[30]	Ongoing

[25] Commitments have been completed as nominated and no longer require inclusion.
[26] No upgrades now proposed as part of mine operations and so reference to road and intersection standards unnecessary.
[27] Crossings not required as road constructed around rail loop.
[28] Commitment has been completed as nominated and no longer requires inclusion.
[29] Included under "Community Contributions".
[30] Blasting related management measures include in BMP are based upon but may supersede commitments contained within the assessment documentation.

Table 6.1 (Cont'd)
Draft Statement of Commitments for Site Operations and Management

Desired Outcome	Action	Timing
Attenuate mining noise sources to ensure compliance with Project Specific Noise Criteria. (Cont'd)	~~7.3 Locate all mining related infrastructure, e.g. the Coal Processing Area and Site Administration and Facilities Area, in such a way that local topography (of "Old Colliery" and "Cintra" Hills) provides a natural acoustic barrier to the town of Werris Creek and the residential receivers located to the south of the town.~~	Ongoing ~~During the construction phase of the Project~~
	~~7.4 Use temporary ROM coal stockpiles from time to time within the open cut mine area to minimise the transmission of noise during night-time operations.~~[31]	~~Ongoing during night-time period~~
	~~7.5 Continue to cover the conveyor belt of the rail load out facility.~~	~~Ongoing~~
	7.6 Employ a dedicated Noise Control Operator (NCO) to continually monitor real time noise levels and inform the Open Cut Examiner (OCE) if the dominant noise source is mining.	Ongoing
	7.7 Modify or partially suspend mining operations to achieve the nominated noise criteria when elevated noise levels a result of mining noise.	On advice from NCO of elevated mining noise
	~~7.8 Ensure that all noise mitigation measures nominated in an approved Noise Management Plan are implemented to ensure that all noise emissions from the Project Site meet predicted noise levels. This may include the following.~~	
	~~• Apply the manufacturer specified attenuator kits to each truck to achieve a noise reduction of 8dB.~~	~~Ongoing~~
	~~• Apply a 1 600rpm reverse gear limiter on bulldozers operating on exposed areas of the Project Site such as the Product Coal Storage Area and ROM Pad.~~	~~Ongoing~~
	~~• Construct a 5m high barrier around the northeastern perimeter of the relocated coal processing infrastructure.~~	~~Within 6 months of Project Approval~~
	~~• Ensure that all equipment exhibits sound power levels consistent with the schedules in *Appendix D* of Spectrum Acoustics (2010).~~	~~Ongoing~~
	~~• Limit the number of operating drills (non exploration) on the Project Site to two at any one time.~~	~~Ongoing~~
	~~• Stand down all mobile equipment operating to the north of the advancing open cut under noise enhancing conditions during the evening and night-time, i.e. temperature inversion and winds from the south-southeast or northwest.~~	~~During adverse meteorological conditions during the night time period~~

[31] Superseded by use of Real Time Noise Monitor and Noise Control Officer.

Table 6.1 (Cont'd)
Draft Statement of Commitments for Site Operations and Management

Desired Outcome	Action	Timing
Attenuate mining noise sources to ensure compliance with Project Specific Noise Criteria. (Cont'd)	~~• Whilst the Coal Processing Area remains in its current location, limit the number of trucks and excavators operating during inversion conditions to 10 and 3 respectively.~~ ~~• Ensure that during periods of noise enhancing winds, overburden emplacement activities are preferentially undertaken 'in-pit'.~~	~~Ongoing until the coal crushing and screening infrastructure are relocated~~ ~~Ongoing~~
Monitor and manage noise generated by the LOM Project	7.9 Implement noise monitoring in accordance with an approved NMP for the ~~LOM Project~~ Mine.	As defined within the NMP ~~12 months of project approval~~
	~~7.10 Continue the existing monthly Noise Monitoring Program at the existing site to include five new locations to be affected by the Project.~~	~~Ongoing~~
	~~7.11 Implement a real-time monitoring program at selected residential locations that would be most affected by the LOM Project.~~	~~Within 12 months of project approval~~ ~~Ongoing~~
	~~7.12 Implement a real-time meteorological monitoring program at the Project Site to gather data on wind speed and direction, and deduce inversion conditions.~~	~~Ongoing~~
	~~7.13 Use the real time meteorological data in the management of mining operations to minimise impact of noise on the environment.~~ [32]	~~Ongoing~~
8. Blasting		
Minimise impacts from blasting on surrounding receptors and infrastructure. [33]	8.1 Undertake blasting in accordance with an approved Blast Management Plan (BMP).	Ongoing
	~~8.2 Maintain the Deed of Agreement that has been established with ARTC.~~	~~Ongoing~~
	~~8.3 Continue to implement the road closure management procedure when blasting occurs within the 500m of Werris Creek Road.~~	~~Ongoing~~
	~~8.4 Minimise the number of blasts by maximising blast size without compromising compliance with the environmental criteria.~~	~~Ongoing~~
	~~8.5 Implement refinements to blast design components on the basis of monitoring results and the achievement of specific blasting objectives.~~	~~Ongoing~~

[32] Monitoring contained within the Noise Management Plan is based upon but may supersede commitments included in the assessment documentation.
[33] Blasting related management measures include in BMP are based upon but may supersede commitments contained within the assessment documentation.

Table 6.1 (Cont'd)
Draft Statement of Commitments for Site Operations and Management

Desired Outcome	Action	Timing
Minimise impacts from blasting on surrounding receptors and infrastructure. [34] (Cont'd)	~~8.6 Blast design and implementation is undertaken by a suitably qualified blasting engineer and/or experienced and appropriately certified shot-firer.~~	~~All blasts~~
	~~8.7 Ensure that the minimum practicable weight of explosive detonates at an instant for each blast.~~	~~All blasts~~
	~~8.8 Maintain a blast exclusion zone of 500m around each blast.~~	~~All blasts~~
	8.9 Continue to monitor blasting impacts in accordance with BMP.	All blasts
9. Air Quality		
~~Minimise impacts to air quality relating to the Project.~~	~~9.1 Cover the conveyor belt on the rail load out facility.~~	~~Ongoing~~
	~~9.2 Cleared vegetation would not be burnt.~~	~~Ongoing~~
	~~9.3 Limit groundcover removal in advance of mining to be consistent with operational requirements.~~	~~Ongoing~~
Minimise impacts to air quality relating to the Project.	9.4 Undertake all surface disturbance, mining, processing, transportation and other air emissions activities in accordance with an approved Air Quality and Greenhouse Gas Management Plan (AQGHGMP) for the ~~LOM Project~~ Mine. ~~Where practicable, soil stripping operations would be undertaken at a time when there is sufficient soil moisture to prevent significant lift-off of dust.~~	Ongoing ~~During soil stripping operations~~
	~~9.5 Overburden emplacement would be limited on the top lift of the overburden emplacement area when winds are from a northerly direction and greater than 3m/s over more than four consecutive 15 minute periods during operations similar to those operations modelled in Scenario 1.~~ [35]	~~Ongoing until Coal Processing Area relocated to the north~~
	~~9.6 Apply water at the feed hopper, crusher and at all conveyor transfer and discharge points.~~	~~Ongoing~~
	~~9.7 Fit all conveyors with appropriate cleaning and collection devices to minimise the amount of material falling from the return conveyor belts.~~	~~Ongoing in the current CHPP and prior to the operation of the relocated CHPP~~

[34] Blasting related management measures include in BMP are based upon but may supersede commitments contained within the assessment documentation.

[35] Scenario 1 has been completed, commitment no longer relevant.

Table 6.1 (Cont'd)
Draft Statement of Commitments for Site Operations and Management

Desired Outcome	Action	Timing
Minimise impacts to air quality relating to the Project. (Cont'd)	~~9.8 Cease coal processing activities during periods of concurrent high winds and temperatures which cause coal dust dispersal, independent of water applications.~~	~~During high winds and temperatures which cause coal dispersal independent of water applications~~
	~~9.9 Apply water to exposed surfaces with emphasis on those areas subject to frequent vehicle / equipment movements which may cause dust generation and dispersal.~~	~~Ongoing~~
	~~9.10 Water all internal haul roads regularly.~~	~~Ongoing~~
	~~9.11 Ensure operators use appropriate speeds to limit trafficable dust emissions on all vehicles and equipment.~~	~~Ongoing~~
	~~9.12 Progressively rehabilitate areas of disturbance once they are no longer required for mining purposes.~~	~~Ongoing~~
	~~9.13 Use water injection or vacuum extraction on all drill rigs.~~	~~Ongoing during drilling operations~~
	~~9.14 Cover all product coal trucks prior to leaving the Project Site~~	~~Ongoing~~
	~~9.15 Water all product coal prior to being railed from site.~~	~~Ongoing~~
Monitor and manage dust emissions generated by the LOM Project.[36]	9.16 Undertake air quality monitoring in accordance with an approved ~~the Air Quality and Greenhouse Gas Management Plan~~ AQGHGMP for the ~~LOM Project~~ Mine.	As defined within the AQGHGMP
	~~9.17 Continue the existing deposited dust, PM_{10} and TSP monitoring in accordance with AQGHGMP~~	~~Ongoing~~
	~~9.18 Implement a continuous real-time particulate matter monitoring program in Werris Creek~~	~~Within 12 months of project approval Ongoing~~
	~~9.19 Use the real time monitoring data in the management of mining operations to minimise the impact of PM_{10} on the environment.~~	~~Ongoing~~
	~~9.20 Include a review the existing Energy Savings Action Plan as a component of the AQGHGMP.~~	~~Ongoing~~

[36] Monitoring measures included in the AQGHGMP are based upon but may supersede commitments made in assessment documentation.

Table 6.1 (Cont'd)
Draft Statement of Commitments for Site Operations and Management

Desired Outcome	Action	Timing
10. Visibility		
Screen the operation visually from the surrounding local area.[37]	10.1 Construct an Acoustic and Visual Amenity Bund at the northern extent of mining operations.	~~Once~~ Prior to mining through the "Old Colliery" Hill
	~~10.2 Locate all mining-related infrastructure, e.g. the Coal Processing Area and Site Administration and Facilities Area, in such a way that local topography (of "Old Colliery" and "Cintra" Hills) provides a visual barrier to the town of Werris Creek and the residential receivers located to the south of the town.~~[38]	~~As infrastructure is constructed~~
	10.3 ~~Plant~~ Maintain screening vegetation and constructed landforms in accordance with an approved RMP (or MOP) ~~a screen of native trees and shrubs in front of the Acoustic and Visual Amenity Bund prior to its construction~~.	Ongoing
	~~10.4 Plant trees around the perimeter of the extended product coal storage area.~~	~~On completion of construction of the extended product coal storage area~~
	~~10.5 Continue to construct the existing overburden emplacement area to create a visual barrier to the east of the Project Site including Werris Creek Road.~~	~~Ongoing~~
	~~10.6 Progressively rehabilitate areas of disturbance once they are no longer required for mining purposes.~~	~~Ongoing~~
	10.7 Continue to position and direct floodlights to not shine above horizontal and generally orientated in a westerly direction away from Werris Creek Road and adjacent communities ~~minimise emissions~~.	During night-time operations
	10.8 Ensure fixed lights visible from offsite locations will comply with Australian Standard AS4282 (INT) 1995 – Control of Obtrusive Effects of Outdoor Lighting	During night-time operations
	10.9 Maintain a lighting camera located adjacent to R62 on southern edge of Werris Creek orientated towards the Mine.	Ongoing (or until advised by resident)
	~~10.10 Construct the second rail load-out bin with a similar green shade as the existing bin.~~[39]	~~During construction phase~~
	10.11 Maintain the ~~LOM Project area and associated areas of disturbance~~ Mine Site in a clean and tidy condition at all times.	Ongoing

[37] Management measures related to visual screening through vegetation or constructed landforms contained within the Mine Rehabilitation Plan (or MOP) are based upon but may supersede commitments contained within the assessment documentation.
[38] Relocation of Mine Infrastructure Area is now complete.
[39] No longer forms part of mine plans and is therefore redundant.

Table 6.1 (Cont'd)
Draft Statement of Commitments for Site Operations and Management

Desired Outcome	Action	Timing
11. Soils, Land Capability and Agricultural Suitability		
Create a final landform that is safe, stable and is amenable to a combination of agricultural and native flora/fauna conservation activities.[40]	11.1 Undertake final landform construction and rehabilitation in accordance with an approved RMP or MOP. ~~(Where practicable), immediately transfer stripped soil from source to active rehabilitation.~~	Ongoing ~~During soil stockpiling activities~~
	~~11.2 Stockpile the soils of each soil unit separately. This will allow the Dark Brown Vertosol soils to be preferentially used for areas of the final landform designated for the re-establishment of higher quality agricultural land.~~	~~During soil stockpiling activities~~
	11.3 ~~Maintain a soil inventory:~~ • ~~to ensure appropriate volumes of different soil units are stripped consistently with the soil requirements of the final landform.~~ • ~~to identify the age of various soil stockpiles on the Project Site and therefore assist in minimising the length of time soils remained stockpiled.~~ • ~~to assist the Proponent in using the most appropriate soils for the different elements of the final landform.~~	
	~~11.4 Construct the eastern, southern and western surfaces of the overburden emplacement at 10° or less.~~	~~During regrading of the final slopes~~
	~~11.5 Construct the northern surface of the overburden emplacement, which runs into the open cut void with steeper slopes which would ultimately be reduced to 18° (1V:3H) or less in the final landform.~~	~~During regrading of the final slopes~~
	~~11.6 Create a series of contour banks, similar to those on the existing landform, on the outer slopes of the regraded emplacement to manage surface water runoff and assist in minimising erosion of these slopes.~~	~~During rehabilitation activities~~
	~~11.7 Conduct monitoring of rehabilitation performance against the proposed sustainable land use outcome and carry out amelioration works where necessary.~~	~~During rehabilitation activities~~
	~~11.8 Reinstate at least 37a of Class III land on the rehabilitated landform.~~	~~By the end of mine life~~
	~~11.9 Backfill the final void to above the modelled final water table level.~~	~~During construction of the final void~~

[40] Management measures associated with soil management and rehabilitation of the final landform contained within the Mine Rehabilitation Plan (or MOP) are based upon but may supersede commitments contained within the assessment documentation.

Table 6.1 (Cont'd)
Draft Statement of Commitments for Site Operations and Management

Desired Outcome	Action	Timing
~~Minimise the degradation to and maximise retention of soil resources.~~	~~11.10 Undertake vegetation clearing and soil stripping activities in accordance with an approved Mining Operations Plan activities so as to minimise soil disturbance.~~	~~Ongoing During clearing of larger vegetation~~
	~~11.11 Retain smaller vegetation and leaf litter in the soil to be stripped.~~	~~During soil stripping activities~~
	~~11.12 Stripping of soil during periods of excessive soil moisture content will be avoided to reduce the likelihood of damage to soil structure.~~	~~During soil stripping activities~~
	~~11.13 Soil to be preferentially respread on areas of the final landform immediately following stripping rather than being stockpiled.~~	~~During soil stripping activities~~
	~~11.14 Where stockpiling is necessary, soil stockpiles would not exceed 3m in height.~~	~~During soil stockpiling activities~~
~~Maximise the retention of soil resources.~~	~~11.15 Soil is to be generally stripped in accordance with **Table 2.7.**~~	~~During soil stripping activities~~
12. Waste		
Manage waste appropriately on site.	12.1 Prepare and implement waste management activities in accordance with an approved Waste and Hydrocarbon Management Plan (WHMP) ~~Maintain a register of the types and quantities of wastes produced on the Project Site~~.[41]	Ongoing
	~~12.2 Design and maintain storage areas to contain spillages.~~	~~Ongoing~~
	~~12.3 Segregate and retain recyclable and non-recyclable waste in designated storage areas prior to removal from the Project Site.~~	~~Ongoing~~
	~~12.4 Keep the Project Site in a clean and tidy condition.~~	~~Ongoing~~
	~~12.5 Ensure waste is regularly removed from the Project Site by a licensed contractor.~~	~~Ongoing~~
13. Hazards		
Manage bushfire hazards appropriately.	13.1 Prepare and implement fire prevention, management and suppression measures in accordance with a Fire Management Strategy which forms part of an approved BOMP. ~~Maintain an immediate method of egress from the Project Site to Project personnel in the event of bushfire attack on the Project Site.~~[42]	Ongoing.
	~~13.2 Follow all instructions provided by the NSW Rural Fire Service (RFS) or police in the event of a local bushfire event threatening the Project Site.~~	~~In the event of a local bushfire event threatening the Project Site.~~

[41] Waste and hydrocarbon management measures are based upon but may supersede commitments included in assessment documentation.

[42] Fire prevention, management and suppression measures are based upon but may supersede commitments included in assessment documentation.

Table 6.1 (Cont'd)
Draft Statement of Commitments for Site Operations and Management

Desired Outcome	Action	Timing
Manage bushfire hazards appropriately. (Cont'd)	~~13.3 Provide access to all Project Site water storages to the RFS and any reasonable assistance offered to RFS or police personnel.~~	~~In the event of a local bushfire event threatening the Project Site.~~
	~~13.4 Refuelling to be undertaken within designated fuel bays or within cleared area of the Project Site.~~	~~Ongoing.~~
	~~13.5 Turn off vehicles during refuelling.~~	~~During refuelling.~~
	~~13.6 Enforce a no smoking policy in designated areas of the Project Site.~~	~~Ongoing.~~
	~~13.7 Maintain fire extinguishers within site vehicles and refuelling areas.~~	~~Ongoing.~~
	~~13.8 Ensure a water cart is available to assist in extinguishing any fire ignited.~~	~~In the event of a fire.~~
	~~13.9 Equip all equipment on site with adequate and fully operational fire suppression equipment in accordance with AS 1841 and AS 1851.~~	~~Ongoing.~~
	~~13.10 Train all employees in the proper use of fire fighting equipment held on site.~~	~~Ongoing.~~
	~~13.11 Set aside water especially for fire fighting on site.~~	~~Ongoing.~~
	~~13.12 Ensure that fire fighting equipment is made available to the local Rural Fire Service if required in the event of a bushfire in the land surrounding the Project Site.~~	~~In the event of a bushfire in the land surrounding the Project Site~~
	~~13.13 Develop and maintain firebreaks at the edge of the Project Site.~~	~~Ongoing.~~
~~Minimise the potential for a traffic incident on a public road involving a Project related vehicle.~~	~~13.14 Locate the Escott Road Entrance to the Project Site to the east of the Rail Load-out Road with light vehicle traffic to the Project Site offices not required to cross the Rail Load-out Road.~~	~~During the construction phase of the Project~~
	~~13.15 Install level crossings at the two points where Escott Road crosses the turn-around rail loop.~~	~~During construction of the rail loop~~
	~~13.16 Construct an emergency access road around the perimeter of the turn-around rail loop.~~[43]	~~During construction of the rail loop~~
The storage and handling of hazardous materials is appropriately managed.	13.17 Prepare and implement hydrocarbon management activities in accordance with an approved WHMP ~~Maintain a register of the types and quantities of wastes produced on the Project Site~~.[44]	Ongoing
	~~13.18 Direct all water from wash-down areas and workshops to oil separators and containment systems.~~	~~Ongoing~~

[43] Escott Road upgrade no longer forms part of the proposed mining operations.
[44] Waste and hydrocarbon management measures are based upon but may supersede commitments included in assessment documentation.

Table 6.1 (Cont'd)
Draft Statement of Commitments for Site Operations and Management

Desired Outcome	Action	Timing
The storage and handling of hazardous materials is appropriately managed. (Cont'd)	~~13.19 Ensure that all storage tanks are either self bunded tanks or bunded with an impermeable surface and a capacity to contain a minimum 110% of the largest storage tank capacity.~~	~~Ongoing~~
	~~13.20 Securely store all hydrocarbon products.~~	~~Ongoing~~
	~~13.21 Designate areas for refuelling and minor maintenance work (with the exception of less mobile mining equipment, e.g. excavators which would be refuelled within the open cut area) and enforce the use of these areas.~~	~~Ongoing~~
14. Community Contributions		
Provide for ongoing support to the Werris Creek local community and Liverpool Plains Shire Council.	14.1 Maintain the Community Consultative Committee or similar and include local community representatives.	Ongoing
	14.2 Complete and distribute regular newsletters regarding project progress and operations.	At least 6 monthly
	14.3 Continue to provide funding towards maintenance of Taylors Lane through Section 94 contributions.	Ongoing
	14.4 Implement the Community Enhancement Fund with the Liverpool Plains Shire Council.	Ongoing
~~15. Environmental Monitoring~~[45]		
~~Implement a comprehensive and ongoing surface water monitoring program.~~	~~15.1 Monitor surface water quality in accordance with SWMP.~~	~~Quarterly and during surface overflow events from licensed discharge points~~ ~~Quarterly and within 12 hours after an overflow event to the receiving waters~~
~~Implement a comprehensive and ongoing groundwater monitoring program.~~	~~15.2 Continue monitoring of piezometers and groundwater bores on and surrounding the Project Site in accordance with the SWMP.~~	~~Bimonthly~~
	~~15.3 Review and update the Groundwater Monitoring Program.~~	~~Within 12 months of project approval~~
	~~15.4 Commission an experienced hydrogeologist to collate and review the monitoring data collected annually in order to assess the impacts of the project on the groundwater environment, and to compare any observed impacts with those predicted from groundwater modelling.~~	~~Annual~~

[45] Environmental Monitoring commitments are included within the various management plans nominated by Commitment 1.2.

Table 6.1 (Cont'd)
Draft Statement of Commitments for Site Operations and Management

Desired Outcome	Action	Timing
~~Implement a comprehensive and ongoing groundwater monitoring program.~~ (Cont'd)	~~15.5 Implement the Groundwater Contingency Plan as required.~~	~~As defined by the SWMP~~ ~~In the event that routine monitoring indicates that a trigger has been reached~~
~~Implementation of an appropriate noise monitoring program to ensure continuing compliance with EPA guideline levels.~~	~~15.6 Undertake attended noise monitoring at the residences most likely to be affected by the LOM Project.~~ ~~• R20: "Tonsley Park"~~ ~~• R9: "Almawillee"~~ ~~• R11: "Glenara"~~ ~~• R12: Fletcher~~ ~~• Werris Creek Town (R55 or R62)~~ ~~• R14: "Greenslopes & Banool"~~	~~Monthly~~
	~~15.7 Implement a real-time noise monitoring program with monitoring to be conducted at the most affected receiver based on the prevailing conditions at the time~~	~~Within 6 months of project approval~~
~~Implementation of an appropriate noise monitoring program to ensure continuing compliance with EPA guideline levels.~~	~~15.8 Review and update the Noise Monitoring Program to reflect additional attended and real time monitoring sites.~~	~~Ongoing~~
~~Implementation of an appropriate air quality monitoring program to ensure continuing compliance with DECCW guideline levels.~~	~~15.9 Maintain the existing dust (WC1 to WC10), PM_{10} (WCHV1 to WCHV4) and TSP (WCTSP) monitoring network as nominated identified in the Werris Creek Coal Mine Air Quality Monitoring Program.~~	~~Ongoing~~
	~~15.10 Install a new High Volume Air Sampler, monitoring for $PM_{2.5}$,~~	~~Within 12 months of project approval~~
	~~15.11 Implement a real-time particulate matter monitoring program at locations to be determined within 12 months of approval.~~	~~Within 12 months of project approval~~

7. EVALUATION AND JUSTIFICATION OF THE PROPOSAL

7.1 INTRODUCTION

As a conclusion to the *Environmental Assessment*, the proposed modified operations of the Werris Creek Coal Mine is evaluated against the principles of Ecologically Sustainable Development (ESD) in order to provide further guidance as to its acceptability and justified through consideration of its potential impacts on the environment and potential benefits to the local and wider community.

7.2 ECOLOGICALLY SUSTAINABLE DEVELOPMENT

7.2.1 Introduction

Sustainable practices by industry, all levels of government and the community are recognised to be important for the future prosperity and well-being of the world. The principles of Ecologically Sustainable Development (ESD) that have been recognised for over a decade were based upon meeting the needs of the current generation while conserving our ecosystems for the benefit of future generations. In order to achieve sustainable development, recognition needs to be placed upon the integration of both short-term and long-term environmental, economic, social and equitability objectives.

In determining the proposed activities to modify, the Applicant has endeavoured to address each of the sustainable development principles. The following sub-sections draw together the features of the Proposal that reflect the four principles of sustainable development, namely:

- the precautionary principle;
- the principle of social equity;
- the principle of the conservation of biodiversity and ecological integrity; and
- the principle for the improved valuation and pricing of environmental resources.

7.2.2 The Precautionary Principle

In order to satisfy this principle of ESD, emphasis must be placed on anticipation and prevention of environmental damage, rather than reacting to it. During the planning phase for the Proposal, and throughout the preparation of the *Environmental Assessment*, the Applicant engaged specialist consultants to examine the existing environment, predict possible impacts and recommend controls, safeguards and/or mitigation measures in order to ensure that the level of impact satisfies statutory requirements or reasonable community expectations.

Throughout the development of the Proposal, the Applicant and its consultants have adopted an anticipatory approach to impacts by undertaking an analysis of the risks posed by activities of the Proposal, an appropriate level of research and baseline investigations and environmental evaluation. The controls, safeguards and/or mitigation measures have therefore been planned with a comprehensive knowledge of the existing environment and the potential risk of environmental degradation posed by proposed modified activities.

Examples of matters relating to the precautionary principle that were considered during the various stages of the Proposal are listed below.

Identification of Project Objectives

The Proposal has been designed with the principal objective of providing for a more efficient mining operation without additional impacts on the local biophysical or socio-economic environment. The Applicant has demonstrated through comprehensive environmental assessment, consideration of feasible alternatives, and implementation of appropriate controls, safeguards and mitigation measures, that this objective can be achieved.

Design of Project Components

Noting the minor modifications to the impact footprint, this assessment has demonstrated that there would be no increase in the impact of the Mine on the biophysical environment.

In particular, the following is noted.

- The proposed modifications to the overburden emplacement would not require any new disturbance on the Mine Site. The visibility of the overburden emplacement would increase slightly, however, given the distance between the overburden emplacement and affected receivers (3.7km) this is unlikely to be noticeable.
- The proposed modifications would not result in any change to operations which would result in a noticeable increase in noise or air emissions.
- The proposed modification to surface water management consider and comply with the relevant standards.
- The proposed use of void water on surrounding agricultural land can be undertaken without adverse effect on the receiving soil or catchment. In fact, the use of water in this way is considered more beneficial than the alternatives considered (in Section 2.11.3).

Integration of Safeguards and Procedures

The framework for ongoing environmental management, operational performance and rehabilitation of the Mine Site would continue to be provided by PA 10_0059 and be managed in accordance with approved management plans. The Mining Operations Plan for the Mine would be updated to reflect the Proposal and would provide quantified goals for rehabilitation of the Mine Site including performance criteria, monitoring methods and contingency actions to demonstrate achievement of these goals. Annual Environmental Management Reports would be prepared to report on the progress of the operation and provide an opportunity to review the effectiveness of the environmental management strategies adopted. In addition, the following safeguards and procedures would continue to be implemented at the Mine.

General Safeguards and Procedures

- All on-site procedures would be regularly reviewed, particularly in light of monitoring results.

- Surface water, groundwater, noise, blasting, deposited dust and PM_{10} levels would be monitored at those locations (or equivalent) identified on **Figure 4.1**) in order to ensure the continued compliance with conditional requirements of PA 10_0059 of EPL 12290.

Noise and Blasting Related Safeguards and Procedures

- Noise would continue to be managed in accordance with the Mine Noise Management Plan.
- If required, the Applicant would continually review and update noise attenuation measures as new technologies or methods are identified.
- Real-time noise and meteorological monitoring would continue to be undertaken with feedback provided to ensure operations are managed to comply with noise criteria.
- Blasting would continue to be managed in accordance with the Mine Blast Management Plan.

Surface Water Related Safeguards and Procedures

- Wherever possible, areas not required for mining-related activities or not already disturbed by previous mining activities would remain vegetated to assist in minimising erosion and reducing the suspended sediment load in surface water flowing through the Mine Site.
- Sediment control structures would be maintained to design capacities to ensure optimum settling rates.
- Water collected in the open cut, void water dams, and/or dirty water dams, would be preferentially used for dust suppression or operational purposes.
- Excess void water would be applied to agricultural land in the local area in accordance with an assessment of irrigation and EPA approval.
- Water generated on the Mine Site that requires discharge would be conducted in accordance with the appropriate discharge protocol in order to avoid discharges that are not compliant with licence conditions.

Air Quality Related Safeguards and Procedures

- Vegetation clearing and soil stripping procedures would be implemented to ensure that dust emissions from these processes are minimised.
- Water would be applied to coal both during processing and being loaded onto trains, in order to minimise dust emissions from site as well as to minimise dust emissions from coal wagons.
- Coal processing activities would cease during periods of concurrent high winds and temperatures which may cause coal dust dispersal, independent of water applications.

- Water would be applied to exposed surfaces, with emphasis on those areas subject to frequent vehicle / equipment movements which may cause dust generation and dispersal.
- Water injection and/or vacuum extractors would be used on all operating drill rigs where required to reduce dust emissions from drilling operations.
- All product coal trucks would be covered prior to leaving the Mine Site to minimise dust emissions from road transport associated with the LOM Project.

Traffic and Transport Related Safeguards and Procedures

- Convoying of trucks would be avoided.
- Drivers would be instructed to operate the truck in a safe and courteous manner, abiding by all road standards and speed limits.

Aboriginal Heritage Related Safeguards and Procedures

- The Narrawolga Axe Grinding Grooves would be relocated to the Willow Tree Visitor Information Centre, Willow Tree, in accordance with the approved Heritage Management Plan and the wishes of the local Aboriginal community.
- Staff and contractors would undergo cultural heritage awareness training as part of the Mine induction process.
- In the event any previously unidentified 'objects' or other Aboriginal sites (such as burials) are uncovered, work in that area would be suspended and the OEH Western Regional Archaeologist (Dubbo Office) and local Aboriginal community contacted to discuss how to proceed.

Visual Amenity Related Safeguards and Procedures

- Where the use of lighting plants is required in locations visible from vantage points external to the Mine Site, lights would not shine above horizontal and where practicable, will be generally orientated in a westerly direction away from Werris Creek Road and adjacent communities.
- All fixed lights visible from offsite locations will comply with Australian Standard AS4282 (INT) 1995 – Control of Obtrusive Effects of Outdoor Lighting.
- A lighting camera located adjacent to R62 on southern edge of Werris Creek orientated towards the Mine monitors in near real time night lighting impacts from the Open Cut and Rail Load Out facility allowing operations to be monitored and managed as required.
- Progressive rehabilitation would continue to be undertaken to mitigate the impact on the overburden emplacement when viewed from vantage points external to the Mine Site.
- The Applicant would continue to respond to complaints raised in relation to visual amenity.

Waste Management Related Safeguards and Procedures

- Waste management practices would continue to be implemented to ensure that waste produced on the Mine Site is appropriately managed.

Hazard Related Safeguards and Procedures

- The fire management strategy prepared as part of the Biodiversity and Offset Management Plan would continue to be implemented utilising the local Rural Fire Service as required to ensure that the appropriate management and response procedures are implemented to reduce the risk of bushfire hazard on the Mine Site and Biodiversity Offset Area and subsequently the potential safety risk to employees and the local community.
- Strategies would continue to be implemented to mitigate and manage areas of spontaneous combustion on site including the former underground workings of the Werris Creek Colliery .
- The Waste and Hydrocarbon Management Plan would continue to be implemented to mitigate and manage the potential land contamination associated with the storage and handling of hydrocarbons or hazardous materials on the Mine Site.

Rehabilitation and Subsequent Land Use

Long term adverse impacts on the local environment would be avoided through the design and rehabilitation of disturbed areas to a landform and vegetation structure equivalent to that outlined in Section 2.10 of this document. The majority of the final landform would be restored back to woodland communities consistent with those vegetation communities secured as part of the Biodiversity Offset Strategy for the Mine.

Conclusion

The precautionary principle has been considered during all stages of the design and assessment of the Proposal. The approach adopted, i.e. risk analysis, impact identification, specialist investigations and safeguard design, provides a high degree of certainty that the Proposal would not result in any major unforeseen impacts.

7.2.3 Social Equity

Social equity embraces value concepts of justice and fairness so that the basic needs of all sectors of society are met and there is a fair distribution of costs and benefits to the community. Social equity includes for both inter-generational (between generations) and intra-generational (within generations) equity considerations.

Equity within generations requires that the economic and social benefits of the development be distributed appropriately among all members of the community. Equity between generations requires that the non-material well-being or "quality of life" of existing and future residents of the local community would be maintained throughout and beyond the life of the Mine.

As demonstrated throughout Section 4, the Proposal would have little effect on the specific impacts of the Mine. Furthermore, the Proposal would not influence the overall life of the Mine. On this basis, it is not considered there would be any change to impacts on social equity of the Mine as a result of the Proposal.

7.2.4 Conservation of Biological Diversity and Ecological Integrity

The protection of biodiversity and maintenance of ecological processes and systems are central goals of sustainability. It is important that developments do not threaten the integrity of the ecological system as a whole or the conservation of threatened species in the short- or long-term.

As identified in Section 3.3.8, and throughout Section 4, the Proposal would not result in any additional direct or indirect impacts on biodiversity to those previously identified, assessed, mitigated and offset by the Applicant.

7.2.5 Improved Valuation and Pricing of Environmental Resources

The issues that form the basis of this principle relate to the acceptance that the polluter pays, all resources are appropriately valued, cost-effective environmental stewardship is adopted and the adoption of user pays prices based upon the full life cycle of the costs.

As the Proposal provides for the continued recovery of coal, more efficient management of overburden and a potential beneficial use of void water (application to agricultural land), while not increasing impacts on the environment, this principle of ESD is achieved.

7.2.6 Conclusion

The approach taken in planning for the Proposal has been multi-disciplinary, involved consultation with potentially affected local residents and various government agencies. The emphasis has been on the application of appropriate safeguards to minimise potential environmental, social and economic impacts and it is concluded that the Mine would continue to achieve a sustainable outcome for the local and wider environment.

7.3 JUSTIFICATION OF THE PROJECT

The Proposal would serve four important functions.

1. Provide for an increase in the capacity (both total and active) of the overburden emplacement.
2. Provide for an improvement in coal quality through dry separation of impurities, particularly from the coal recovered from the previously mined coal seam of the former Werris Creek Colliery.

3. Provide for the management of void water excess to surface storage capacity, thereby avoiding the potential for impact on access to the lower coal seams under high rainfall conditions.
4. Provide local property owners / managers with access to an additional water source for beneficial use on these properties, e.g. irrigation, stock watering.
5. Allow road transportation to be undertaken for an additional four hours between 6:00pm and 10:00pm, which is concurrent with the hours of operation of the Whitehaven CHPP.

This *Environmental Assessment* has been prepared to assist in the assessment of the likely environmental impacts associated with the Proposal to PA 10_0059. The potential impacts have been identified and carefully assessed following consideration of the design features, operational controls and management measures currently in place or proposed.

On the basis of the assessment of each potential impact, the Proposal can be justified as the residual impacts on the biophysical environment can be predicted and appropriately managed, there would be no notable additional socio-economic impacts and the consequences of not proceeding are considered more adverse than proceeding. Each of these factors considered in the justification of the Proposal are presented below.

Biophysical Considerations

The Proposal would not result in any increase in the area of disturbance on the Mine Site, with the minor modifications to the overburden emplacement unlikely to result in a perceptible change in the visibility of the Mine from vantage points external to the Mine Site. In particular, while the visual section of the overburden emplacement (above 425m AHD) would extend approximately 250m closer to Werris Creek, it would still remain approximately 3.7km from the closest residential receiver (in Werris Creek).

A review of the likely emissions from the modified mining operations has confirmed that subject to the continued implementation of dust mitigation measures, continued compliance with air quality criteria is anticipated.

Additional noise modelling considering the worst-case scenario associated with the modified mining operations has confirmed that compliance with the noise criteria of PA 10_0059 can be achieved at all previously assessed receivers. A noise criterion of 37dB is recommended for an additional property to the northeast of the Mine Site which currently does not contain a residence but on which building entitlement is held.

As there would be no increase to the impact footprint of the Mine, the volume of dirty water generated by the Mine would not change. However, the Applicant has taken the opportunity to propose an improvement in the dirty water management system through the addition of a sediment basin (SB18) to collect runoff from the northern section of the Acoustic and Visual Amenity Bund. The sediment basin would become an additional discharge point from the Mine, with discharge criteria the same as other discharge points to be applied.

No impacts on the local road network, road users or property owners/residents adjoining the transport route from the Mine Site additional to those of current road transport operations, have been identified as a result of the proposed extension in hours of operation for the road transport of coal.

A review of the Water Balance Model for the Mine has confirmed that under median to high rainfall conditions, the current storage capacity of the void water dams could be exceeded (even with the operation of two misting evaporator units). Considering the various alternatives for managing this excess water, which if retained within the open cut void could prevent access to the lower coal seams, application to agricultural land surrounding the Mine Site has been identified as the preferred option. Through consideration of the physical and chemical parameters of the void water and receiving soils, it has been confirmed that application to land, at a rate of 6.25ML/ha/year could be accommodated by the land without adverse impact on the soils and/or receiving waters of the catchment.

Socio-economic Considerations

The Proposal is unlikely to result in any changes to local socio-economic conditions on the basis that the scale of operations would not be changed, there would be no additional impact on mine emissions and no significant change to the visibility of operations.

Consequence of Not Proceeding

The consequences of the Proposal not proceeding, both direct and indirect, are considered significant.

Direct Consequences

- By not increasing the active and total storage capacity of the overburden emplacement, the risk that access to the lower coal seams may be prevented or delayed as a result of encroachment of the in-pit overburden emplacement would be increased. Should this occur, production levels and efficiency would be reduced.
- By not increasing the storage capacity of the overburden emplacement, the opportunity to relocate the internal open cut haul ramps from the low wall to the high wall which would increase active storage capacity and allow for the construction of a second egress from the open cut, would not eventuate.
- By not allowing the dry separation process to be undertaken on the Mine Site, the value of coal produced would be reduced.
- By not approving the off-site application of void water to surrounding agricultural land, the potential for restricted access to the lower coal seams (as a consequence of water surplus to the storage capacity of the void water dams accumulating in the open cut) would be increased. Based on the Water Balance Model for the Mine, should a high rainfall year be experienced between 2015 and 2020, surplus water of up to 500ML could accumulate in the open cut. The effect of restricted access to the lower coal seams could be reduced production, reduced employment and an increased life of Mine (as annual production rates would be reduced).
- Not approving the off-site irrigation of void water would also require excess water to be removed by evaporation alone. It is considered that application to agricultural land is a more beneficial use of the water.
- The limited number of truck movements between the Mine and the Whitehaven CHPP (Gunnedah) would not occur during the evening (6:00pm to 10:00pm). As a result there would be no reduction in the number of truck movements on these roads during the day time, when most other road users are on the roads.

Indirect Consequences

As a result of reduced production at the Mine, as a consequence of delayed or restricted access to the lower coal seams, the following indirect impacts could eventuate.

- Reduced mining and production rate could result in reduced employment at the Mine, with the subsequent flow-on effects to the communities within which the mining workforce reside.
- Reduced coal recovery rates would likely result in an increase in the life of Mine and therefore time before the Mine Site is rehabilitated.
- Reduced coal recovery would also reduce the overall contribution of the Mine to the local, regional and state economies

On consideration of the above, the Proposal would provide for important improvements to operations at the Werris Creek Coal Mine, while only having very minor impacts on other features of the local environment. On balance, the benefits of the Proposal more than compensate for these minor and temporary impacts.

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