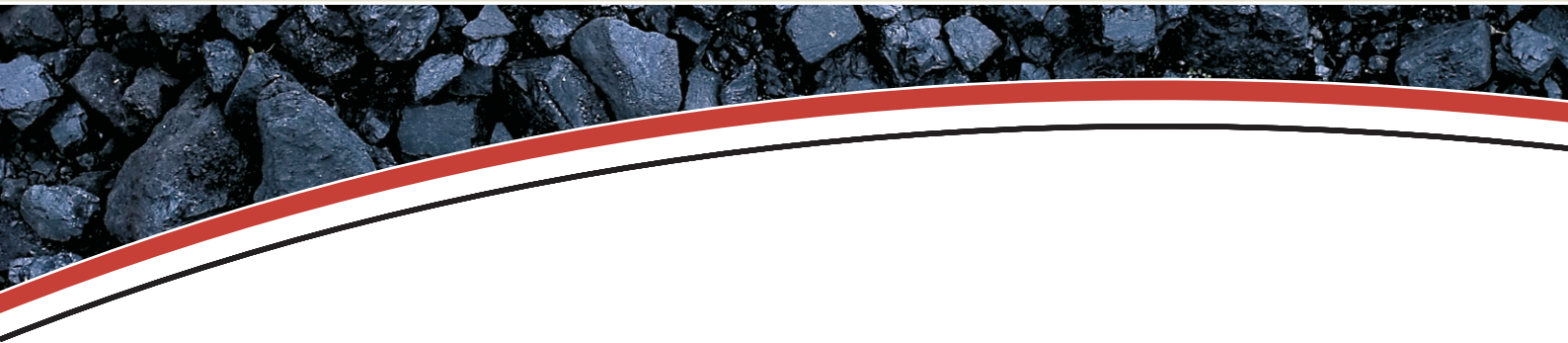




ENVIRONMENTAL ASSESSMENT

Proposed South Pit Extension Project

Volume 1 - Main Text

Environmental Assessment Proposed South Pit Extension Project

Prepared by
Umwelt (Australia) Pty Limited
on behalf of
Mt Arthur Coal

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Report No. 2000/R02/Final	Date: July 2007



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Executive Summary

Mt Arthur Coal Pty Ltd (Mt Arthur Coal) operates the Mt Arthur Coal open cut coal mine, located south of Muswellbrook in the upper Hunter Valley of NSW. The Mt Arthur Coal open cut operations include the former Bayswater No. 2 mining area and the current Bayswater No. 3 and Mount Arthur North (MAN) mining areas. The company proposes to extend the currently approved MAN South Pit further south into the Bayswater No. 3 Mining Lease (ML) in order to maximise resource recovery, maximise productivity of its mining equipment and improve overburden handling efficiencies and rehabilitation outcomes. This project is known as the South Pit Extension Project (refer to **Figure 1**).

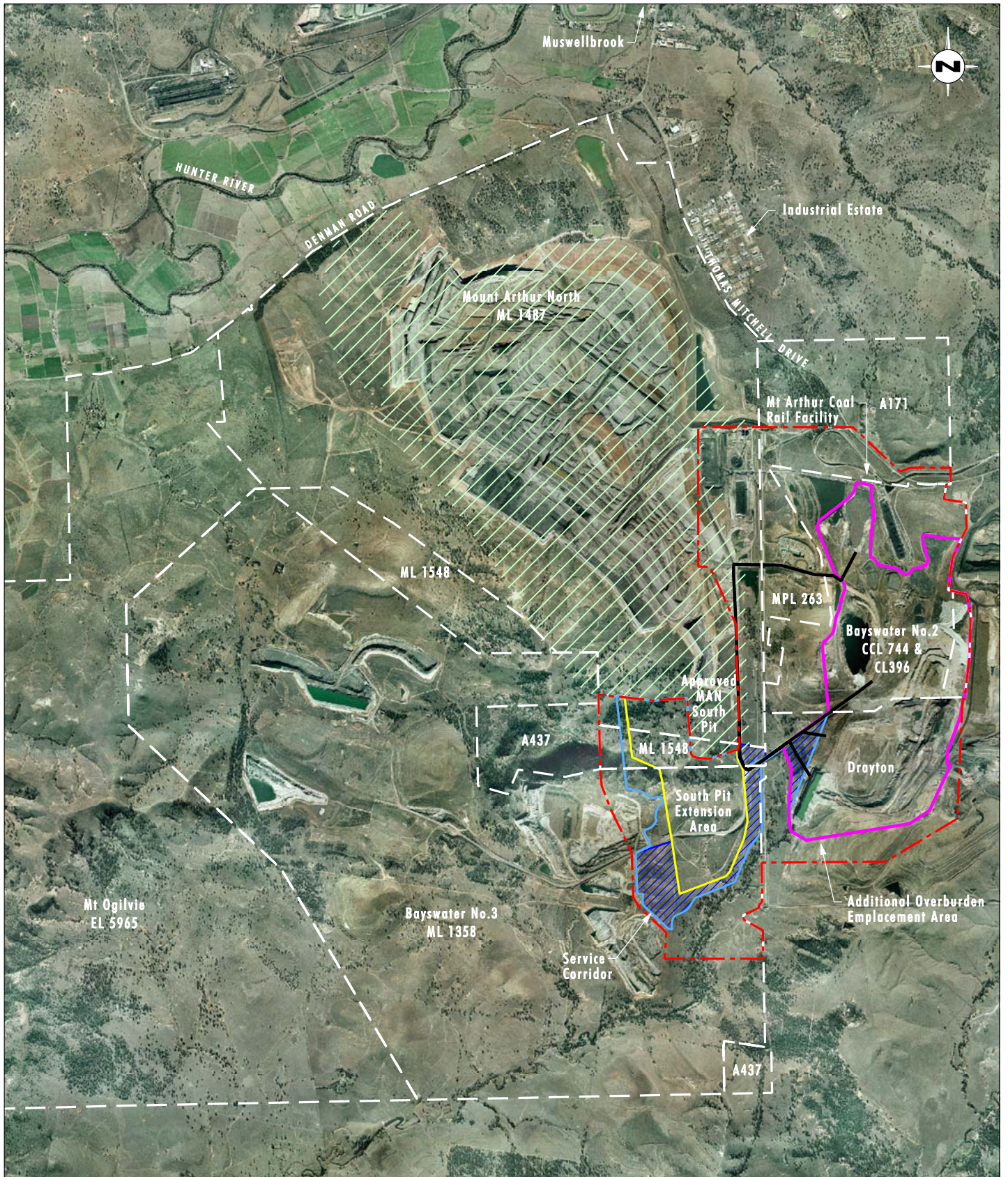
The additional area of coal proposed to be extracted as part of the South Pit Extension Project is contained within existing MLs and is surrounded by existing mining operations undertaken by Mt Arthur Coal and neighbouring Drayton open cut mine. The approved MAN South Pit is currently extracting the same coal seams as occur within the proposed extension area and will provide ready access into the additional resource, allowing it to be economically recovered. It is considered unlikely that the coal within the South Pit Extension area would be able to be economically recovered as a stand-alone operation and therefore is likely to be sterilised if not extracted by Mt Arthur Coal.

Mining in the proposed South Pit Extension area will be managed as part of the existing Mt Arthur Coal open-cut operation utilising the existing operational, safety and environmental management systems. All coal from the project area will be taken to Mt Arthur Coal's existing coal handling and preparation facilities for processing and then transported off site for sale using current rail loading and conveyor facilities. Total coal production from the Mt Arthur Coal operations will not increase beyond the currently approved limits of approximately 20 million tonnes per annum run-of-mine coal.

The majority of overburden extracted from within the extended South Pit will be emplaced in the existing Bayswater No. 2 mining area and the neighbouring Drayton west pit, in agreement with Anglo Coal Australia. The emplacement of overburden in these two areas will allow rehabilitation to be completed with an improved final landform including filling of existing mining voids. The emplacement of overburden material in these areas will also provide additional capping over areas susceptible to spontaneous combustion, effectively remediating these areas.

The South Pit Extension Project is defined as a major project of State significance and requires approval from the Minister for Planning under Part 3A of the *Environmental Planning and Assessment Act 1979* (EP&A Act). The Department of Planning has provided the Director General's Requirements (DGRs) for the Environmental Assessment report, including identification of the key environmental and community issues. This Environmental Assessment (EA) has addressed the DGRs and outlines the EA findings, and also details the management and mitigation measures to be implemented to address the identified key issues.

The detailed studies outlined in this EA have demonstrated that the project can be completed without significant changes in the impact of Mt Arthur Coal's currently approved operations on the community or local environment. The EA identifies that the project specific impacts are predicted to comply with all relevant noise, blasting and air quality goals, with minimal changes to the current noise, blasting and air quality impact of Mt Arthur Coal's total operations. The project will result in only minor changes to the existing surface water management system and groundwater impacts, and is not predicted to adversely impact on any water users, groundwater dependent ecosystems or aquatic habitats.



Source: Mt Arthur Coal

0 1 2 3 km
1:65 000

Legend

- | | |
|--|---------------------------------------|
| Mining and Exploration Lease Boundary | Proposed Service Corridor |
| Approved MAN Mining Area | Approximate New Disturbance Footprint |
| South Pit Extension Mining Area | |
| Additional Overburden Emplacement Area | |
| Project Application Area | |
| Main Haul Roads | |

FIGURE 1

Proposed South Pit Extension Project

The EA identifies that the project will result in the removal of approximately 50 hectares of native vegetation, with a comprehensive offset package including conservation of approximately 100 hectares of native vegetation in perpetuity, establishment of a vegetated corridor and rehabilitation plantings proposed to offset this loss and result in a net increase in native vegetation and fauna habitat. The project will also impact on several Aboriginal sites, with this loss to be mitigated by salvage of the affected sites in cooperation with the local Aboriginal community prior to mining.

Potential environmental impacts will be managed by implementing the management commitments outlined in the EA and by implementation of Mt Arthur Coal's existing Environmental Management System which is certified to the international standard ISO 14001. Mt Arthur Coal has demonstrated through its existing operations a commitment to best practice management of impacts associated with mining and will implement proven management practices as part of the proposed South Pit Extension.

The project will provide substantial operational benefits to Mt Arthur Coal by allowing full utilisation of Mt Arthur Coal's currently approved mobile equipment fleet, by providing additional working room and a safer working environment. The flexibility of greater working room and overburden emplacement areas will also assist Mt Arthur Coal in actively managing environmental impacts (e.g. noise impacts) by providing greater flexibility to change operations in high risk periods to minimise impacts on the community (e.g. noise impacts during adverse climatic conditions).

The emplacement of overburden material at Bayswater No. 2 and Drayton will assist in remediation of areas currently subject to spontaneous combustion and will result in an improved final landform in these areas, providing an environmental benefit as part of the project. The completion of rehabilitation in these areas will result in a net increase of native vegetation and also allow Mt Arthur Coal to meet its commitment to complying with the Department of Primary Industries synoptic landscape strategy for the rehabilitation of coal mines in the Hunter Valley (DMR, 1999).

The project will provide revenue to the State government through the payment of royalties and taxes, and will also provide ongoing employment opportunities for the Mt Arthur Coal workforce.

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9	Noise and Blasting Assessment
10	Air Quality Assessment
11	Greenhouse Gas Assessment

1.0 Introduction

Mt Arthur Coal Pty Ltd (Mt Arthur Coal), a wholly owned subsidiary of BHP Billiton Hunter Valley Energy Coal, operates the Mt Arthur Coal open cut coal mine south of Muswellbrook in the upper Hunter Valley of NSW (refer to **Figure 1.1**). Mt Arthur Coal proposes to extend the currently approved Mount Arthur North (MAN) South Pit further south into the Bayswater No. 3 Mining Lease (ML) in order to maximise resource recovery, maximise productivity of its mining equipment and improve overburden handling efficiencies and rehabilitation outcomes. This project is known as the South Pit Extension Project.

Mt Arthur Coal's existing operations consist of three mining areas, the Bayswater No. 2 mining area (extraction complete), the Bayswater No. 3 mining area and the MAN mining area and associated coal handling and loading facilities (refer to **Figure 1.2**). The additional area of coal proposed to be extracted as part of the South Pit Extension Project (refer to **Figure 1.3**) is contained within existing MLs and is surrounded by existing mining operations undertaken by Mt Arthur Coal and neighbouring Drayton open cut mine. The approved MAN South Pit is currently extracting the same coal seams occurring within the proposed extension area and will provide ready access into the additional resource, allowing it to be economically recovered. Based on current economics, it is considered unlikely that the coal within the South Pit Extension area would be able to be economically recovered as a stand-alone operation and therefore is likely to be sterilised if not extracted by Mt Arthur Coal.

The South Pit Extension Project is classed as a 'Major Project' under Part 3A of the *Environmental Planning and Assessment Act 1979* (EP&A Act) (refer to **Section 4.0**), requiring the preparation of an Environmental Assessment (EA) report. The Minister for Planning will be the consent authority for the project.

A Major Projects Application for the project was lodged with the Department of Planning (DoP) in March 2006. The Project Application Area (project area) is shown on **Figure 1.3**. This EA has been prepared by Umwelt (Australia) Pty Limited (Umwelt) on behalf of Mt Arthur Coal in accordance with DoP's Director General's Requirements (DGRs) for the project. This EA includes a description of the project, a discussion of the planning and environmental context, a detailed environmental impact assessment, identifies the required management and mitigation measures, and contains a statement of commitments to be implemented as part of the project. The schedule of lands for the project is contained in **Appendix 1**.

1.1 Mine History and Existing Operations

Mt Arthur Coal's history traces back to the early 1960s, when it began open-cut mining in Bayswater No. 2, within the Greta Coal Measure. Coal production slowly increased until September 1994 when approval was obtained (DA 210/93) for a significant expansion of the operation into the Bayswater No. 3 ML (ML1358), mining the Wittingham Coal Measures.

Mining began at Bayswater No. 3 in 1995, serviced by the existing coal processing and industrial facilities. Mining was completed in Bayswater No. 2 in late 1998. To support the expanded operation and to remove coal transport from public roads, approval was obtained in November 2000 for the construction and operation of a rail loading facility and spur line. Commissioned in late 2001, the rail facility provided an immediate reduction in heavy traffic volumes along Thomas Mitchell Drive and the New England Highway, improving the safety and amenity of these areas.

In May 2001, the MAN mine, located adjacent to Bayswater No. 2, was given development approval (DA 144-05-2000). MAN was approved to produce up to 15 million tonnes of ROM



FIGURE 1.1
Locality Plan



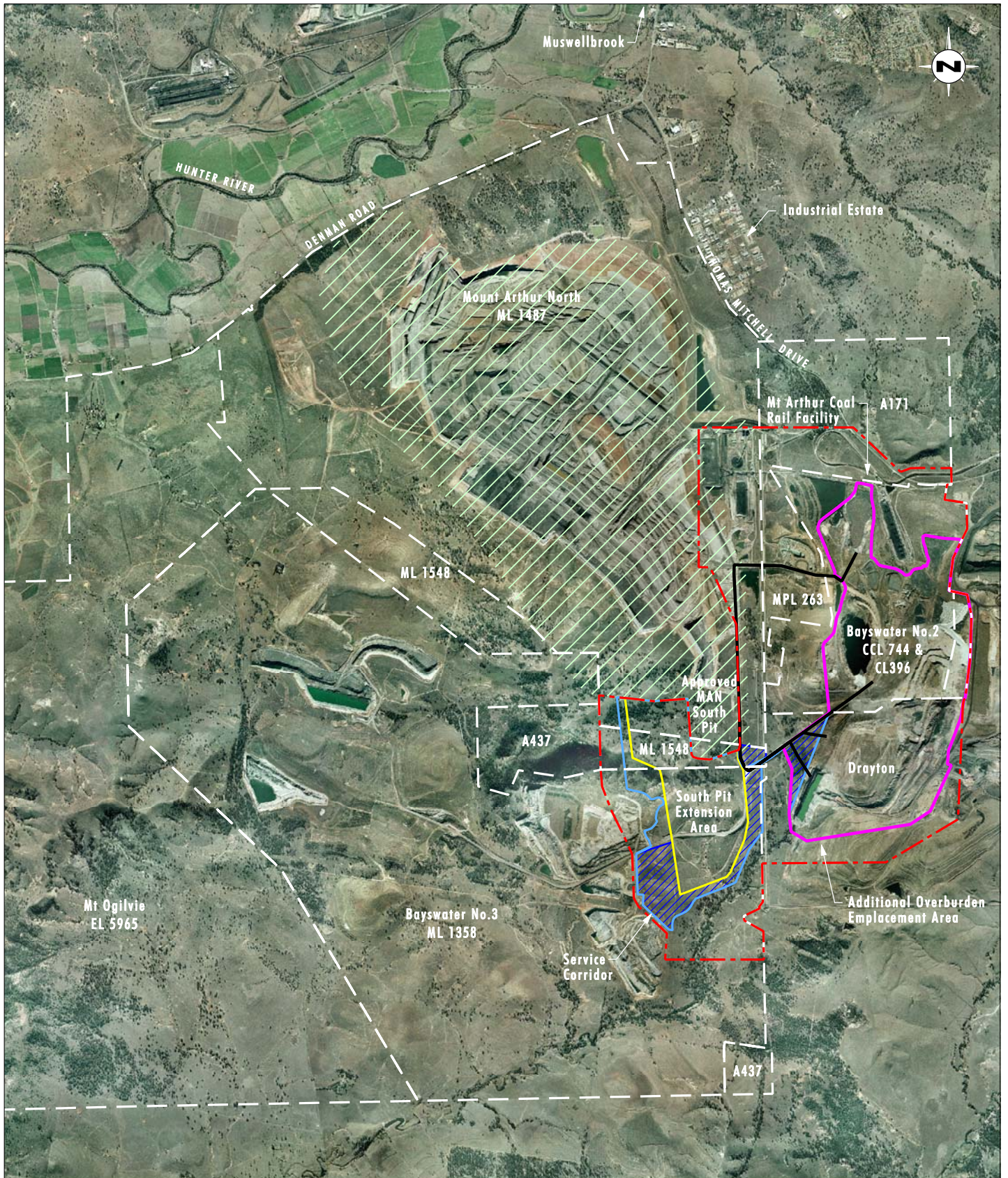
Source: Mt Arthur Coal

Legend

Mining and Exploration Lease Boundary

FIGURE 1.2

**Mt Arthur Coal Operations -
Existing Mining and
Exploration Titles**



Source: Mt Arthur Coal

0 1 2 3 km
1:65 000

Legend

- | | |
|--|---------------------------------------|
| Mining and Exploration Lease Boundary | Proposed Service Corridor |
| Approved MAN Mining Area | Approximate New Disturbance Footprint |
| South Pit Extension Mining Area | |
| Additional Overburden Emplacement Area | |
| Project Application Area | |
| Main Haul Roads | |

FIGURE 1.3

Proposed South Pit Extension Project

coal per annum. Construction of this area commenced in late 2001 and coal mining began in 2002.

Since the integration of mining operations within the Mt Arthur Coal area in 2002, mining has been focused within the MAN area. Coal preparation, handling and loading is undertaken within the centralised MAN coal handling and preparation plant (CHPP) located within the MAN ML (ML1487) and loaded onto trains for export via the Bayswater rail facility or stockpiled and transported by conveyor to nearby Bayswater Power Station, operated by Macquarie Generation.

Mt Arthur Coal has a comprehensive Environmental Management System (EMS) in place for the existing operations that is certified against ISO 14001. This certification requires regular surveillance audits and a full recertification audit undertaken by external auditors every three years. The most recent recertification audit was undertaken in May 2006. Mt Arthur Coal was successful in maintaining certification. The EMS includes an Environmental Management Strategy, detailed environmental management plans, EMS and operational procedures to assist in managing the operation's environmental impacts and continual improvement programs. A feature of the EMS is to disseminate responsibilities for environmental management to all persons working on site.

The Environmental Management Strategy and a number of the environmental management plans are required by development consent conditions. These documents are regularly reviewed and provided to DoP and other government agencies, as required, for authorisation.

1.2 Overview of the Project

The MAN South Pit was approved as part of the MAN development consent in May 2001. The extent of the currently approved MAN mining area is shown on **Figure 1.3** and extends close to the southern boundary of the MAN ML. The South Pit Extension Project will extend the limit of the South Pit approximately 2.5 kilometres further south, as illustrated in **Figure 1.3**. This will involve the disturbance of an additional approximately 330 hectares not previously disturbed by mining (refer to 'new disturbance area' shown on **Figure 1.3**) and result in the recovery of in the order of 25 million tonnes of additional coal over the proposed 21 year project life.

Approval is sought to mine in the South Pit Extension area for 21 years, which will be for approximately five years beyond the currently approved life of the MAN mining area. The MAN mining area has substantial resources beyond the 21 year approval granted in the 2001 development consent and is planned to continue beyond 21 years. Mt Arthur Coal intends to seek approval to continue the MAN operation as it approaches the end of its currently approved life.

Mining in the proposed South Pit Extension area will be managed as part of the existing open-cut operation utilising the existing safety and environmental management systems and mining resources, including the approved Mt Arthur Coal equipment fleet (i.e. the combined MAN and Bayswater No. 3 approved equipment fleets). All coal from the project area will be taken to Mt Arthur Coal's existing coal handling and preparation facilities for processing then transported off site for sale using current rail loading and conveyor facilities.

Coal mining in the South Pit Extension area will remain within the currently approved Mt Arthur Coal production limits and will allow full utilisation of Mt Arthur Coal's approved mobile equipment for the MAN and Bayswater No. 3 mining areas. Furthermore, mining in the South Pit Extension area will provide the opportunity to enhance rehabilitation outcomes at Bayswater No. 2 and Drayton, as discussed in **Section 3.2.6**.

1.3 Environmental Assessment Team

Umwelt prepared this EA on behalf of Mt Arthur Coal. A number of organisations undertook specialist studies as part of the EA process, including:

- Wilkinson Murray Pty Limited - Noise and Blasting Assessment
- Holmes Air Sciences - Air Quality Assessment
- Australasian Groundwater & Environmental Consultants Pty Ltd - Groundwater Assessment
- SEE Sustainability Consulting - Greenhouse Gas and Energy Consumption Assessment.

The assessments of surface water, ecology and archaeology were completed by Umwelt's in-house specialists. Further details of the Project Team are provided in **Appendix 1**.

1.4 Environmental Assessment Structure

The purpose of this EA is to enable consideration of the implications in proceeding with this project. The EA has been prepared in accordance with EP&A Act and Regulations (refer to Environmental Assessment Statement of Authorship in **Appendix 1**). An overview of the layout of this EA is provided below:

The **Executive Summary** provides a brief overview of the project and the major outcomes of the environmental assessment.

Section 1.0 introduces the project, outlines the project background and existing operations, provides a summary of the key project details, outlines the project team involved in producing the EA and outlines the structure of the EA.

Section 2.0 contains a description of the stakeholder consultation program and the environmental and community issues identified as part of this process for detailed assessment in the EA.

Section 3.0 contains a detailed description of the proposed development.

Section 4.0 describes the planning context and environmental context for the project, including the applicability of Commonwealth and State legislation.

Section 5.0 contains a description of the existing environment and a comprehensive analysis and assessment of the environmental impacts of the project, including the project specific and cumulative impacts.

Section 6.0 details the draft Statement of Commitments proposed to be adopted throughout the life of the project in order to mitigate impacts.

Section 7.0 contains a conclusion as required by the DGRs.

Section 8.0 contains a list of references referred to in the EA.

2.0 Stakeholder Consultation

2.1 Authority Consultation

The authority consultation process for the project commenced with initial briefing meetings held with DoP, Muswellbrook Shire Council (MSC) and the Department of Water and Energy (DWE, previously Department of Natural Resources - DNR), with discussions also held with the Department of Environment and Climate Change (DECC, previously Department of Environment and Conservation - DEC) regarding the Aboriginal archaeology assessment and with the Department of Lands regarding Crown Road reserves in Mt Arthur Coal's operational area. Consultation with the Department of Primary Industries (DPI) has also been ongoing throughout the project planning phase with a Conceptual Mine Plan meeting held with DPI on 22 November 2005 and a joint meeting with Anglo Coal Australia (Anglo Coal) held regarding the proposed sub-lease / partial-lease transfer terms and conditions in December 2006.

The project application for the South Pit Extension Project was lodged with DoP on 8 March 2006. DoP subsequently provided the DGRs for the project on 26 April 2006 (refer to **Section 2.3.2**), confirming that the project requires approval under Part 3A of the EP&A Act. A checklist of the DGRs is included in **Section 2.3.2**, along with an indication of where these requirements are addressed within the EA. A copy of the DGRs and other agency correspondence are included in **Appendix 2**.

During the preparation of the EA report, relevant government agencies were consulted regarding the draft assessment outcomes for key issues. This included meetings with DWE (when previously DNR) and DoP in August 2006, discussions with DECC (when previously DEC) in September 2006 and correspondence with the Roads and Traffic Authority (RTA). A presentation to MSC's Environment Committee was also provided in October 2006.

As required by the DGRs, the Australian Rail Track Corporation (ARTC) was consulted regarding the project. The project will not change the currently approved number of train movements from Mt Arthur Coal as total approved production will not change. ARTC did not advise of any specific issues for consideration during preparation of the EA.

2.2 Other Stakeholder Consultation

2.2.1 Community Consultation

Initial Consultation Phase

Initial consultation with the community regarding the project was undertaken by briefing Mt Arthur Coal's two Community Consultative Committees (CCCs) and through the distribution of information regarding the project in Mt Arthur Coal's regular community newsletter. The newsletter, *Community Matters*, is delivered to all addresses within the Muswellbrook Local Government Area (LGA), plus other interested parties on Mt Arthur Coal's mailing list (a total of approximately 8500 households and businesses).

The newsletter containing information on the project was distributed in October/November 2005 (a copy of the newsletter is provided in **Appendix 3**) and covered the following:

- an introduction to the project;
- the project key features;

- a summary of the approval process;
- information about the community involvement program; and
- contact details for obtaining further information on the project including an invitation to arrange a meeting to discuss the project.

A reply paid feedback form was included with the newsletter, with the form including the following question relating to the project:

Do you have any feedback on issues for consideration in the proposed South Pit Extension Environmental Assessment or any other comments on the proposed extension?

A total of 32 responses were returned to Mt Arthur Coal. Of these, 56% didn't respond to the above question, 13% stated they had no issues and 31% provided comments. The comments received included:

- Hopefully it will go ahead.
- Yes - abort for the love of the ozone.
- Great to receive comprehensive info on this project, your certainly keeping us informed.
- Environmental impacts.
- Should not go ahead.
- Concerned about extend of open cut mining in Muswellbrook.
- Look after the land for our future generations.
- Consider pointing your lights at the ground at work in progress rather than up in the sky.
- Will read EIS first.
- Make sure the facts are true.

In addition to the above feedback forms, one resident to the north-west of Mt Arthur Coal's operations also commented on the project via phone. This resident was generally opposed to the project and raised concerns regarding:

- Lack of faith in the approval process.
- Dust, blasting and spontaneous combustion.
- Accuracy of predictive modelling.
- Perceived constant changes to mines once approved.

Feedback & Impact Assessment Findings Communication Phase

Regular updates have been provided to both Mt Arthur Coal CCCs regarding the project, including a tour of the project area, a briefings on the findings of the survey work and a

presentation of the key environmental assessment findings. The CCCs will continue to be provided with updates regarding the project throughout the approval process.

A second newsletter regarding the project was distributed to the community in May 2006 (refer to **Appendix 3**). This newsletter:

- included an update on the project;
- provided a summary of community feedback following the October 2005 newsletter;
- provided an update on the status of the approval process for the project;
- outlined the key findings of the environmental assessment; and
- provided contact details for people interested in obtaining more information about the project or to discuss any questions / issues that they may have.

Two further inquiries regarding the project were received by Mt Arthur Coal. These two individuals and the resident to the north-west of the project area who commented on the project were offered a face to face meeting to discuss the project and the environmental assessment findings. Meetings were held with two of these community stakeholders in October and November 2006.

2.2.2 Aboriginal Community Consultation

Sixteen Aboriginal stakeholder groups who registered an interest in the project or who were previously known to have an interest in the project area were consulted regarding the Aboriginal archaeology assessment completed for the project. This consultation was undertaken in accordance with DECC's consultation guidelines and is discussed further in **Section 5.3**.

2.2.3 Consultation with Anglo Coal

Anglo Coal was consulted throughout the planning and environmental assessment phases of the project. Consultation included specific discussion regarding the sub-lease / partial-lease agreement (refer to **Section 4.1.2**) and general project updates. Consultation with Anglo Coal will be ongoing throughout the implementation phase of the project, if approved.

2.3 Identification of Issues

2.3.1 Community Issues

Community issues were identified through feedback on the community newsletters distributed throughout the Muswellbrook LGA, by issues raised by the CCC and through discussions with interested community stakeholders. Some of the specific comments received in relation to the project were discussed in **Section 2.2.1**, with the key issue themes identified including:

- air quality;
- noise and blasting;
- visual impacts;

- spontaneous combustion;
- greenhouse impacts;
- land management and rehabilitation; and
- cumulative impacts.

The potential impacts of the project and proposed management measures relating to each of these issue themes are discussed in **Section 5.0**.

2.3.2 Agency Requirements

The DGRs for the Environmental Assessment report are contained in **Table 2.1**, which also notes the relevant section of the EA that addresses each requirement. A full copy of the DGRs is included in **Appendix 2**.

Table 2.1 - Director-General's Requirements Checklist

Requirement	Relevant Section
General Requirements	
The EA must include:	
• an executive summary;	Executive Summary
• a detailed description of the project including the: ▪ need for the project; ▪ alternatives considered; and ▪ various components and stages of the project;	Section 3.0 and 7.0
• consideration of any relevant statutory provisions;	Section 4.1
• an environmental risk analysis of the project which takes into consideration the issues raised during consultation;	Section 5.1
• A detailed assessment of the key issues specified below, which includes: ▪ description of the existing environment; ▪ an assessment of the potential impacts of the project, including the potential cumulative impacts (particularly on surface and groundwater, flora and fauna, noise and air quality) that may arise from the combined operation of the mine, together with existing Mt Arthur operations including the Bayswater No. 2, the proposed Mt Arthur Coal Underground project, and the neighbouring Drayton Coal Mine and Saddlers Creek Proposal; and ▪ a description of the measures that would be implemented to avoid, minimise, mitigate, offset, manage, and/or monitor the impacts of the project;	Section 5.0 (refer also to Note 1 below table).
• a draft Statement of Commitments, outlining environmental management, mitigation, and monitoring measures;	Section 6.0
• a conclusion justifying the project, taking into consideration the environmental impacts of the proposal, the suitability of the site, and whether or not the project is in the public interest; and	Section 7.0
• a signed statement from the author of the Environmental Assessment certifying that the information contained in the report is neither false nor misleading.	Appendix 1

Table 2.1 - Director-General's Requirements Checklist (cont)

Requirement	Relevant Section
Key Issues	
Flora and Fauna - including impacts on critical habitats, threatened species, populations, ecological communities and native vegetation. An offset strategy should be included to compensate for the loss of existing (or previously approved) conservation areas, and to ensure that there is no net loss of flora or fauna values in the area in the medium to long term;	Section 5.2
Surface and Groundwater - including a site water balance, a salinity budget, and potential impacts on Saddlers Creek. A surface and groundwater contingency strategy must be included as part of the mitigation measures for the project which details the measures proposed to protect the supply of water to landowners and the environment in the region;	Section 5.4
Rehabilitation, Final Landform and Final Void Management - including a justification of the proposed final land use for the site in relation to strategic land use objectives and the synoptic landscape plan for the Upper Hunter Valley area; a detailed description of how the site would be progressively rehabilitated and integrated into the biodiversity offset strategy for the project; and the measures which would be put in place for the long term protection and management of the site (and any off-site biodiversity offset areas) following cessation of mining;	Sections 3.2.6 and 5.10
Noise - including construction, operation, and on-site and off-site road and rail noise impacts, including impacts adjacent to the Antiene rail spur;	Section 5.5
Blasting and Vibration;	Section 5.5
Air Quality - including a detailed greenhouse gas assessment, and consideration of impacts in the vicinity of the Antiene rural residential area;	Sections 5.6 and 5.8
Heritage - both Aboriginal and non-Aboriginal;	Section 5.3
Visual;	Section 5.9
Traffic and Transport; and	Section 5.11
Social and Economic.	Section 5.12
References	
The Environmental Assessment should take into account appropriate State government technical and policy guidelines. While not exhaustive, guidelines which may be relevant to the project are included in the attached list.	Section 5.0
Consultation	
During the preparation of the Environmental Assessment, you must consult with the relevant local and State government authorities, service providers, community groups, affected landowners and affected Commonwealth government authorities.	Section 2.0
In particular you must consult with: - Department of Environment and Conservation; - Department of Natural Resources; - Department of Primary Industries; - Muswellbrook Shire Council; - Australian Rail Track Corporation; and - NSW Roads and Traffic Authority.	Section 2.0

Notes: 1) No details were available regarding the Saddlers Creek Proposal mentioned in the Director General's Requirements at the time of preparation of this Environmental Assessment and the proposal has not been

approved. This proposal could not therefore be considered in the assessment of cumulative impacts. Regarding the assessment of cumulative impacts associated with the Mt Arthur Coal Underground Project, as the Underground Project is ongoing and an environmental assessment has not been lodged, an assessment of cumulative impacts is not possible at this time. Consistent with the Director General's requirements for the Mt Arthur Coal Underground Project, the Environmental Assessment prepared for the Underground Project will include consideration of cumulative impacts associated with the South Pit Extension Project.

3.0 Description of the Project

3.1 Exploration History and Resource Description

The project area has been subject to a number of exploration programs since initial exploration works in 1968, with the most recent exploration program undertaken by Mt Arthur Coal commencing in 2004. A total of 104 boreholes have been drilled as part of the historic exploration programs in the general vicinity of the South Pit project area, with an additional 168 holes drilled by Mt Arthur Coal as part of the most recent exploration program. An aerial magnetic survey has also been flown over the project area. This extensive exploration work has given Mt Arthur Coal further detailed knowledge of the coal resource in the project area, building on the resource information gathered from the adjacent open cut mining operations.

The target coal seams are Upper Permian in age and are contained within the Wittingham Coal Measures. The Wittingham Coal Measures contain in excess of 14 coal seams, or seam groups in the local area. Nine of these coal seams are currently considered as potential open cut mining resource targets in the project area as shown on the stratigraphic column included as **Figure 3.1**. The remaining smaller coal seams may be recovered depending on geology and economics at the time of mining. In the project area the target seams steeply dip from east to west at an angle of between 14 degrees and 21 degrees. There are a number of faults and igneous intrusions within the project area however none of these structures are considered a significant constraint to the proposed mining operations, or to pose any specific environmental management issues.

3.2 South Pit Extension

3.2.1 Concept Mine Plan

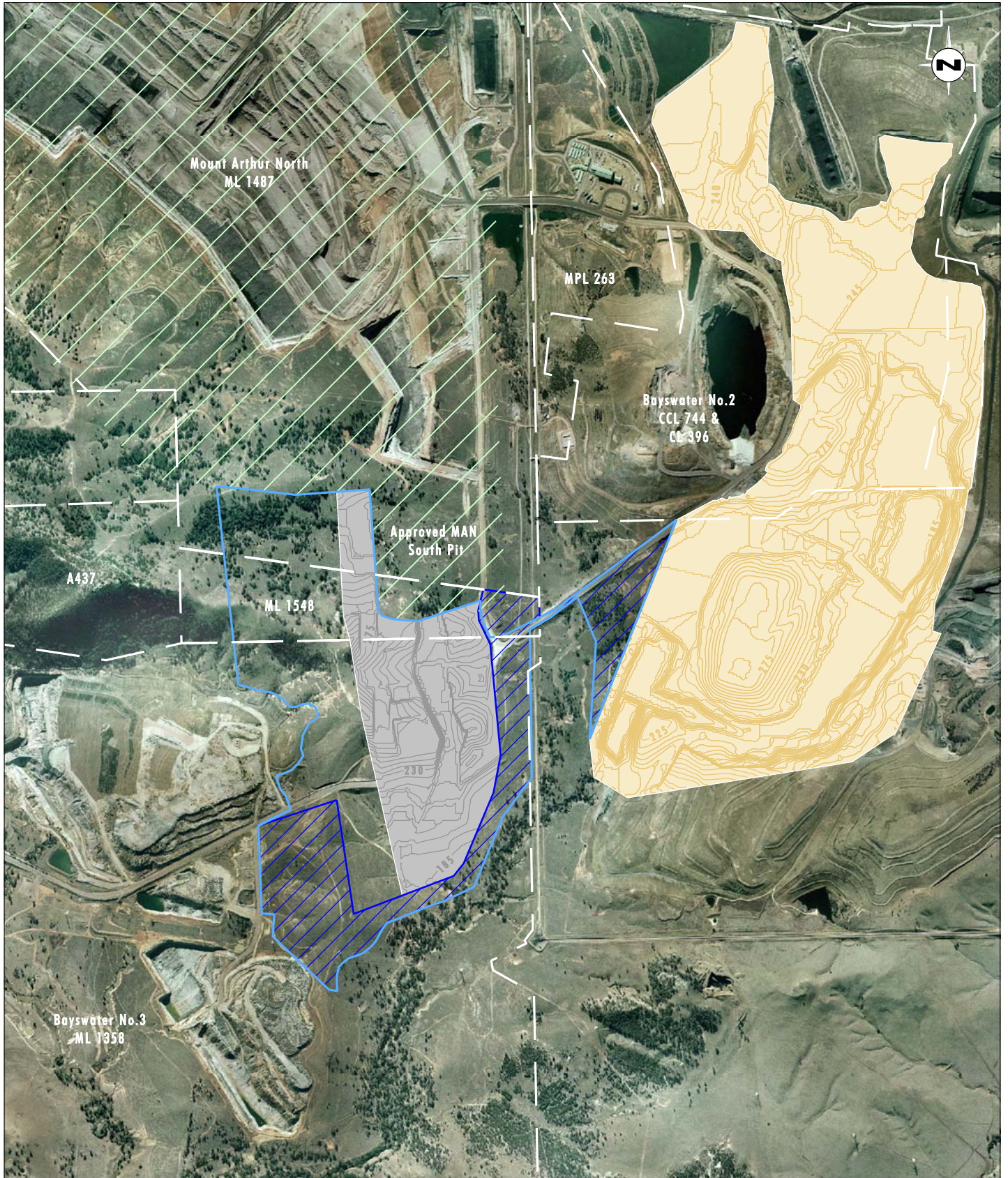
The MAN South Pit was approved as part of Mt Arthur Coal's MAN Coal Mine in 2001. The extent of the currently approved MAN mining area is shown on **Figure 1.3** and extends close to the southern boundary of the MAN ML. The proposed South Pit Extension Project will extend the existing approved South Pit west in the MAN ML and further south into the Bayswater No. 3 ML increasing resource recovery from within Mt Arthur Coal's existing mining area. The project will extend the limit of the South Pit further west in the MAN ML and approximately 2.5 kilometres further south, as illustrated in **Figure 1.3**. This will involve the disturbance of an additional approximately 330 hectares, of which approximately 195 hectares will be the mining pit, with the remaining area associated with haul roads, access tracks, drainage structures and other ancillary mining activities. It is estimated that the project will result in the recovery of up to approximately 25 million tonnes of coal over the proposed 21 year initial mining period.

The concept mine plan staging for the project is shown on **Figures 3.2 to 3.5**. As shown in the stage plans, mining will progress from east to west, consistent with coal seam dip. Mining will commence at the subcrop of the Ramrod Creek coal seam, with the mining pit intercepting the subcrops of the other target seams as it progresses to the west. As discussed in **Section 3.2.2**, the concept emplacement area design shown is a bulk design only and will be refined as part of the Mining Operations Plan (MOP) process should the project be approved, including identification of enhanced progressive rehabilitation opportunities. It is currently predicted that annual production from the South Pit Extension area will be up to 3 million tonnes per annum (Mtpa) depending on mining schedules, however, total production from Mt Arthur Coal will not exceed the currently approved total production limits of approximately 20 Mtpa run-of-mine (ROM) coal (15 Mtpa ROM coal from the MAN mining area plus approximately 5 Mtpa ROM coal (3.8 Mtpa product) from the Bayswater No. 3 mining area).

GROUP	SUBGROUP	FORMATION	SEAM NAME
W I T T I N G H A M C O A L M E A S U R E S	J E R R Y S P L A I N S S U B G R O U P	MILBRODALE FORMATION	
		MT THORLEY FORMATION	Woodlands Hill
			Unnamed B
			Arrowfield
			Bowfield
			Warkworth
		FAIRFORD FORMATION	
		BIRNAMWOOD FORMATION	Unnamed F
			Mount Arthur
			Unnamed C
			Piercefield
			Unnamed H
			Unnamed I
			Vaux
			Broonie
			Bayswater
	ARCHERFIELD SANDSTONE		
	V A N E S U B G R O U P	BULGA FORMATION	
		FOYBROOK FORMATION	Wynn
			Edderton
			Clanricard
			Bengalla
			Edinglassie
			Transitional
			Ramrod Creek

Section of stratigraphy
to be mined in South Pit

FIGURE 3.1
Stratigraphic Column



Source: Mt Arthur Coal

0 0.5 1 1.5 km
1:30 000

Legend

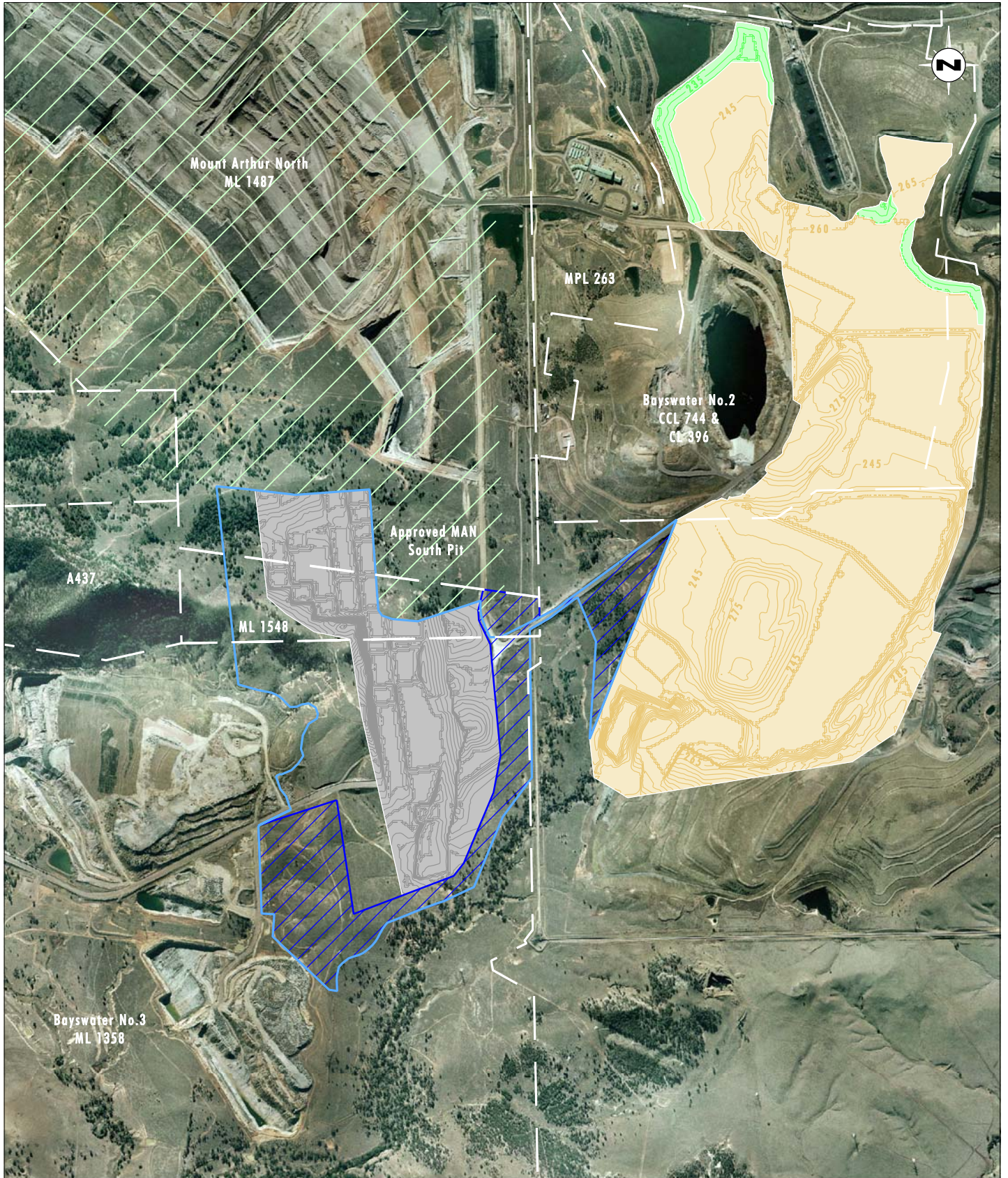
- Mining and Exploration Lease Boundary
- Approved MAN Mining Area
- Proposed Service Corridor
- Proposed Mining Area
- Proposed Emplacement Area
- Approximate New Disturbance Footprint

Note: Contour Interval 5m

File Name (A4): R02_V1/2000_102.dgn

FIGURE 3.2

Year 5 Conceptual Mine Plan



Source: Mt Arthur Coal

0 0.5 1 1.5 km
1:30 000

Legend

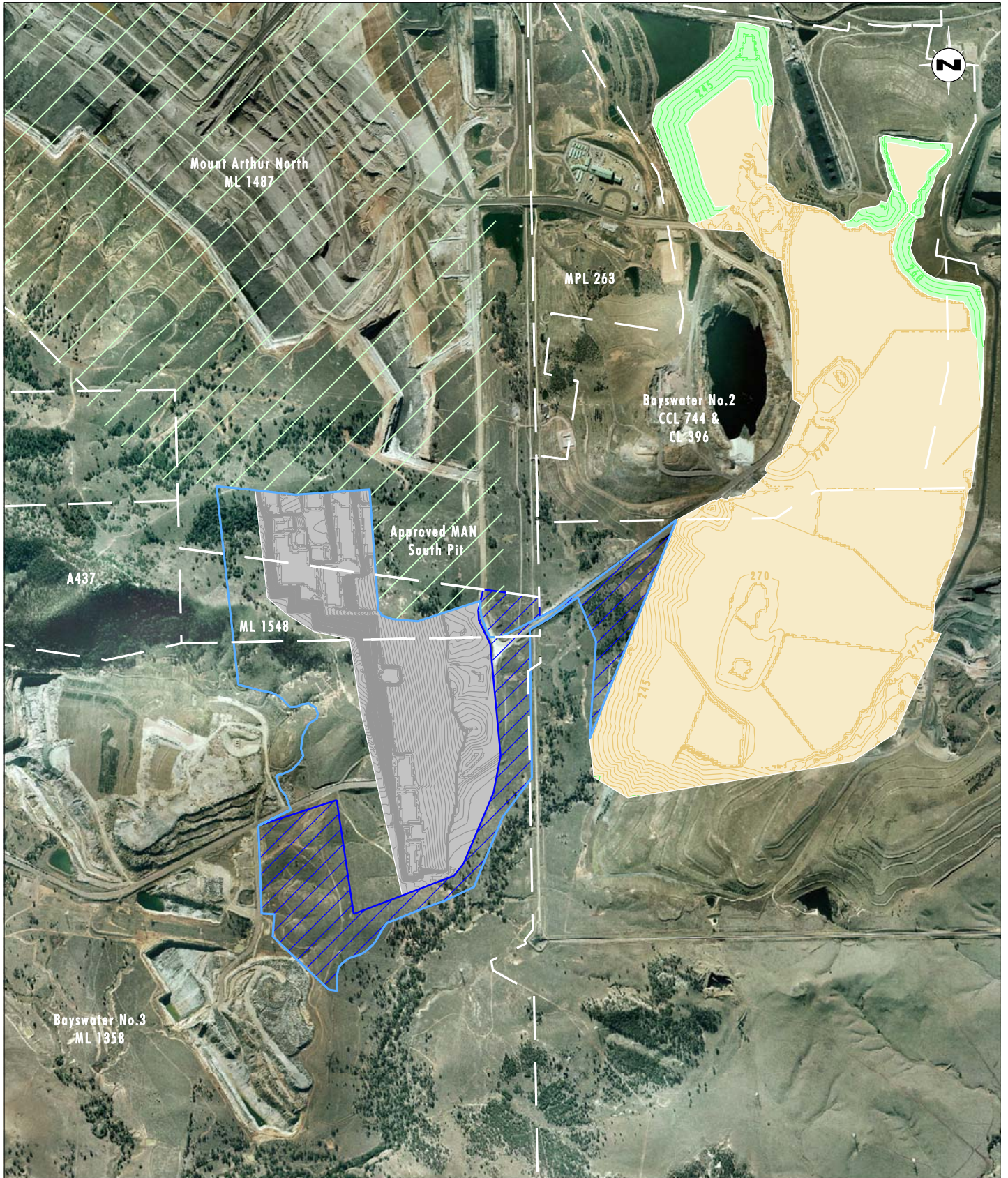
- ▨ Mining and Exploration Lease Boundary
- ▨ Approved MAN Mining Area
- ▨ Proposed Service Corridor
- ▨ Proposed Mining Area
- ▨ Proposed Emplacement Area
- ▨ Proposed Rehabilitated Area
- Approximate New Disturbance Footprint

Note: Contour Interval 5m

File Name (A4): R02_V1/2000_103.dgn

FIGURE 3.3

Year 10 Conceptual Mine Plan



Source: Mt Arthur Coal

0 0.5 1 1.5 km
1:30 000

Legend

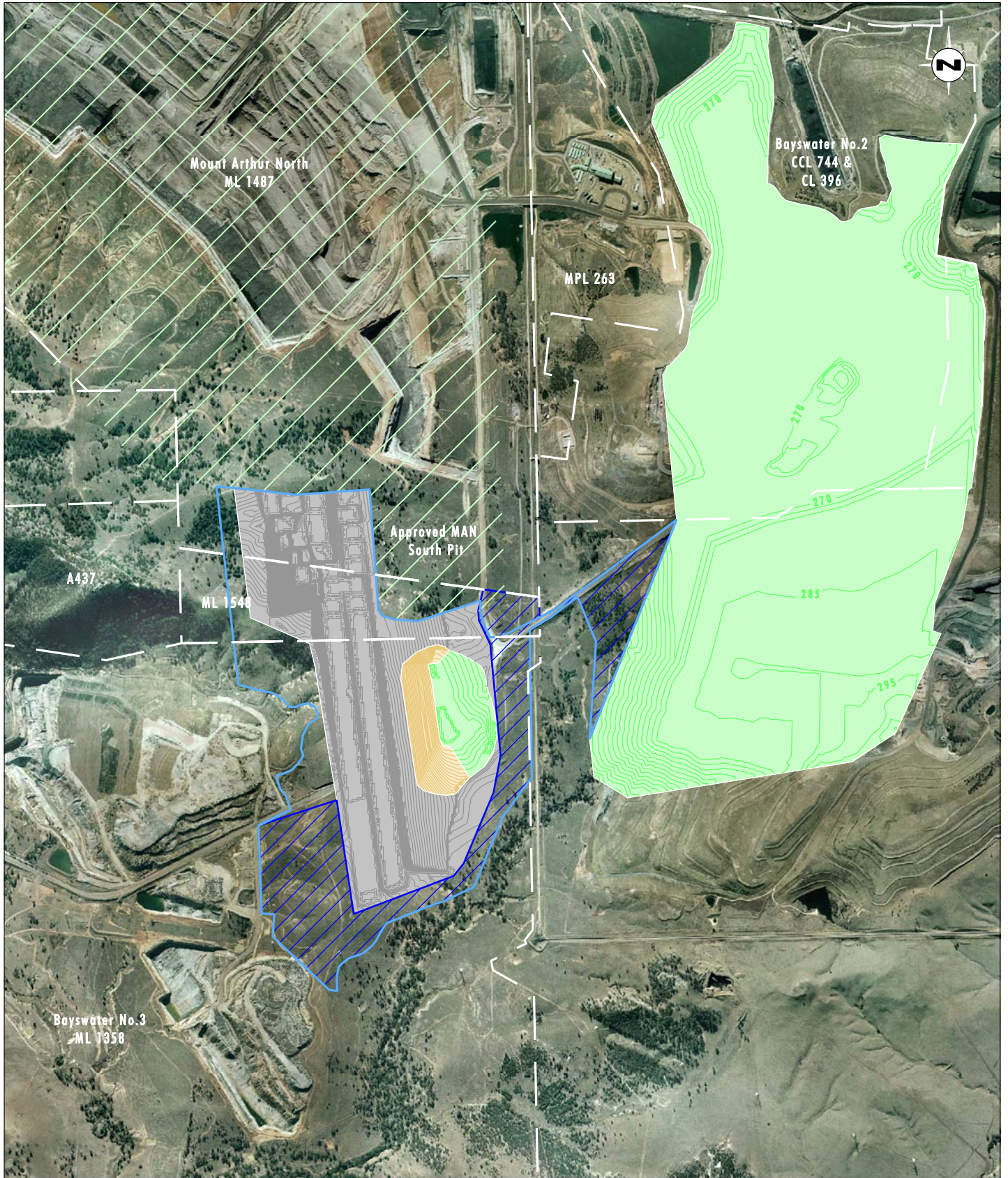
- Mining and Exploration Lease Boundary
- Approved MAN Mining Area
- Proposed Service Corridor
- Proposed Mining Area
- Proposed Emplacement Area
- Proposed Rehabilitated Area
- Approximate New Disturbance Footprint

Note: Contour Interval 5m

File Name (A4): R02_V1/2000_104.dgn

FIGURE 3.4

Year 15 Conceptual Mine Plan



Source: Mt Arthur Coal

0 0.5 1 1.5 km
1:30 000

Legend

- Mining and Exploration Lease Boundary
 - Approved MAN Mining Area
 - Proposed Service Corridor
 - Proposed Mining Area
 - Proposed Emplacement Area
 - Proposed Rehabilitated Area
 - Approximate New Disturbance Footprint
- Note: Contour Interval 5m

File Name (A4): R02_V1/2000_105.dgn

FIGURE 3.5

Year 21 Conceptual Mine Plan

The general mining sequence will be as per the existing operations and will include the stripping of topsoil, removal of overburden, extraction of coal resource, emplacement of overburden and progressive rehabilitation. Clearing and topsoil stripping will be conducted progressively as the pit advances, minimising the extent of clearing to that required in advance of each mining strip. With the exception of some near-surface weathered material, it is expected that all overburden will require drilling and blasting prior to excavation. The weathered material will be ripped by bulldozer in preparation for loading. Coal is not expected to require routine blasting and will be ripped and loaded into trucks by excavator. Limited coal blasts may, however, be undertaken as the need arises.

Approval is sought to mine in the South Pit Extension area for an initial period of 21 years, which will be for approximately five to six years beyond the currently approved life of the MAN mining area. The MAN mining area has substantial resources beyond the 21 year approval granted in the 2001 development consent and is planned to continue beyond 21 years. There will be additional coal resources remaining within the vicinity of the South Pit Extension area at the end of the initial 21 year mining period which may be subject to a future project, depending on mining economics at that time. A conceptual final landform assuming that there is no ongoing mining in the South Pit Extension area post year 21 is discussed in **Section 3.2.6**. Should further mining be proposed for this area it is likely to be incorporated in the application for extension of the MAN operation towards the end of its current consent period (2022).

Mining in the proposed South Pit Extension area will be managed as part of the existing open-cut operation utilising the existing safety and environmental management systems and mining resources including the approved Mt Arthur Coal equipment fleet (that is, the combined approved MAN and Bayswater No. 3 equipment fleets). All operations will be conducted using truck and shovel mining methods as per the existing operations, with overburden primarily emplaced in the Bayswater No. 2 and Drayton west pit areas (refer to **Section 3.2.2**).

All coal from the project area will be taken to Mt Arthur Coal's existing coal handling and preparation facilities for processing then transported off site for sale using current rail loading (export) and conveyor facilities (domestic) (refer to **Section 3.2.3**).

3.2.2 Overburden Emplacement Areas

The majority of overburden extracted from within the extended South Pit will be emplaced in the Bayswater No. 2 mining area and the neighbouring Drayton West Pit, in agreement with Anglo Coal. The emplacement of overburden in these two areas as part of the South Pit Extension Project will allow rehabilitation of the areas to be completed, providing an improved final landform. The emplacement of additional overburden material in these areas will also assist in providing additional capping over areas susceptible to spontaneous combustion, providing a further environmental benefit as part of the project. The conceptual progression of the overburden emplacement areas is shown on **Figures 3.2 to 3.5**.

Although opportunities to accelerate backfilling of the new void will be assessed and pursued on an ongoing basis during mine life, limited in-pit dumping is anticipated within the extended South Pit during the initial 21 year mining period due to the steeply dipping pit floor. However, this void is expected to be used extensively for in-pit dumping in the planned continuation of the MAN mining area beyond its currently approved 21 year life. The steeply dipping floor constrains in-pit dumping during mining operations as the slope angle could result in overburden material dumped in pit slumping downslope posing a safety risk for active mining operations.

The overburden emplacement schedule will be designed to prioritise dumping at the northern end of the emplacement area at Bayswater No. 2 in the initial five years of the project to establish a bund behind which the remaining overburden emplacement will be completed. The emplacement of overburden over the former Bayswater No. 2 North Pit tailings dam may not be possible within this period due to the need to allow sufficient time for tailings to dry out and possible opportunities for ongoing use for washery reject emplacement activities, however, this area will also be completed in the first five years if possible. Once established, the northern faces of the emplacement area will be rehabilitated as a priority, including use of trees in strategic locations to assist in the minimisation of visual impacts (refer to **Section 5.9**) and re-establishment of wildlife corridors linked with surrounding remnant vegetation.

Once bulk dumping and reshaping of overburden emplacement areas has occurred to achieve the desired landform, the final surface of any large flat areas of the emplacement areas will be constructed and shaped to effectively control drainage and resemble a more natural landform. This is consistent with current practice and will be managed on an area-by-area basis as part of the mine rehabilitation process. This work will be planned in consultation with the DPI as part of the MOP approvals process. Rehabilitation methods are discussed in further detail in **Section 3.2.6**. The emplacement area in the Bayswater No. 2 ML will be limited to a height of approximately 270 mAHD at the northern end where it will be visible from some residences at South Muswellbrook. The maximum height of the emplacement area will be approximately 290 mAHD at the southern end of the Bayswater No. 2 area and in Drayton's West Pit. The emplacement areas will be designed to achieve a stable final landform compatible with the surrounding environment with the majority of slopes 10 degrees or less. All slopes will be less than 14 degrees unless otherwise approved by DPI. Further details regarding rehabilitation of overburden emplacement areas are contained in **Section 5.10.2**.

Mt Arthur Coal proposes to obtain an appropriate interest from Anglo Coal in part of the existing Drayton lease regarding the emplacement of overburden and associated activities on Anglo Coal's land. Approval of this interest, either by sub-lease or partial-lease transfer (subject to the approval of Anglo Coal and the Minister for Primary Industries) is required from DPI prior to the commencement of operations. Mt Arthur Coal will be responsible for the environmental management of emplacement activities undertaken within this area consistent with conditions of the agreement and any subsequent statutory approval conditions.

Overburden from the South Pit Extension area may also be emplaced in either the MAN or Bayswater No. 3 mining areas within existing approved dumping areas. Overburden from each of these mining areas may also be taken to the South Pit void or to the Bayswater No. 2 or Drayton emplacement areas to retain the overall overburden emplacement area balance and achieve desirable rehabilitation outcomes.

3.2.3 Mine Infrastructure

One of the aims of the project is to maximise the use of Mt Arthur Coal's currently approved equipment and infrastructure. The additional mining area will allow full utilisation of Mt Arthur Coal's mobile equipment fleet by providing additional working room. The project will also make use of the existing CHPP and coal transportation facilities without requiring any changes to these currently approved facilities. Total coal processing will remain within the current limit of 20 Mtpa approved as part of the MAN development consent, although approval is sought to continue use of these facilities for the additional five years that the South Pit Extension Project will continue beyond the currently approved life of MAN.

The South Pit Extension will result in the removal of part of the existing haul road that connects the Bayswater No. 3 mining area with the MAN and Bayswater No. 2 mining areas,

with this section of haul road needing to be relocated around the southern end of the South Pit. The haul road will be relocated within the proposed services corridor shown on **Figure 3.2**, with this corridor also providing sufficient space for placement of other Mt Arthur Coal operational infrastructure such as water pipelines and powerlines which will need to be relocated as the South Pit progresses further south.

3.2.4 Reject and Tailings Disposal

In the MAN Project Environmental Impact Statement (EIS) (April 2000), a range of options for rejects and tailings disposal were canvassed.

The EIS noted that the preferred option for the disposal of tailings was eventually mechanical dewatering and disposal of tailings and coarse rejects in the pit overburden emplacement after the West Pit void at Bayswater No. 2 is filled with washery reject during the initial years of mining. The key drivers in this assessment were limitation of space, efficiency of water use, economic feasibility and ultimate rehabilitation.

As part of this application, it is proposed that all coal from MAN, Bayswater No. 3 and the proposed South Pit Extension will be handled by the existing MAN CHPP with coarse reject and tailings currently disposed of by using the existing West Pit void at Bayswater No. 2 for tailings emplacement whilst coarse reject is disposed of within active overburden dumps. As part of this project, additional tailings and coarse reject emplacement areas will be established within existing voids and overburden emplacements areas in consultation with DPI. Coarse reject and tailings material are proposed to be disposed of in emplacement areas at Bayswater No. 2 and in the sub-lease or partial-lease transfer area and in overburden dumps at MAN. In the South Pit Extension Project area this may include co-disposal of coarse reject and tailings in the same emplacement areas or the use of separate emplacement areas depending on the final emplacement strategy agreed in consultation with DPI.

Mt Arthur Coal is currently investigating dewatering options for tailings as discussed in the MAN EIS. The aim of the tailings dewatering investigations is to increase the tailings solids component resulting in increased water recovery, improved geotechnical stability of the final landform and greater flexibility for long-term emplacement activities. Options being investigated include paste or deep cone thickeners and other process improvement technologies that are used to reduce water loss to the emplacement area. Depending on the outcome of these investigations, small-scale dewatering facilities may be constructed at the MAN CHPP, Bayswater No. 2 or Drayton's West Pit sub-lease / partial-lease transfer area to meet these objectives.

The design of overburden emplacement areas for this project has ensured that sufficient capacity and environmental controls will be provided for the life of the project for any reject and tailings material disposed at Bayswater No. 2 or in Drayton's sub-lease / partial-lease transfer area.

Tailings emplacement strategies implemented during the life of the project will require consultation with, and approval from, DPI prior to activities commencing. These approvals will detail the specific operational design and management measures to be implemented, including environmental management measures.

3.2.5 Workforce and Hours of Operation

As total coal production and processing will remain within those levels currently approved, there will be no significant change to the currently approved workforce for both Mt Arthur Coal and Bayswater No. 3 as part of this project. It is possible that a small number of additional staff may be employed to assist with management of the additional mining area.

The proposed mining operations and associated facilities are planned to operate seven days per week, 24 hours per day, in accordance with current approvals.

3.2.6 Rehabilitation and Decommissioning

A key outcome of the South Pit Extension Project will be the emplacement of additional capping material (overburden) over areas affected by spontaneous combustion in the Drayton West Pit and Bayswater No. 2 mining area, and the completion of final rehabilitation of these areas. The proposed overburden emplacement design will fill in the existing mining voids and create a landform capable of sustaining a productive post mining land use. Mt Arthur Coal has extensive experience in achieving successful rehabilitation, with rehabilitation works being completed for various open cut mining areas over the past 15 to 20 years. This extensive local experience combined with information provided by a number of site based rehabilitation research projects ensures that successful rehabilitation outcomes can be achieved as part of the project. Further details of the rehabilitation planning for this project including rehabilitation objectives, criteria and post mining land use, are included in **Section 5.10**.

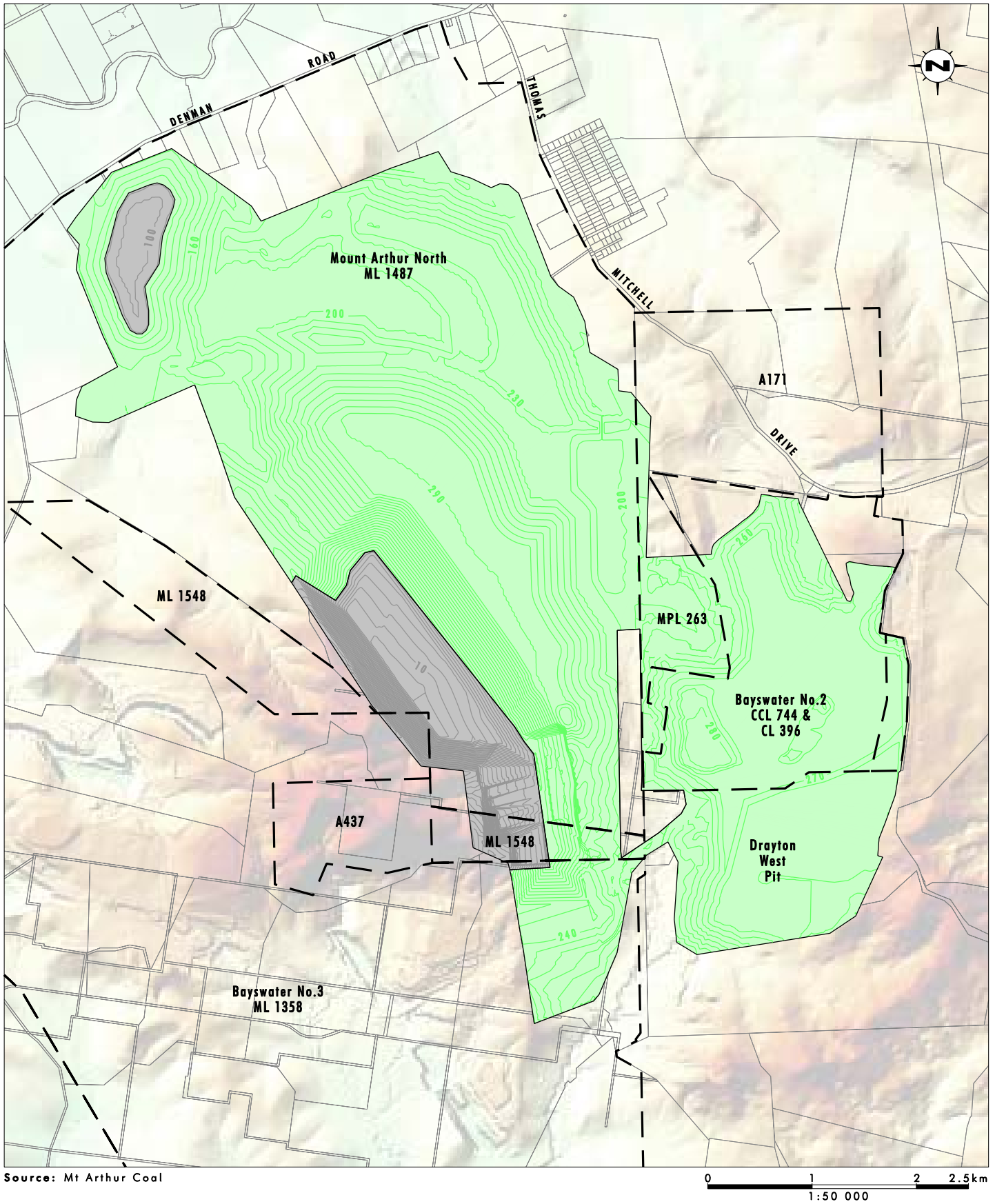
Due to the steeply dipping nature of the coal seams in the South Pit Extension mining area, there is little potential for in-pit dumping of overburden during the initial life of this project. This area will, however, be available for overburden dumping during the latter years of mining in the MAN area (post the currently approved life of this area). The South Pit Extension area will be an attractive overburden emplacement area at this time from a mine planning perspective as it will provide a dumping area close to active mining and will also be distant from residential receivers and screened by surrounding topography. The void created by the South Pit Extension Project is therefore intended to be primarily filled by overburden following the completion of coal extraction. As discussed in **Section 3.2.2**, opportunities to accelerate backfill of the new void area will be investigated during the initial 21 year mining period. The additional mining area will result in an additional area of final void, however, this area will be integrated with the currently approved final void concept for the MAN mining area. The conceptual final landform in this area is shown on **Figure 3.6**, with further discussion regarding final void management included in **Section 5.10**.

The former Bayswater No. 2 CHPP and workshop areas are within the proposed overburden emplacement area for this project and will be decommissioned prior to overburden emplacement in this area. An outline of the decommissioning strategy for this area is included in **Section 5.10**.

As discussed in **Section 3.2.1**, additional coal resources will remain at MAN at the end of the currently approved mining period and mining in this area is planned to continue beyond the life of the South Pit Extension Project. Any subsequent approval for mining in the MAN area will require ongoing use of the MAN CHPP, coal stockpile areas, workshop and administration facilities and Bayswater rail loading facility and spur line. Should, however, future mining approvals not be granted, these facilities will be closed and decommissioned following the completion of the South Pit Extension Project in accordance with the closure strategy outlined in the MAN EIS (URS, 2000).

3.3 Project Alternatives

During the development of the conceptual mine plan a number of alternative mine plans were considered. Minimising environmental impacts and maximising economic resource recovery have been major considerations in the evaluation of alternative options. Alternative options considered have included:



Legend

- Mining and Exploration Lease Boundary
- Final Void
- Rehabilitated Mining Area

FIGURE 3.6

Conceptual Final Landform

- the mining footprint area;
- mining method (pit layout, sequence of mining); and
- overburden disposal locations and emplacement area designs.

The key alternative mine plan considered was to extend the mining pit further south which would have involved mining through Saddlers Creek. The coal seams to be mined within the project area continue below Saddlers Creek, however, it was decided that given the nature of the resource in this area and the extent of environmental impacts associated with mining through the creek, that this alternative was not desirable. The conceptual mine plan was therefore revised to avoid directly impacting on Saddlers Creek and the associated riparian zone (40 metres from top of bank).

Another alternative mine plan considered was to dispose of all overburden from the extension area within existing disturbance areas at Mt Arthur Coal, primarily at Bayswater No. 2 and MAN. The preferred mine plan, however, has sought to maximise mining productivity and environmental outcomes by emplacing overburden primarily within the former mining areas at Bayswater No. 2 and neighbouring Drayton mine. This preferred mine plan will result in improved capping of areas currently affected by spontaneous combustion and will fill existing mine voids providing a more amenable final landform than currently proposed for these areas, without impact on the currently approved conceptual final landform for the MAN mining area. It also has the added benefit of shorter haulage routes for some of the mining term and provision of additional shielded dumping areas surrounded by existing mining operations and distant from residential receivers for use during climatic conditions that pose a higher risk of noise and dust impacts (e.g. when strong temperature inversions exist).

The alternative of not proceeding has also been considered, however this option is not thought to be appropriate as the environmental and social impacts of the project can be effectively managed and not proceeding would result in the loss of the benefits of the project including:

- the opportunity to more effectively rehabilitate areas affected by spontaneous combustion at Bayswater No. 2 and in Drayton's West Pit by filling existing voids and capping susceptible areas;
- continued employment opportunities beyond the currently approved life of the MAN and Bayswater No. 3 mining areas;
- generation of State and Federal government revenue; and
- productive use of a valuable State owned coal resource.

4.0 Planning and Environmental Context

4.1 Planning Context

The following section contains details of the relevant Commonwealth and State planning provisions and a discussion of the application of these planning provisions to the project.

4.1.1 Commonwealth Legislation

4.1.1.1 Environmental Protection and Biodiversity Conservation Act 1999

Under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act), approval of the Commonwealth Minister for the Environment is required for any action that may have a significant impact on matters of national environmental significance. These matters are:

- World heritage properties;
- National Heritage Places;
- Ramsar wetlands;
- cetaceans, migratory species, threatened species, critical habitats or ecological communities listed in the EPBC Act;
- Commonwealth land, marine areas or reserves; and
- nuclear actions.

No threatened species listed under the EPBC Act were recorded within the project area, with seven species listed as migratory recorded in the project area and adjoining habitats. Due to the presence of potentially suitable habitat, a number of threatened species were considered to potentially occur within the project area. An assessment of the impact of the project on these threatened and migratory species was undertaken. It was determined that species listed under the EPBC Act are unlikely to be significantly impacted by the project. On this basis, approval under the EPBC Act is not required for the project.

None of the other listed triggers for assessment under the EPBC Act are relevant to this project.

4.1.1.2 Native Title Act 1993

The Commonwealth government enacted the *Native Title Act 1993* in response to the High Court of Australia decision in *Mabo v Queensland* (1992). In this case, the High Court recognised the ownership of land by Australia's indigenous people at common law prior to European settlement of Australia. This decision resulted in the recognition that a form of native title rights existed and hence entitled Aboriginal people to claim ownership of land in certain circumstances.

The Act is administered by the National Native Title Tribunal. The Tribunal is responsible for maintaining a register of native title claimants and bodies to whom native title rights have been granted. These native title holders and claimants must be consulted prior to the granting of a mining lease over land to which the native title claim or right applies. The Act prescribes that native title can be extinguished under certain circumstances, including the granting of freehold land.

No native title claims are known to exist over land within the project area.

4.1.2 New South Wales Legislation

4.1.2.1 Environmental Planning and Assessment Act 1979

The EP&A Act defines the approval process for proposed developments in NSW. The objectives of the Act relevant to the project are:

- (a) to encourage:
 - (i) the proper management, development and conservation of natural and artificial resources,
 - (ii) the promotion and co-ordination of the orderly and economic use and development of land,
 - (iii) the protection of the environment, including the protection and conservation of native animals and plants, including threatened species, populations and ecological communities, and their habitats, and
 - (iv) ecologically sustainable development, and
- (b) to provide increased opportunity for public involvement and participation in environmental planning and assessment.

It is considered that the project meets these objectives as it relates to planning for the safe and economic recovery of the State's coal resource whilst not significantly impacting on the environment or community. Consistent with the above objectives relating to community participation, a community consultation program was undertaken as part of the environmental assessment process to provide opportunities for community involvement, with further opportunities to be provided by the public exhibition of the environmental assessment report, facilitated by DoP.

Major Project

The South Pit Extension Project requires approval under Part 3A of the EP&A Act as it is of a class of development listed in Schedule 1 of the State Environmental Planning Policy (SEPP) (Major Projects) 2005. The listing in Schedule 1 of the SEPP that applies to this project is:

Development for the purpose of mining that is coal or mineral sands mining.

As the project requires approval under Part 3A of the EP&A Act, the Minister for Planning will be the consent authority. The Director-General of DoP provided the requirements for the EA as discussed in **Section 2.1**.

Application of Environmental Planning Instruments

The project is located wholly within the area to which the Muswellbrook Local Environmental Plan 1985 (Muswellbrook LEP) and Hunter Regional Environmental Plan 1989 (Hunter REP) apply.

However, section 75R of the EP&A Act provides that environmental planning instruments, other than SEPPs, do not apply to Major Projects assessed under Part 3A of the Act, other than as detailed below.

Permissibility

Muswellbrook LEP is relevant to the permissibility of the Project. Section 75J(3)(b) of the EP&A Act provides that the Minister cannot approve the carrying out of a project that would be wholly prohibited under an environmental planning instrument. The land affected by the South Pit Extension Project is located wholly within land zoned 1(a) (Rural "A" Zone). Mining is a permissible land use within zone 1(a) and therefore the Minister may grant project approval.

In addition to approval under the EP&A Act, the proposed project may also require approval under a number of additional Acts or assessment under State planning policies. The additional Acts and policies potentially relevant to this project are discussed in the following sections.

4.1.2.2 Mining Act 1992

The *Mining Act 1992* is administered by DPI on behalf of the Minister for Mineral Resources and, amongst other legislative instruments, places controls on methods of exploration and mining, the disposal of mining waste, land rehabilitation, and environmental management activities.

An ML granted under the Mining Act entitles the leaseholder to mine coal from a deposit. Mt Arthur Coal currently holds MLs over the project area (ML1487, ML1358, ML1548, CCL744 and CL396) with the exception of the portion of the proposed emplacement area in Drayton's West Pit. Mt Arthur Coal is finalising agreement with Drayton for a sub-lease / partial-lease transfer over this area, with Ministerial approval of the sub-lease / partial-lease transfer under the *Mining Act 1992* to be sought from DPI once project approval has been obtained. DPI was consulted during the initial preparation of this sub-lease / partial-lease transfer agreement during which it expressed support for the proposal.

If a sub-lease is pursued, it would include terms and conditions that require effective management by Mt Arthur Coal of operational and environmental issues including preparing applications for subsequent approvals (e.g. modification of Environment Protection Licence boundary, preparation of MOPs, etc.), surface and ground water management, spontaneous combustion, rehabilitation and interactions between the different operations. Mt Arthur Coal will have exclusive control over the sub-lease area, as per the agreement, ensuring interactions between the two operations are minimised and well controlled. Anglo Coal has confirmed that the Drayton West Pit has been mined out with only small areas of additional overburden emplacement planned prior to responsibility for the area being transferred to Mt Arthur Coal as part of the sub-lease agreement / partial-lease transfer. Water from the current Drayton West Pit void (that drains this mining area) will be recovered and re-used at Mt Arthur Coal for road dust suppression and use in the MAN CHPP. Mt Arthur Coal currently sources surplus mine water from Drayton and so this working relationship will be continued. This has the added benefit of reducing Mt Arthur Coal's demand for cleaner water supplies, such as the Hunter River, to meet demand (refer to **Section 5.4**).

Mt Arthur Coal has a long standing and successful working relationship with Anglo Coal regarding works carried out along the mutual lease boundary that will be continued for management of the sub-lease / partial-lease transfer area. As part of the sub-lease / partial-lease transfer, Mt Arthur Coal has committed to being responsible for the reshaping and sowing of the material emplaced within the sub-lease / partial-lease transfer area and also retains responsibility for the rehabilitation maintenance period.

The conditions on the MLs held by Mt Arthur Coal require the submission of a MOP to DPI for approval prior to commencement of mining. The MOP is required to include details regarding geological data, proposed mine development, reject emplacement, rehabilitation

activities and environmental management measures to be implemented. DPI also requires the preparation of an Annual Environmental Management Report (AEMR), which documents the environmental performance of the mining operation. These conditions will need to be satisfied in relation to the South Pit Extension Project via submission of a MOP prior to commencement of mining operations and submission of an AEMR that covers operations in the South Pit Extension area.

4.1.2.3 Coal Mine Health and Safety Act 2002

The *Coal Mine Health and Safety Act 2002* recently replaced the *Coal Mines Regulation Act 1982*. The principal aim of the *Coal Mine Health and Safety Act 2002* is to secure the objectives of the *Occupational Health and Safety Act 2000* in relation to coal operations. It does this by imposing certain specific safety requirements on coal mines. This includes the requirement to comply with minimum barriers for underground mining workings and the requirement to obtain consent from the Minister for Mineral Resources for the establishment of emplacement areas.

Approval for establishment of reject emplacement areas is required from the DPI under Section 100 of the Act.

4.1.2.4 Mine Subsidence Compensation Act 1961

Under the *Mine Subsidence Compensation Act 1961*, the approval of the Mine Subsidence Board (MSB) is required for the erection or alteration of improvements and subdivision of land within a mine subsidence district, unless the erection or alteration is a deemed approval. The project area is located within the Muswellbrook Mine Subsidence District.

No new buildings or infrastructure (excluding minor services) will be erected as part of the South Pit Extension Project with the project using existing Mt Arthur Coal infrastructure. No approvals are therefore required under the *Mine Subsidence Compensation Act 1961*.

4.1.2.5 Protection of the Environment Operations Act 1997

The *Protection of the Environment Operations Act 1997* (PoEO Act) is administered by DECC. The Act establishes the procedures for issuance of licences for environmental protection including waste, air, water and noise pollution control. The owner or operator of a premise that is engaged in scheduled activities is required to hold an Environment Protection Licence (EPL) and comply at all times with the conditions of that licence. The project will require an EPL because coal mining is a scheduled activity listed in Schedule 1 of the PoEO Act.

Mt Arthur Coal currently holds two EPLs, one for the Bayswater No. 2 and 3 mining areas (EPL 113) and one for the MAN mining area (EPL 11457). All operations associated with the South Pit Extension Project will be undertaken within existing EPL areas, except for overburden emplacement with Drayton's West Pit. A modification of one of the existing EPLs will be sought to include the overburden emplacement activities in the Drayton's West Pit void.

4.1.2.6 Water Act 1912

As a Water Sharing Plan under the *Water Management Act 2000* has not been developed for the area encompassing the South Pit Extension Project, the licensing provisions of the *Water Act 1912* still apply. The *Water Act 1912* is administered by DWE. Under the Act, a permit and/or licence must be obtained to extract surface (Part 2 of the Water Act) or groundwater (Part 5 of the Water Act).

An approval under Part 5 of the Act will be required for the project for the mining void itself.

4.1.2.7 Environmentally Hazardous Chemicals Act 1985

DECC is granted power under the *Environmentally Hazardous Chemicals Act 1985* to assess and control chemicals by making a Chemical Control Order (CCO). A CCO can prohibit specified activities or require them to be licensed, prohibit activities that don't comply with the conditions of the order or permit an activity unconditionally. CCOs exist for certain chemicals such as Polychlorinated Biphenyls (PCBs). The project will not require any change to chemicals stored and used by Mt Arthur Coal. Approval will not therefore be required under this Act.

4.1.2.8 Threatened Species Conservation Act 1995

The *Threatened Species Conservation Act 1995* (TSC Act) provides protection for threatened plants and animals native to NSW (excluding fish and marine vegetation, which are protected under the *Fisheries Management Act 1994*) and integrates the conservation of threatened species into development control processes under the EP&A Act. A licence is not required under the TSC Act if a project approval has been granted under Part 3A of the EP&A Act, as the consent authority is required to assess the impact of the proposal on threatened species, populations or communities prior to granting development approval. No approvals are therefore required under this Act.

4.1.2.9 Roads Act 1993

The *Roads Act 1993* is administered by the RTA, local Council or the Department of Lands. The RTA has jurisdiction over major roads, local Council over minor roads and the Department of Lands over road reserves or Crown roads.

Under Section 138, Part 9, Division 3 of the Act, a person must not:

- (a) erect a structure or carry out a work in, or over a public road, or
 - (b) dig up or disturb the surface of a public road, or
 - (c) remove or interfere with a structure, work or tree on a public road, or
 - (d) pump water into a public road from any land adjoining the road, or
 - (e) connect a road (whether public or private) to a classified road,
- otherwise than with the consent of the appropriate roads authority.

The Act requires that applications for the closure of Crown roads be made to the Minister for Lands.

The approval of the Minister of Lands will be required for the closure of Crown road reserves in the project area. No other Roads Act provisions apply.

4.1.2.10 Crown Lands Act 1989

The *Crown Lands Act 1989* provides for the administration and management of Crown land in the eastern and central divisions of the State. Crown land may not be occupied, used, sold, leased, dedicated, reserved or otherwise dealt with unless authorised by this Act or the *Crown Lands (Continued Tenures) Act 1989*.

The approval of the Department of Lands will be required for any works within Crown road reserves, if they have not been closed, as discussed above. Mt Arthur Coal has consulted with the NSW Lands Office during the preparation of this EA regarding the closure of the remaining Crown roads in this area.

4.1.3 State Environmental Planning Policies

State Environmental Planning Policies (SEPPs) are environmental planning instruments created by the State government. The SEPPs that are potentially relevant to the project include:

- SEPP (Major Projects) 2005;
- SEPP (Mining, Petroleum Production and Extractive Industries) 2007;
- SEPP 33 – Hazardous and Offensive Development;
- SEPP 44 – Koala Habitat Protection; and
- SEPP 55 – Remediation of Land.

The applicability of these SEPPs to the project is discussed below.

4.1.3.1 State Environmental Planning Policy (Major Projects) 2005

The State Environmental Planning Policy (Major Projects) 2005 identifies development to which the development assessment and approval process under Part 3A of the EP&A Act apply. As discussed in **Section 4.1.2.1**, the project is listed under Schedule 1 of the SEPP and will therefore be assessed under Part 3A of the EP&A Act.

4.1.3.2 State Environmental Planning Policy (Mining, Petroleum Production and Extractive Industries) 2007

The State Environmental Planning Policy (Mining, Petroleum Production and Extractive Industries) 2007 (Minerals SEPP) was gazetted in February 2007. The Minerals SEPP repeals State Environmental Planning Policy 37 - Continued Mines and Extractive Industries and State Environmental Planning Policy 45 - Permissibility of Mining. The SEPP also removed mining developments from Schedule 1 of State Environmental Planning Policy 11-Traffic Generating Development, meaning that SEPP 11 no longer applies to mining projects.

The new SEPP aims to:

- (a) provide for the proper management and development of mineral, petroleum and extractive material resources for the purpose of promoting the social and economic welfare of the State;
- (b) facilitate the orderly and economic use and development of land containing mineral, petroleum and extractive material resources; and
- (c) establish appropriate planning controls to encourage ecologically sustainable development through the environmental assessment, and sustainable management, of development of mineral, petroleum and extractive material resources.

With regards to mining, the Minerals SEPP outlines where various minerals activities are permissible both with and without development consent. The Minerals SEPP also defines mining developments that are prohibited, exempt or complying developments. These

provisions do not affect the requirement for approval under Part 3A of the EP&A Act for the current project.

4.1.3.3 State Environmental Planning Policy 33

SEPP No. 33 – Hazardous and Offensive Development requires the consent authority to consider whether an industrial proposal is a potentially hazardous industry or a potentially offensive industry. Under Clause 3 a potentially hazardous industry is defined as a development that 'would pose a significant risk in relation to the locality: to human health, life or property; or to the biophysical environment, and includes a hazardous industry and a hazardous storage establishment' and a potentially offensive industry is defined as a development that 'would have a significant adverse impact in the locality or on the existing or likely future development on other land, and includes an offensive industry and an offensive storage establishment' (DoP, 1994).

The aim of this policy is to link the permissibility of a proposal to its safety and pollution control performance. The assessment process is applicable to the storage and handling as well as the transportation of hazardous materials to and from the site. The assessment establishes whether the proposal is potentially hazardous and if this is not the case, SEPP 33 is not applicable.

Mt Arthur Coal's existing operations are not classed as hazardous or offensive and as this project is an extension of the existing mining operations and does not include any changes to the existing infrastructure and hazardous materials storage areas, it is not considered hazardous or offensive. A detailed hazard assessment is therefore unnecessary.

4.1.3.4 State Environmental Planning Policy 44

SEPP No. 44 – Koala Habitat Protection applies to the extent that in local government areas listed in the SEPP a Council is restricted from granting development consent for proposals on land identified as core koala habitat without the preparation of a plan of management. Muswellbrook LGA is listed in Schedule 1 of the SEPP and therefore the SEPP is relevant to this project. A koala habitat assessment was completed as part of the ecological assessment for this project and no core koala habitat was identified within the project area. Therefore a koala plan of management is not required for the project.

4.1.3.5 State Environmental Planning Policy 55

SEPP No. 55 – Remediation of Land aims to provide a State-wide planning approach to the remediation of contaminated land and also to reduce the risk of harm to human health and the environment by consideration of contaminated land as part of the planning process. Under the SEPP, a consent authority must not consent to the carrying out of development on land unless it has considered potential contamination issues.

As discussed in **Section 5.10**, there are some areas of potentially hydrocarbon contaminated land in the vicinity of the Bayswater No. 2 former workshop and fuel farm facilities. A closure and decommissioning strategy, including a contaminated land management strategy will be developed for these facilities prior to their decommissioning (refer to **Section 5.10.3**). This strategy will be included in the MOP submitted to DPI for approval should this project be approved.

Following decommissioning of the Bayswater No. 2 facilities, the area will be covered with overburden. With these controls in place, there are not expected to be any residual contaminated issues that will affect post mining land use.

4.2 Environmental and Community Context

4.2.1 Land Ownership and Land Use

Land Ownership

The proposed South Pit Extension area is owned by Mt Arthur Coal, except for the proposed overburden emplacement area on land owned by Anglo Coal (to be covered by a sub-lease agreement / partial-lease transfer) and a small number of Crown Road reserves (refer to **Figure 4.1**). The closest privately owned residential property is located approximately 2.5 kilometres north-east of the project area within the Antiene rural residential area, as measured from the closest section of overburden emplacement area at Bayswater No. 2 (refer to **Figure 4.1**). This residence is approximately 7.5 kilometres from the nearest point of the South Pit Extension mining area. Other private residences are located along Denman Road approximately 7.5 kilometres north-west of the South Pit Extension Mining area, to the north of the project area on Denman Road (approximately 7.5 kilometres from the mining area and approximately 5.5 kilometres from the overburden emplacement area) and at South Muswellbrook (approximately 8 kilometres from the mining area and approximately 5.5 kilometres from the overburden emplacement area).

Land Use

The Hunter Valley has had a long history of rural land use and as such the majority of the region consists of cleared land used for a variety of agricultural pursuits, predominantly grazing. More intensive agricultural land uses occur on fertile lands, such as the Hunter River alluvial zone, including horse studs, dairying, viticulture, olives and intensive cropping for stock feed. Other key land uses in the region are mining and power generation, residential and smaller areas of industrial land use.

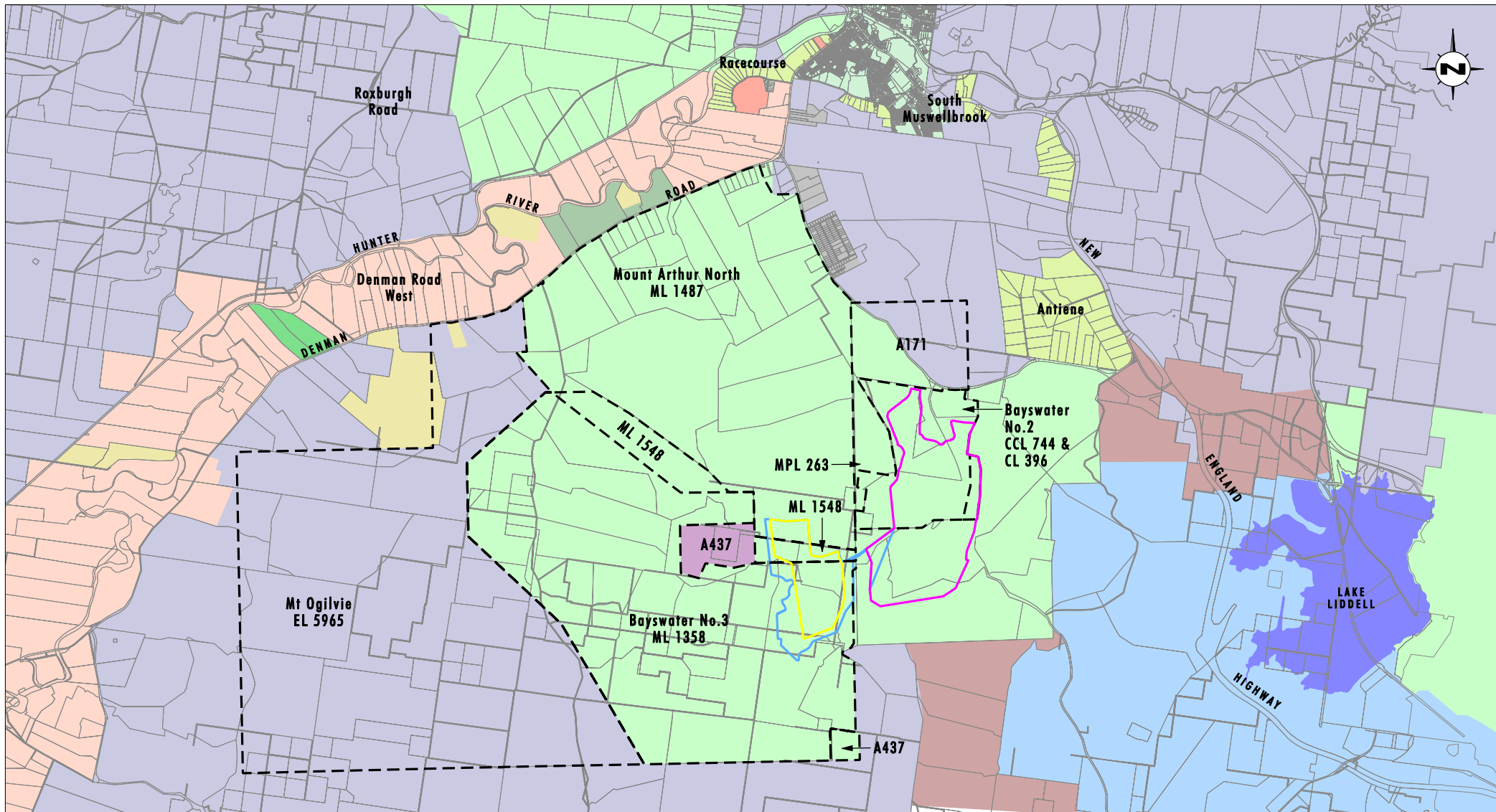
Land use surrounding the project area is generally a reflection of these regional land use patterns, although the dominant surrounding land use is mining (refer to **Figure 4.2**). The South Pit Extension area is located centrally within existing mining areas owned by Mt Arthur Coal and Anglo Coal, with open cut mining areas to the west, north and east. Land use to the south of the extension area consists of cleared agricultural land used for grazing, however it is owned by Anglo Coal who holds an exploration lease over the area. Adjoining Anglo Coal's land to the south and south-east are large areas of land owned by Macquarie Generation, forming buffer land for the nearby Bayswater and Liddell Power Stations.

Other land uses within the vicinity of the project area include irrigated cropping and horse studs (including on Mt Arthur Coal land) within the Hunter River alluvial zone approximately 7 kilometres to the north of the project area, and viticulture, olives and further irrigated cropping approximately 7 kilometres to the north-west, the residential area of Muswellbrook approximately 5 kilometres to the north and the rural residential Antiene Estate approximately 2 kilometres to the east (refer to **Figure 4.2**). The Muswellbrook Industrial Estate is also located on Thomas Mitchell Drive approximately 5 kilometres north of the South Pit Extension mining area.

4.2.2 Topography

The topography of Mt Arthur Coal's existing operational area is dominated by Mt Arthur (482 metres) which is located approximately in the middle of the existing operations and Mt Ogilvie (468 metres) which occurs in the western half of the Mt Ogilvie EL. In the South Pit Extension area, the topography is undulating to hilly. Elevations range from approximately 200 mAHD within the south and south-eastern extents of the project area, to 340 mAHD within the north-western portion of the project area. The higher elevations are associated with a prominent ridgeline which radiates south-east from Mt Arthur, whilst areas of lower

File Name (A4): R02_V1/2000_106.dgn



Base Source: LEP 2004, LPI 2004

0 1 2.5 5km
1:110 000

Legend

- Mining and Exploration Lease Boundary
- South Pit Extension Mining Area
- Additional Overburden Emplacement Area
- Approximate New Disturbance Footprint
- Olive Plantation
- Vineyard
- Olive Plantation
- Rural Residential
- Racecourse / Greyhound Track
- Urban
- Area of intensive / Irrigated Agriculture
- Non-intensive Agricultural Use (Grazing)
- Power Station Owned Land Used Primarily for Grazing
- Power Station Buffer
- Mount Arthur
- Mining
- Industrial

File Name (A4): R02_V1/2000_107.dgn

FIGURE 4.2

Land Use

elevation are located where the project area grades into the Saddlers Creek floodplain. The remainder of the project area is characterised by a number of hilltops at approximately 240 mAHD linked by a series of saddles.

A slope analysis of the proposed mining area was undertaken for the Bayswater No. 3 EIS (Resource Planning, 1993) indicating that it consists of slopes ranging from low (0-5 degrees) within its eastern extent through to medium (5-10 degrees) and moderately high (14-17 degrees) slope classes. The moderately high slope class areas are largely associated with the hilltops and prominent ridgeline extending from Mt Arthur.

4.2.3 Soils and Erosion

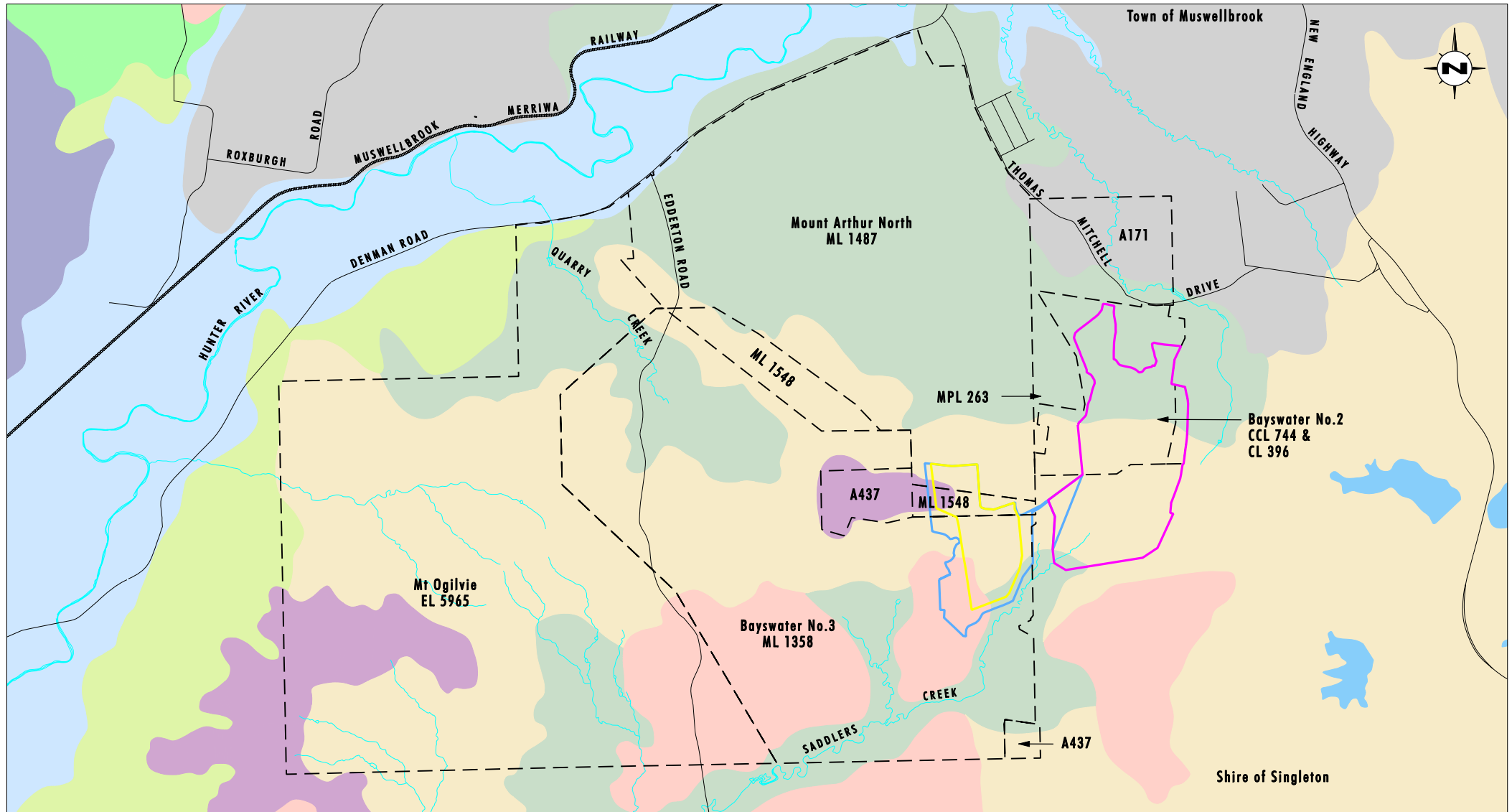
The soils types occurring within the project area are mapped on the Singleton 1:250,000 Soil Landscapes Map Sheet (digital mapping provided by the then DNR, 2005) and described in Kovac and Lawrie (1991). Soil landscapes present in the project area are shown on **Figure 4.3** and include the Liddell, Bayswater, Brays Hill and Ogilvie landscapes. These soil landscapes consist of a range of soil types including various clays, sands and duplex soils. Erosion hazards across these soil landscapes are typically moderate to high, although some soil types have low erosion hazards (e.g. the majority of Brays Hill landscape has low to moderate erodibility). The fertility of all soils is low, except for the Brays Hill landscape which is high except where Yellow (orange) Solodic Soils are present (Kovac and Lawrie, 1991).

Detailed site specific soil surveys have also been undertaken within the project area including surveys for the Bayswater No. 3 and MAN EISs (Resource Planning, 1993 and URS, 2000). These surveys indicate that the majority of the project area, particularly to the south-east, consists of Non-calci Brown soils, with Yellow Podzolics and Solodics concentrated within the eastern extent of the project area (Resource Planning, 1993). In addition, the north-western extent of the project area consists of Red and Yellow Duplex Soils, with concentrated areas of predominantly loamy massive earths (URS 2000).

The Yellow Podzolic and Solodic soils are generally associated with drainage depressions and are characterised by a relatively thick (5-20 centimetres) dispersible A2 horizon with poor structural characteristics. Given these characteristics, this soil type has been assessed as being largely unsuitable for stripping and the incorporation of these A2 materials in topsoil used in rehabilitation works would be likely to lead to surface stability problems and subsequently high erosion rates (Resource Planning, 1993). The Yellow Duplex soils identified in the north-west extent of the project area have also been identified as having similar A2 horizon characteristics and a sodic clay subsoil (URS, 2000), and would also largely be unsuitable as topdressing material.

4.2.4 Land Capability

Land capability is the ability of the land to maintain its productive potential under a specified use, without degradation. Climate, soils, geology, geomorphology, soil erosion, site and soil drainage characteristics and current land use data are all considered in determining land capability (Emery, 1986). Eight classes of Rural Land Capability were defined by the then Soil Conservation Service for mapping rural lands (refer to **Table 4.1**). Mapping of the Muswellbrook 1:100,000 map sheet was provided in digital format by then Department of Infrastructure Planning and Natural Resources in early 2004. Land Capability in the project area is shown on **Figure 4.4**.



Source: DNR, 2005

0 1 2 4 km
1:90 000

Legend

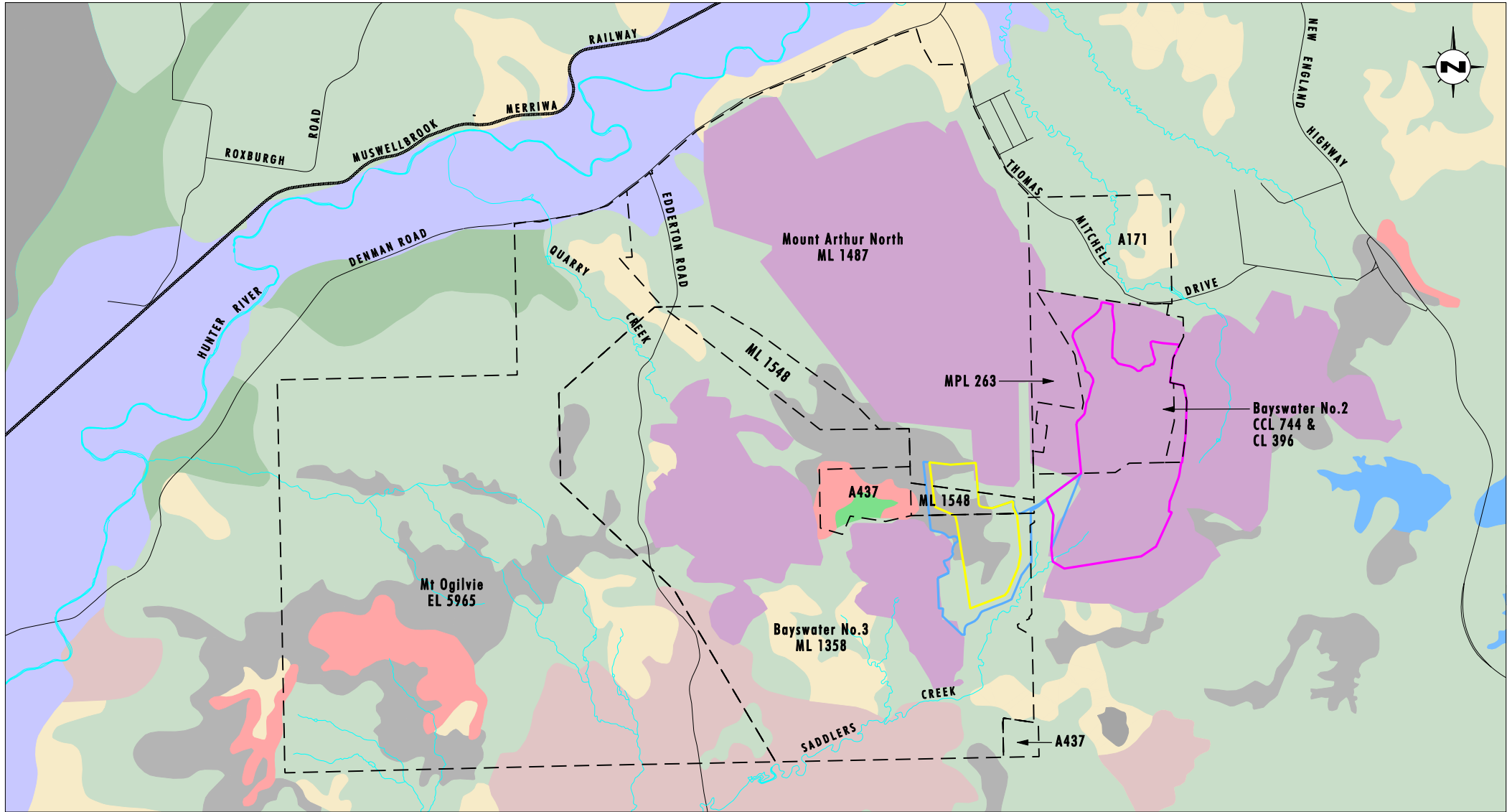
- Mining and Exploration Lease Boundary
- South Pit Extension Mining Area
- Additional Overburden Emplacement Area
- Approximate New Disturbance Footprint

Soil Landscapes

- | | |
|----------------|-------------|
| — Sandy Hollow | — Bayswater |
| — Castle Rock | — Ogilvie |
| — Dartbrook | — Liddell |
| — Brays Hill | — Water |
| — Hunter | — Roxburgh |

FIGURE 4.3

Soil Landscapes



Source: DIPNR, 2004

0 1 2 4 km
1:90 000

Legend

- Mining and Exploration Lease Boundary
- South Pit Extension Mining Area
- Additional Overburden Emplacement Area
- Approximate New Disturbance Footprint

Land Capability Classification

- Class I
- Class II
- Class III
- Class IV
- Class V
- Class VI
- Class VII
- Class VIII

- Urban Area
- Mining and Quarrying Areas

FIGURE 4.4

Land Capability

Table 4.1 – Rural Land Capability Classes

General Capability	Land Capability Classes	Interpretations and Implications
Suitable for regular cultivation	I	Suitable for a wide variety of uses. Where soils are fertile, has the highest potential for agriculture. Includes 'prime agricultural land'.
	II	Usually gently sloping land suitable for a wide variety of agricultural uses. Includes 'prime agricultural land'.
	III	Sloping land suitable for cropping on a rotational basis. Soil erosion problems are often severe. Generally fair to good agricultural land.
Suitable for grazing and occasional cultivation	IV	Land not suitable for cultivation on a regular basis owing to limitations of slope gradient, soil erosion, shallowness or rockiness, climate, or a combination of these factors. Comprises the better classes of grazing land.
	V	Land not suitable for cultivation on a regular basis owing to considerable limitations of slope gradient, soil erosion, shallowness or rockiness, climate, or a combination of these factors. Soil erosion problems are often severe. Production is generally lower than for grazing lands in Class IV.
Suitable for grazing but not for cultivation	VI	Productivity will vary due to soil depth and fertility. Comprises the less productive grazing lands.
Land best protected by green timber	VII	Generally comprises areas of steep slopes, shallow soils and/or rock outcrop.
Unsuitable for agricultural or pastoral uses	VIII	Cliffs, lakes or swamps and other lands unsuitable for agricultural and pastoral production.
Mining and quarrying areas	M	

Excluding the previously mined areas, the proposed South Pit Extension area is dominated by two land capability classes, V and VI. Class V land is suitable for grazing and occasional cultivation, and is concentrated on the lower sloping areas within the southern, eastern and northern extents of the proposed mining area. Class VI land, which is suitable for grazing but not for cultivation, is associated with the foot slopes of Mt Arthur and is generally located along the prominent ridgeline extending into the proposed mining area from the north-west.

4.3 Existing Mt Arthur Coal Environmental Management System

Mt Arthur Coal has a comprehensive Environmental Management System (EMS) in place for the existing mining operations. As discussed in **Section 1.1**, the EMS has been certified to ISO 14001 since 2003 and is the subject of regular certification surveillance audits and a full recertification audit every three years. The EMS includes a number of environmental management plans that have been prepared to assist in the management of key environmental issues. Many of these plans have been prepared in accordance with conditions contained in one of Mt Arthur Coal's three main development consents and have therefore been prepared in consultation with relevant government agencies and approved for implementation, typically by DoP.

The EMS also contains EMS procedures which provide directions for the successful implementation of the EMS, including aspects such as monitoring, external communication, environmental risk assessment and training. Operational procedures are also developed to ensure that areas of residual risk are appropriately managed with all relevant site personnel trained in relation to these procedures. Operational procedures exist for operations such as clearing and topsoil stripping, drill and blast, overburden handling and coal extraction, reject emplacement, equipment maintenance, spill response, water management, waste handling and disposal and purchasing.

The successful implementation of the Mt Arthur Coal EMS has ensured a high level of environmental performance by the existing operations including compliance with Mt Arthur Coal's detailed development consent conditions. This high level of compliance has been confirmed during regular statutory compliance audits undertaken in accordance with conditions included in Mt Arthur Coal's development consents and reported externally to DoP and Mt Arthur Coal's CCCs.

The key management plans for the MAN mining area that will assist in the management of mining operations undertaken in the South Pit Extension area include the:

- Environmental Management Strategy – provides an overview of the environmental management system and strategies for the MAN mining area;
- Dust Management Plan - outlines the dust and weather monitoring to be undertaken and specifies the dust controls to be implemented;
- Noise Management Plan - defines noise mitigation and monitoring measures, and specifies noise controls;
- Blasting/Vibration Management Plan – outlines monitoring requirements, blasting criteria and specifies controls to be implemented;
- Site Water Management Plan – outlines design criteria and specifies controls to be implemented;
- Soil Stripping Management Plan – details topsoil stripping and storage management strategies;
- Spontaneous Combustion Management Plan – identifies controls and monitoring requirements;
- bushfire, land management and waste management plans; and
- Community Involvement Management Plan – details Mt Arthur Coal's approach to community involvement and engagement.

The majority of these management plans have been approved for implementation by DoP and assist Mt Arthur Coal in successfully managing the impacts of its existing operations. As the South Pit Extension Project will use Mt Arthur Coal's existing facilities, mining techniques and systems, the implementation of the above management plans for the South Pit Extension operations, will ensure that an effective, integrated management approach is implemented.

Details of how these management plans will be applied to the South Pit Extension Project are discussed in the relevant sections of the environmental assessment section of this report (refer to **Section 5.0**).

As discussed with DoP during the planning phase for this project, Mt Arthur Coal intends to consolidate the different environmental management plans which exist for the approved operations of MAN, Bayswater No. 3 and Rail Loading Facility during the review of management plans post gaining project approval. This process will be done in consultation with DoP and is intended to produce a single suite of environmental management plans that apply to all operations across site. This is largely an administrative change to reduce duplication and will not affect the current level of commitment to effective environmental management.

5.0 Environmental Assessment

5.1 Preliminary Environmental Risk Analysis

To assist in identifying the key environmental and community issues that required detailed assessment as part of this EA report, a preliminary environmental risk analysis was undertaken as part of the Preliminary Environmental Assessment (Umwelt, 2006). The risk analysis was completed using the BHP Billiton risk assessment process, with the risk matrix, consequence table and likelihood table used for the assessment included in **Appendix 4**. Consistent with the BHP Billiton quantitative risk assessment matrix, environmental risks were categorised as low, medium, high or extreme. As shown in **Appendix 4**, the majority of activities were rated as low or medium level risks, with few high risks and no extreme risks identified. The activities that were identified in the preliminary environmental risk analysis as high risks (Note: this is the initial risk rating prior to detailed assessment with no project specific controls in place) were the:

- loss of flora and fauna values due to vegetation clearance and topsoil removal;
- disturbance of Aboriginal objects or places due to vegetation clearing and topsoil removal; and
- alteration of existing topography due to mining of the South Pit Extension Area.

Following the completion of the detailed assessment and with the implementation of the management practices outlined in **Sections 5.2, 5.3** and **5.10** it is considered that the risk associated with the above activities is lower than the original risk identified in the preliminary risk analysis and is able to be effectively managed as part of the project.

The Preliminary Environmental Assessment which included the preliminary risk analysis was provided to DoP along with the Project Application for consideration in issuing the DGRs for the project. The Preliminary Environmental Assessment was also provided to other relevant government agencies with whom DoP consulted regarding the DGRs. The DGRs identified the key environmental assessment issues for the project as:

- ecology;
- cultural heritage;
- surface and groundwater;
- noise;
- air quality;
- spontaneous combustion;
- greenhouse gas emissions;
- visual impacts; and
- rehabilitation and site decommissioning.

Detailed assessments of each of these key issues are included in the following sections, with the assessment also designed to satisfy the DGRs issued for the project by DoP.

5.2 Ecology

Extensive ecological survey has been completed over the Mt Arthur Coal operations area during the past 15 years for numerous environmental assessments and ecological monitoring programs. The entire South Pit Extension area has also been previously surveyed for either the MAN EIS (URS, 2000) or Bayswater No. 3 EIS (Resource Planning, 1993). A specific ecological survey of the South Pit Extension area was also completed for this project. The survey covered all previously un-mined land potentially impacted by the project, with survey work being completed in February and November 2005.

A summary of the key findings of the ecological assessment are provided below, with the full ecological assessment report included as **Appendix 5**.

5.2.1 Existing Flora

The upper Hunter Valley has been largely cleared of native vegetation, primarily for agricultural and other land uses, including urban development and mining. The valley floodplain areas have been subject to the most intensive agricultural use. Due to these land use patterns, conserved areas of native vegetation are generally located on the edge of the valley and connectivity to and from these conservation reserves is patchy due to the variety of land tenures and long history of land modification. In terms of the main valley floor area, formally protected areas constitute about 1.9% (Peake, 2006).

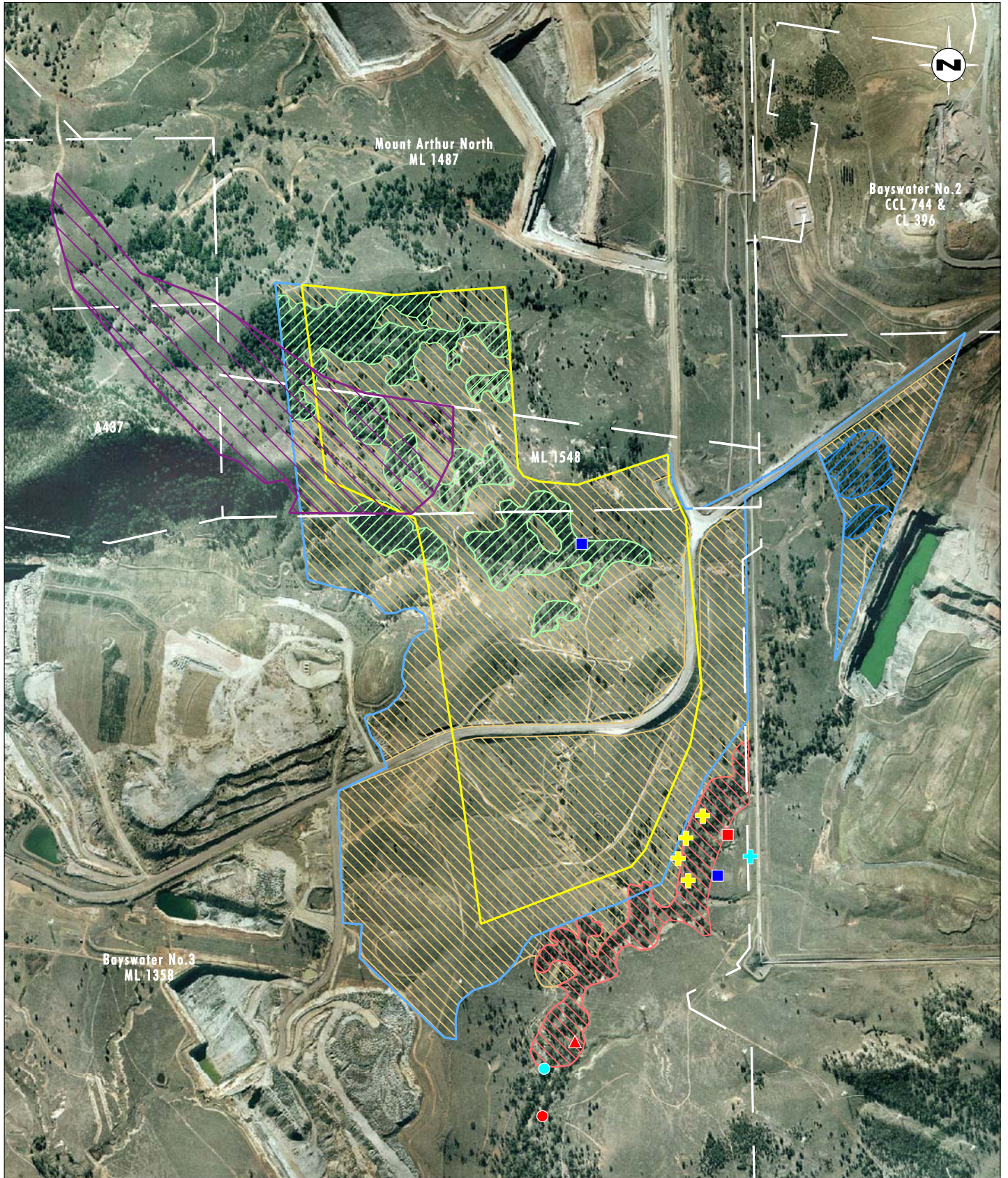
On a local scale, the project area contains a number of scattered vegetated fragments that form a 'stepping-stone' corridor for fauna species that can readily move across large gaps of open country. Although the lack of continuous movement corridors somewhat reduces the flora and fauna habitat potential of a number of these areas, the remnants are still important on local and regional scales. Vegetation on Mt Arthur to the immediate north-west of the project area is not subject to any proposed or approved mining and represents a significant area of flora and fauna habitat in the local area. There are tenuous corridor linkages from Mt Arthur to the riparian habitats associated with Saddlers Creek and to Mt Ogilvie to the west. A highly fragmented, but significant corridor follows north-east from Mt Arthur, through spotted gum (*Corymbia maculata*) dominated woodland to the Antiene area, with approved mining activity at Mt Arthur Coal and neighbouring Drayton Mine impacting on this corridor.

Areas of remnant vegetation also occur to the east of the project area within the Macquarie Generation power station buffer zones. These habitats are not linked via vegetation corridors to habitats within the project area.

5.2.1.1 Vegetation of the Project Area

The floristic diversity of the project area is regarded as low, with a total of 119 flora species recorded (79% indigenous to the project area and 21% exotic or non-local natives). The overall number of plant species recorded is likely to be affected by the history of agricultural and mining disturbance. The floristic diversity of the project area is considered to be representative of similar disturbed woodlands and derived grasslands occurring widely across the Hunter Valley.

Five vegetation communities were recorded within the project area. The extent of each of the vegetation communities is shown on **Figure 5.1**. Vegetation communities have been named in accordance with the vegetation communities mapped by Peake (2006) as part of the Hunter Remnant Vegetation Project, except where the communities recorded were not consistent with these descriptions. The vegetation communities recorded included:



Base Source: Mt Arthur Coal

0 0.25 0.5 1.0 km
1:20 000

Legend

- Mining and Exploration Lease Boundary
- South Pit Extension Mining Area
- Approximate New Disturbance Footprint
- Central Hunter Ironbark-Spotted Gum-Grey Box Forest
- Derived Grassland
- Hunter Floodplain Red Gum Woodland Complex
- Central Hunter Bullock Forest Regeneration
- Corymbia maculata* Regeneration Area

- eastern bentwing bat
- squirrel glider
- eastern cave bat
- large-footed myotis
- grey-crowned babbler
- grey-crowned babbler nest
- Cymbidium canaliculatum*

FIGURE 5.1

**Vegetation Communities and
Threatened Species Locations**

- Hunter Floodplain Red Gum Woodland Complex – identified along Saddlers Creek;
- Central Hunter Ironbark-Spotted Gum-Grey Box Forest – identified in the northern and central portions of the proposed mining area;
- Central Hunter Bulloak Forest Regeneration – located to the east of the proposed mining area adjacent to the Drayton west pit;
- aquatic vegetation – recorded within the bed of Saddlers Creek and also fringing some of the farm dams within the project area; and
- Derived Grassland – which occurred over the balance of the project area previously undisturbed by mining activities.

No threatened flora species, endangered populations or Endangered Ecological Communities (EECs) were identified within the project area during the flora survey. Several threatened species and endangered populations have, however, been previously recorded within 20 kilometres of the project area, including on Mt Arthur Coal land. Further discussion regarding these species and endangered populations is included in **Section 5.2.3**.

Two vegetation communities present within the project area are considered to be of regional significance due to the extent of past clearing of these communities across the region. These communities are the Hunter Floodplain Red Gum Woodland Complex and Central Hunter Ironbark-Spotted Gum-Grey Box Forest.

5.2.2 Existing Fauna

A total of 67 fauna species, including four species listed as vulnerable on the TSC Act and seven species listed as migratory on the EPBC Act were recorded in the project area. The threatened fauna species recorded were the squirrel glider (*Petaurus norfolcensis*), and three micro-bats: the eastern bentwing-bat (*Miniopterus schreibersii oceanensis*), large footed myotis (*Myotis adversus*) and the eastern cave bat (*Vespadelus troughtoni*).

All threatened species were recorded in riparian vegetation along Saddlers Creek, with the eastern cave bat was also recorded towards the middle of the project area (refer to **Figure 5.1**). Each of the species is, however, expected to utilise the habitats within the remainder of the proposed mining area. The project area is also considered to provide potential habitat for a number of other threatened species known to occur in the area, including several previously recorded on Mt Arthur Coal land. Further discussion regarding these species is included in **Section 5.2.3**.

Seven EPBC listed migratory species were recorded within the project area: the black-faced cuckoo shrike (*Coracina novaehollandiae*), silvereye (*Zosterops lateralis*), rainbow bee-eater (*Merops ornatus*), Australian kestrel (*Falco longipennis*), magpie-lark (*Grallina cyanoleuca*), white-throated needletail (*Hirundapus caudacutu*) and Richard's pipit (*Anthus novaeseelandiae*). These species were recorded at various locations throughout the South Pit Extension area.

5.2.3 Ecological Impact Assessment

5.2.3.1 Flora Impact Assessment

The project will result in the disturbance of an area of up to approximately 330 hectares of land not previously disturbed by mining (including the additional mining area and area within the new disturbance area shown on **Figure 5.1** that may be impacted for services, access

tracks, drainage works, etc.). This will include the removal of up to approximately 48 hectares of Central Hunter Ironbark-Spotted Gum-Grey Box Forest, approximately 4.5 hectares of Central Hunter Bulloak Forest Regeneration, approximately 0.3 hectares of Hunter Floodplain Red Gum Woodland Complex and approximately 280 hectares of Derived Grassland. The loss of Central Hunter Ironbark-Spotted Gum-Grey Box Forest includes removal of approximately 19 hectares of a spotted gum regeneration area established as an offset for clearing associated with the MAN project (refer to **Figure 5.1** and **Section 5.10**).

The Central Hunter Ironbark-Spotted Gum-Grey Box Forest and Hunter Floodplain Red Gum Woodland Complex are considered to be regionally significant and the loss of these communities will therefore be offset as part of the project. Mt Arthur Coal will design rehabilitation works completed as part of the project to ensure no net loss of each community occurs, with an overall net gain of woodland / forest vegetation achieved. The total area of native woodland / forest vegetation established as part of rehabilitation works will be approximately 250 hectares, a 5:1 ratio to the vegetation cleared. For the Hunter Floodplain Red Gum Woodland Complex, the offset will be achieved by fencing off a section of Saddlers Creek adjoining the project area to encourage the regeneration of this community on currently cleared floodplain areas. The loss of the Central Hunter Bulloak Forest Regeneration community will also be replaced through rehabilitation plantings, although this community is relatively widespread throughout Mt Arthur Coal's operational area and the upper Hunter Valley.

In addition to the rehabilitation / regeneration offsets discussed above, a 45 hectare vegetation corridor will be established to connect the vegetated habitats of Mt Arthur and Saddlers Creek. This corridor will be established through seeding / planting of native woodland species and will be adjacent to the South Pit Extension mining area providing a proximate offset for the vegetation cleared as part of the project. A mine service corridor will be maintained through this area to provide access to the Bayswater No. 3 mining area to the west, with this corridor to be revegetated using native species at the completion of mining. Further details of the proposed offset strategy, including a proposed existing vegetation conservation offset, are discussed in **Section 5.2.4.1**.

The ecological assessment has found that the project will not result in a significant loss of floristic diversity in the project area, Mt Arthur Coal operations area or region. Floristic diversity in the project area is considered to be representative of surrounding areas, including habitat management and conservation areas established as part of the MAN project. These areas include Mt Arthur, McLeans Hill and the A171 area adjacent to Thomas Mitchell Drive (formally a Travelling Stock Reserve). The project also incorporates significant habitat re-instatement objectives (refer to **Section 5.2.4**) with the aim of recreating both vegetation communities and fauna habitats. The recreation of habitat in the medium to long term through rehabilitation and corridor establishment will provide an offset for the loss of native vegetation currently occurring within the project area, with a further existing vegetation conservation offset discussed in **Section 5.2.4.1**.

Impact on Threatened Flora Species, Populations and Endangered Ecological Communities

No threatened flora species, endangered populations or EECs listed on the TSC Act were recorded in the project area. Potential habitat was, however, considered to exist for several threatened flora species with an assessment of significance completed for these species. A detailed assessment of significance was completed as part of the ecological assessment (refer to **Appendix 5**) and concluded that the project will not have a significant impact on any threatened flora species, endangered populations or EECs.

No EPBC Act listed threatened flora species or EECs were recorded in the project area during surveys, however several species were considered to have potential to occur in the

project area due to the presence of suitable habitat. An assessment of significance was conducted for these species in accordance with the EPBC Act (refer to **Appendix 5**). The assessment concluded that the project will not have a significance impact on threatened flora species.

5.2.3.2 Fauna Impact Assessment

The project will result in the loss of up to approximately 330 hectares of fauna habitat within the project area. This comprises approximately 50 hectares of woodland habitat, and approximately 280 hectares of highly disturbed grassland habitat.

The vegetation of the project area, and in the local area generally, is highly fragmented with pockets of vegetation of varying sizes, features and habitat quality. Many fragments consist of canopy species only, with little or no understorey vegetation. Such areas are likely to provide greatly reduced protection to fauna species, particularly when dispersing. While the project is likely to contribute to further local fragmentation, offset measures proposed include the re-instatement of native vegetation communities as part of rehabilitation works to provide improved local and regional connectivity and conservation of approximately 100 hectares area of existing fauna habitat in perpetuity (refer to **Section 5.10**). Further details of the proposed offset strategy are contained in **Section 5.2.4.1**.

Detailed management and mitigation measures will be implemented as part of the project to limit impacts on fauna species. Such measures include the re-establishment of arboreal habitat, the revegetation of mining areas with native vegetation communities, relocation of habitat structures and implementation of pre-clearing surveys to reduce the impact on native fauna, particularly threatened species. Proposed management measures are discussed in further detail in **Section 5.2.4**.

Impact on Threatened Fauna Species

Four threatened fauna species; squirrel glider, eastern bentwing-bat, large footed myotis and the eastern cave bat were recorded during fauna surveys conducted as part of the project. The majority of records were from the riparian vegetation along Saddlers Creek (refer to **Figure 5.1**), with the eastern cave bat was also recorded towards the middle of the project area. The identified species are also expected to utilise the habitats within the remainder of the proposed mining area. A number of other species were considered to potentially occur in the project area due to local or regional records, or based on the presence of suitable habitat within the project area. A detailed assessment of significance was completed as part of the Ecological Assessment (refer to **Appendix 5**) to determine the impact of the project on the four threatened species recorded, and those considered to potentially occur within the project area. The assessment of significance found that the project will not have a significant impact on any threatened fauna species.

Seven migratory species listed under the EPBC Act were also recorded in the project area. An assessment of significance was undertaken for these species in accordance with the EPBC Act (refer to **Appendix 5**). The assessment determined that the project will not have a significant impact on any listed migratory species.

5.2.4 Proposed Management and Mitigation Measures

An ecological offset package has been developed for the project to offset the loss of native vegetation and fauna habitat as a result of the project. The offset also considers the impact of the project on previous ecological management and rehabilitation commitments made for the MAN and Bayswater No. 3 projects. Further details regarding the proposed ecological offset are discussed in **Section 5.2.4.1**.

Mt Arthur Coal also currently has a range of ecological management and monitoring strategies in place for the existing operations, including ecological management and monitoring plans. Monitoring and management strategies include revegetation works to establish native vegetation communities, management of remnant vegetation, pre-clearing surveys, fauna habitat creation and ecological monitoring including monitoring of fauna, remnant vegetation and revegetation areas. In addition to the implementation of the offset strategy, it is proposed to build on these existing programs to assist in management and mitigation of the ecological impacts associated with the South Pit Extension Project.

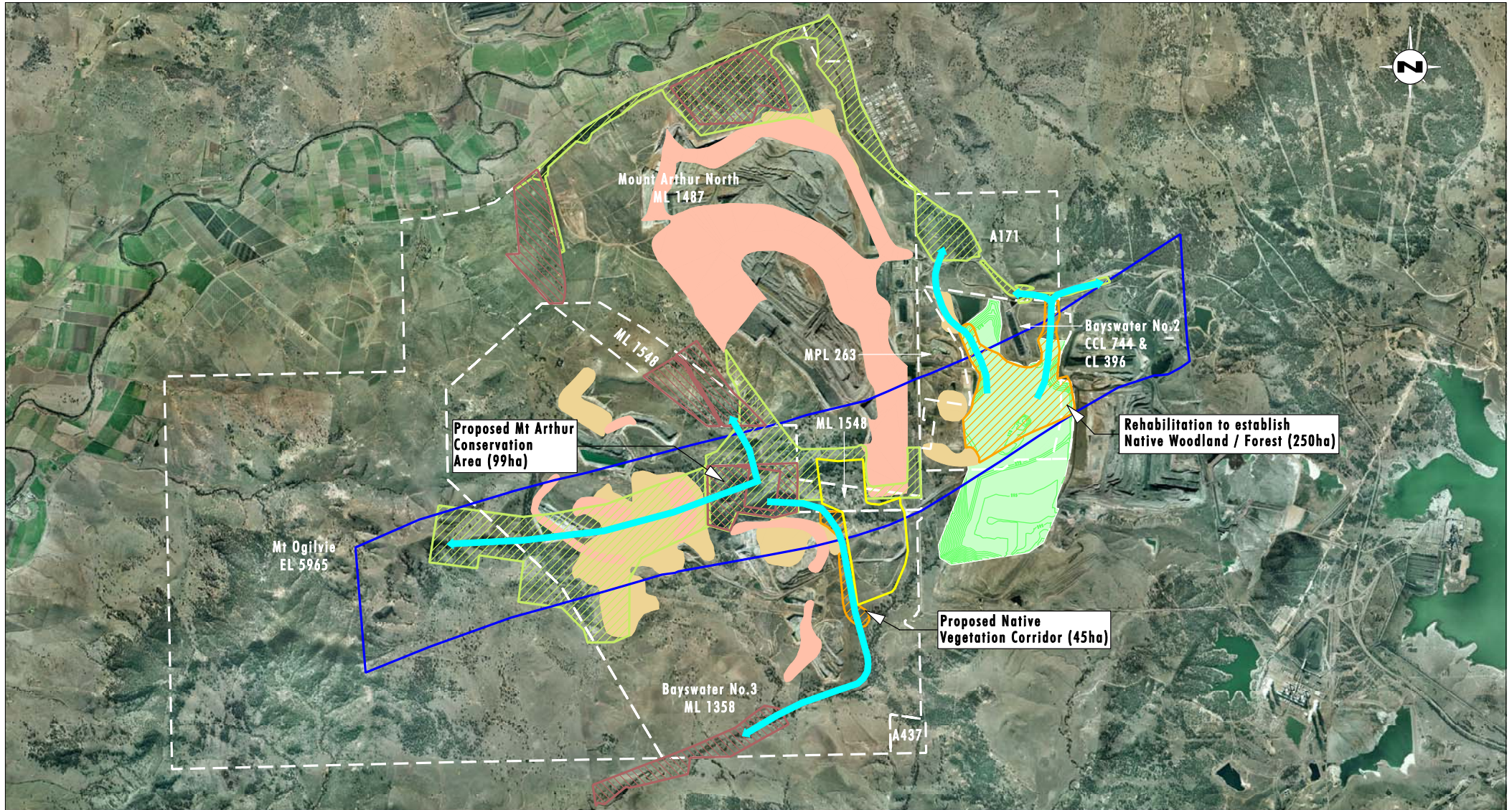
The proposed management and mitigation measures to be implemented as part of the project are outlined in detail in **Appendix 5**, and in summary include:

- implementation of a pre-clearance survey and clearing procedure for all clearing works associated with the project. This strategy will be used to minimise the potential impact of clearing activities on fauna species, particularly threatened fauna species and allow salvage of suitable habitat structures;
- enhancement of arboreal habitat through the relocation of salvaged tree hollows and erection of nest boxes in surrounding remnant vegetation and in the post mining landscape once the re-instated vegetation is of sufficient age;
- Saddlers Creek near the project area (as defined in Section 6.3.2 of the Ecological Assessment in **Appendix 5**) will be fenced off to protect the riparian corridor and encourage natural regeneration. Cattle grazing (other than as a land management tool to reduce fire risk, etc) will be excluded from this area;
- modification of the existing Mt Arthur Coal ecological monitoring program to include rehabilitation monitoring, fauna monitoring and nest box monitoring consistent with the Ecological Assessment in **Appendix 5**; and
- additional sites for implementation of the proposed offset strategy outlined in **Section 5.2.4.1**.

5.2.4.1 Proposed Offset Strategy

To offset the loss of native vegetation and fauna habitat due to clearing works associated with the project, the South Pit Extension Project rehabilitation strategy will ensure that there is no net loss of each woodland / forest vegetation community impacted by the project. In addition, the project will achieve a net increase in forest/woodland habitat through establishment of extensive forest/woodland areas as part of the rehabilitation of the overburden emplacement area at Bayswater No. 2 (refer to **Figure 5.2**). These rehabilitation plantings will provide an area of native forest/woodland vegetation covering approximately 250 hectares, proving a 5:1 ratio to the vegetation cleared, and are discussed in further detail in **Section 5.10.1**. The rehabilitation plantings will provide an important link in the completion of a regional habitat linkage proposed in the DPI's Synoptic Landscape Plan (DMR, 1999) (refer to **Figure 5.2**).

It is also proposed as part of the project to establish a vegetated corridor to connect the vegetated habitats of Mt Arthur and Saddlers Creek (refer to **Figure 5.2**). This 45 hectare corridor will be established through seeding / planting of native species and will be adjacent to the South Pit Extension mining area providing a proximate offset for the vegetation cleared as part of the project. As discussed previously, a mine service corridor will be maintained through this corridor to provide access to the Bayswater No. 3 mining area, with this area to be revegetated at the completion of mining. The plantings will be comprised of species from the Central Hunter Ironbark-Spotted Gum-Grey Box Forest community. Once the vegetation in this corridor is sufficiently established, nest boxes will be installed at strategic locations



Base Source: Mt Arthur Coal

0 1 2 4 km
1:90 000

Legend

- Mining and Exploration Lease Boundary
- South Pit Extension Mining Area
- Rehabilitated Area
- Existing and Previously Proposed Rehabilitation Area - Native Trees
- Regional Habitat Links (Synoptic Plan, NSW DMR 1999)
- Heritage Management and Conservation Areas
- Habitat Management/Improvement Zones
- Proposed Vegetated Corridors - South Pit Extension Project
- Local Corridors

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FIGURE 5.2

Proposed Ecological Offset Strategy

within the corridor to provide enhanced fauna habitat values (refer to **Appendix 5** for details of nest box type and number).

In addition to rehabilitation / regeneration / corridor planting offsets, DECC has also requested that an existing native vegetation offset be included as part of the project. Mt Arthur Coal has undertaken a review of proximate existing vegetation areas to identify any potential offset opportunities. Any offset would be in perpetuity and therefore needs to be carefully planned in consideration of existing and potential future land use (including post mining land use). These investigations identified an area of approximately 100 hectares of native vegetation surrounding Mt Arthur on land owned by Mt Arthur Coal as a potential offset opportunity (refer to **Figure 5.2**). This area is not proposed to be mined and is required by the MAN development consent to be conserved for its Aboriginal archaeology values under a Voluntary Conservation Agreement (VCA). In addition to the proposed rehabilitation / regeneration / corridor planting offsets discussed above, Mt Arthur Coal propose to modify the VCA process underway for this area to ensure that it provides for appropriate protection and enhancement of the ecological values of this area in perpetuity, in addition to the existing requirement to conserve the archaeological values of the area. This would be achieved by inclusion in the VCA management plan of specific measures to protect and enhance the ecological values of the VCA area. This would provide an approximate 2:1 existing vegetation offset for the project in addition to the measures discussed above.

The key ecological values of the Mt Arthur native vegetation area that make it a suitable ecological offset for the project are:

- the vegetation within this area is Mt Arthur Forest Complex which is considered to be regionally significant (Peake 2006). Dominant species include (*Eucalyptus punctata*), grey box (*Eucalyptus moluccana*), kurrajong (*Brachychiton populneus* subsp. *populneus*) and forest oak (*Allocasuarina torulosa*). This community has not been recorded anywhere else in the Hunter Valley to date, and therefore is unique and not protected anywhere else;
- the community has a mid-dense to dense understorey providing good fauna habitat values and includes a highly diverse range of species such as native olive (*Notelaea microcarpa* var. *microcarpa*), water bush (*Myoporum montanum*), shiny-leaved canthium (*Canthium odoratum*), western golden wattle (*Acacia decora*) and sticky wallaby bush (*Beyeria viscosa*);
- no threatened fauna species have been previously recorded on Mt Arthur, which may be attributed to a lack of surveys being undertaken at this location. However, a number of threatened species that have been recorded in the general vicinity are highly likely to occur on Mt Arthur including the grey-crowned babbler (*Pomatostomus temporalis temporalis*), speckled warbler (*Pyrrholaemus sagittata*), squirrel glider (*Petaurus norfolkensis*), eastern bentwing-bat (*Miniopterus schreibersii oceanensis*), yellow-bellied sheath-tail bat (*Saccolaimus flaviventris*), eastern cave bat (*Vespadelus troughtoni*), greater broad-nosed bat (*Scoteanax rueppellii*), eastern freetail bat (*Mormopterus norfolkensis*) and the large-footed myotis (*Myotis adversus*). Many of these cave-dwelling bats may have potential roosting habitat on Mt Arthur;
- it is part of a significant area of remnant vegetation and is significantly less fragmented than the woodland / forest vegetation proposed to be cleared as part of the project. It is a significant component of a regional habitat linkage proposed in the DPI's Synoptic Landscape Plan (refer to **Figure 5.2**);
- it has not been subject to the same extent of disturbance due to past land use practices as the vegetation within the project area; and

- it provides habitat for a diverse range of native fauna species including tree hollow habitats, rocky outcrop areas and a range of potential foraging species for nectarivorous birds, arboreal mammals and flying-foxes.

It is therefore considered that in addition to the proposed rehabilitation / regeneration / corridor planting offsets discussed above, the modification of the VCA process underway for the Mt Arthur area to ensure that it provides for appropriate protection of the ecological values of this area in perpetuity would provide a suitable existing vegetation offset for the project.

Mt Arthur Coal is committed to achieving an appropriate ecological offset package as part of this project including the conservation in perpetuity of areas to specifically protect ecological values (100 hectares), planting of a vegetated corridor (45 hectares) to improve local habitat connectivity and mine rehabilitation incorporating extensive areas of native woodland vegetation (250 hectares). DECC and DoP will be further consulted to confirm the detail of the proposed ecological offset package.

Further details regarding the integration of the offset strategy with the proposed rehabilitation plan for the Mt Arthur Coal complex are provided in **Section 5.10**.

5.3 Heritage Assessment

5.3.1 Cultural Heritage

A comprehensive Aboriginal archaeological and cultural heritage assessment has been undertaken for the project in accordance with DoP and DECC guidelines and in consultation with representatives of the registered Aboriginal stakeholder groups. The Aboriginal archaeological assessment report is included as **Appendix 6**, with a summary included in this section.

5.3.1.1 Aboriginal Consultation

Sixteen Aboriginal groups were consulted for the project in accordance with the draft Part 3A assessment guideline *Draft Guidelines for Aboriginal Cultural Heritage Impact Assessment and Community Consultation*, July 2005 and *DEC's Interim Community Consultation Requirements for Applicants 2004*. Registered Aboriginal community stakeholders were involved in all facets of the project including providing comment on survey strategy, the opportunity to provide a tender for participation in field survey, site identification and recording, provision of information regarding cultural heritage values and review of and comment on the draft report.

5.3.1.2 Previous Archaeological Survey and Assessment

The proposed new disturbance area for this project (refer to **Figure 1.3**) has been previously surveyed as part of either the Bayswater No. 3 project (Resource Planning, 1993) or MAN project (URS, 2000). The northern section of the South Pit Extension Area was comprehensively surveyed as part of the MAN Project, with this area not therefore requiring resurvey for this project. The balance of the project area was surveyed and partially salvaged as part of the Bayswater Archaeological Research Project (Davidson, James and Fife, 1993, Resource Planning, 1993, Wilson 1995 and MacDonald and Davidson 2005). Much of this work was completed in the early to mid 1990s. Due to the passage of time since these surveys were completed and the bias of the survey on particular landforms, it was considered necessary to resurvey the portion of the project area within the Bayswater No. 3 ML for the South Pit Extension Project.

Archaeological surveys undertaken for the Bayswater Archaeological Research Project identified eight artefact scatters within the survey area. Several of these sites have since been destroyed by subsurface investigations and surface salvage under section 90 consents. Where these sites still exist (i.e. the sites that have not been salvaged) they were re-recorded as part of the Umwelt survey of the South Pit Extension area.

Fifteen sites were recorded within the northern section of the South Pit Extension area as part archaeological surveys for the MAN Project. These sites were identified and recorded using a classification system of archaeological terrain units and environmental and cultural contexts. Areas in which artefacts were located were recorded as site loci (spatially discrete units where archaeological evidence was identified usually due to ground surface exposure within an archaeological terrain unit). A total of 24 loci were identified across the 15 sites.

In addition to the previous work completed within the project area, a number of other surveys and assessments have been completed within Mt Arthur Coal's operational area and surrounds. This includes extensive subsurface testing programs in both the Bayswater No. 3 and MAN MLs. These surveys, assessments and testing programs provide extensive information about the Aboriginal heritage values of the Mt Arthur Coal area and allowed preparation of a detailed predictive model of the distribution of Aboriginal sites within the survey area. This model was used in both survey planning and for impact assessment.

5.3.1.3 Survey Methodology and Results

The survey strategy for this project was designed to be consistent with that used for the MAN Project to make the results of both surveys comparable. The project area was traversed on foot by archaeologists accompanied by representatives of the Aboriginal stakeholder groups. Sites were recorded using a comparable system of archaeological terrain units and environmental and cultural contexts, with areas in which artefacts were located recorded as site loci.

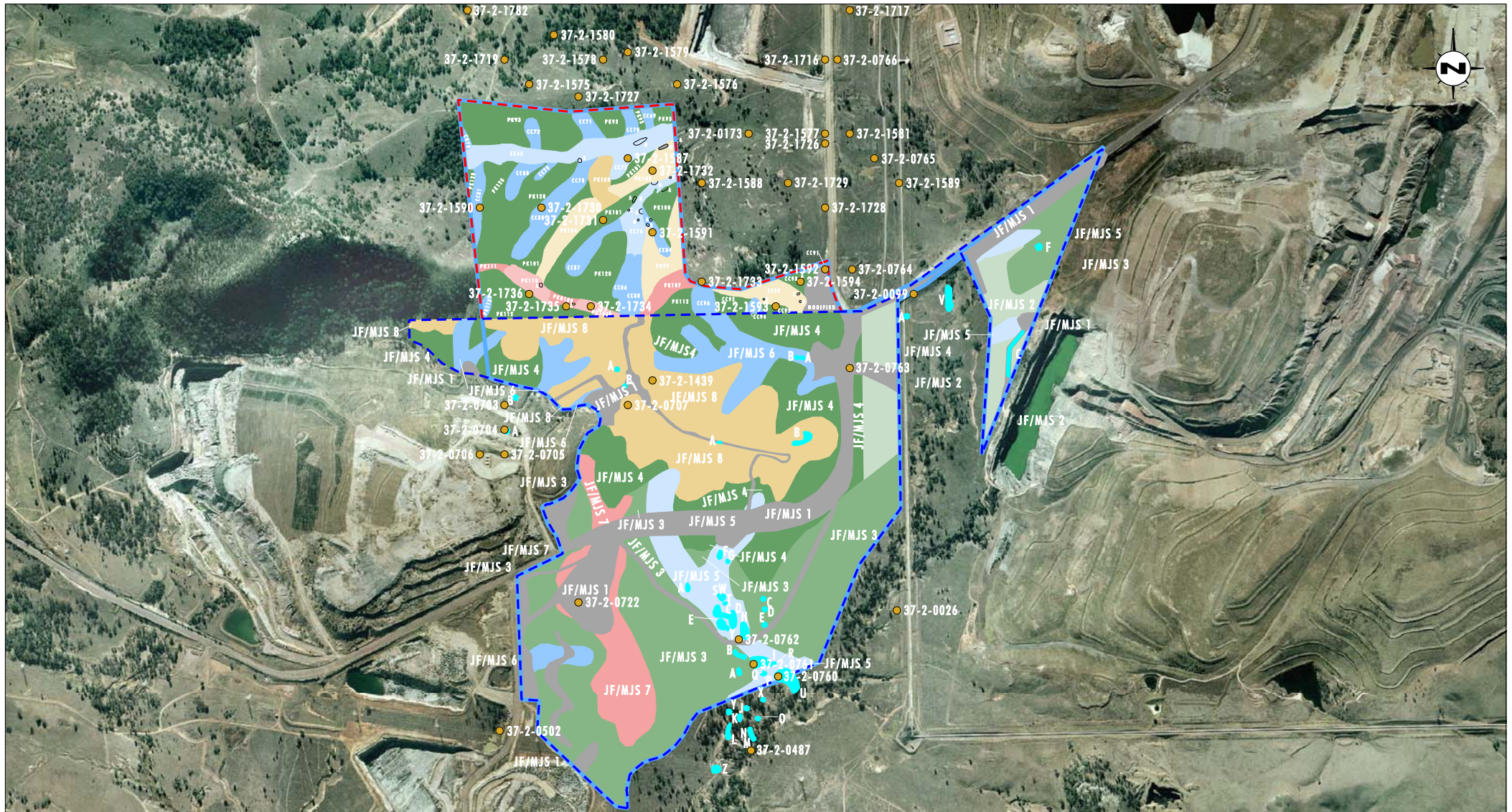
The survey led to the identification of seven new archaeological sites and one previously recorded site which was a continuation of a site recorded as part of the MAN project. A total of 42 site loci were recorded within these eight archaeological terrain units. The sites recorded within the South Pit Extension area from both the project specific survey and the MAN project survey are shown on **Figure 5.3**.

5.3.1.4 Significance Assessment

The assessment of significance of Aboriginal sites has two defined components: cultural significance, which is determined by the Aboriginal community; and archaeological / scientific significance, which is determined by an archaeologist based on the ability of the site to contribute to the scientific understanding of Aboriginal culture prior to European settlement. These two components are not interrelated, with sites potentially having different cultural and scientific values.

Aboriginal Cultural Significance

Aboriginal cultural significance can only be assessed by the relevant Aboriginal community groups. All Aboriginal groups place a high value on their cultural heritage and have communicated this belief either during fieldwork involvement or during the consultation process. During the consultation process each of the registered stakeholders was requested to provide information regarding the cultural significance of the project area, in addition to the values of the objects identified. During the extensive consultation process no information was provided regarding specific cultural heritage values of the project area. The following comments therefore relate to specific comments made in relation to individual sites.



Base Source: LPI NSW, 2000 & Mt Athur Coal
Source: Kuskie 1999

0 0.25 0.5 1km
1:22 000

- Legend**
- | | | |
|---|--|---|
| — Approximate New Disturbance Footprint | Drainage Depression - gentle | Spur Crest - moderate / steep |
| Modified Terrain | Drainage Depression - moderate / steep | Kuskie (1999) Archaeological sites defined by terrain units |
| Simple slope - very gentle | Ridge Crest - gentle | Umwelt (2005) Archaeological Site Boundary defined by terrain units |
| Simple slope - gentle | Ridge Crest - moderate | ● AHIMS Registered Site |
| Simple slope - moderate / steep | Spur Crest - gentle | ● Site Loci |

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FIGURE 5.3

**Archaeological Terrain Units and
Archaeological Site Loci within
South Pit Extension Disturbance Area**

No site specific cultural assessments were contained within the Kuskie (1999) report regarding the MAN project area, however a statement by the Wonnarua Tribal Council included in the assessment indicated that the land within the MAN project area was significant to their people and that they were against the total destruction of the land within the MAN project area. The Wonnarua Tribal Council subsequently agreed to the section 90 consent process based on an offset that included extensive surface and subsurface salvage investigations and the establishment of conservation and management areas as required by the MAN development consent.

Of the sites recorded during the specific survey for the South Pit Extension Project, the Aboriginal stakeholder group representatives only made specific comments regarding one site, JF/MJS5 (Drainage Depression Gentle). This site was assessed as having high Aboriginal cultural significance.

Archaeological/Scientific Significance

The archaeological or scientific significance of Aboriginal sites was assessed according to their potential to contribute to furthering the archaeological / scientific understanding of Aboriginal culture. Two sites from the Kuskie (1999) survey were assessed as being of low archaeological significance at a regional scale, four sites were considered to be of low-moderate significance, and nine sites were assessed as being of moderate archaeological significance. The project specific survey identified one site as having low archaeological significance, six sites of low-moderate significance, and one site of moderate to high archaeological value. Site JF/MJS5 (Drainage Depression Gentle) had the highest archaeological significance (moderate to high) mainly derived from its research potential, rarity, complexity and potential for archaeological deposits. This site was partially within the project disturbance area, with the remainder of the site to be managed *in situ*.

5.3.1.5 Impacts and Management Measures

The project will result in the destruction of the Aboriginal sites within the South Pit Extension disturbance area (refer to 'new disturbance area' on **Figure 5.3**), with identified sites outside this area to be conserved *in situ*. The sites to be disturbed include the 15 sites recorded by Kuskie within the MAN ML portion of the South Pit Extension disturbance area (containing 24 loci) and six sites (containing 30 loci) recorded during the project specific survey of the balance of the South Pit Extension area.

Surface collection of the site loci is proposed due to the Aboriginal cultural heritage significance of the South Pit Extension area and to mitigate the loss of Aboriginal sites as a result of the project. The proposed salvage methodology is discussed in detail in **Appendix 6**. Subsurface salvage is not proposed due to the lack of site integrity and potential archaeological deposit (PAD) within the site loci and the terrain units in general, and in recognition of the comprehensive archaeological investigations undertaken of similar terrain units across Mt Arthur Coal's operational area (including investigations at both Bayswater No. 3 and MAN). Each of the archaeological terrain units present within the South Pit Extension area also are represented within the approximately 400 hectares of MAN Heritage Management Zones, ensuring that a representative sample of these terrain units is being managed *in situ* within Mt Arthur Coal's operational area.

Aboriginal site loci (or parts thereof) identified in the archaeological survey completed for this project and located outside of the disturbance area for the South Pit Extension Project (as defined by the 'new disturbance area' shown on **Figure 5.3** (and as listed in Table 8.1 of **Appendix 6**), will be managed *in situ* and protected by fencing, appropriate signage and notification to relevant site personnel. These loci will be protected and managed under Mt Arthur Coal's Aboriginal Heritage Management Plan which will be revised to incorporate these sites.

5.3.2 Historic Heritage

No historic heritage sites were identified within the project area by a search of relevant databases or during fieldwork. The project will not therefore impact on historic heritage values.

5.4 Water Resource Assessment

5.4.1 Surface Water

5.4.1.1 Existing Catchment and Watercourses

The South Pit Extension mining area is located entirely within the Saddlers Creek catchment. Saddlers Creek is a tributary of the Hunter River, has a length of approximately 24 kilometres and a catchment area of approximately 8720 hectares. The project area is located approximately 21 kilometres upstream of the confluence of Saddlers Creek and the Hunter River.

Saddlers Creek flows in a south-west direction and is a fourth order stream. The catchment area is highly disturbed and consists primarily of agricultural grazing land use, with extensive areas of mining activity occurring in the upper catchment. Land within the Mt Arthur Coal and Anglo Coal MLs form the upper catchment of the creek.

The soil types present in the Saddlers Creek catchment are dominated by the Brays Hill Soil landscape, with the Liddell Soil Landscape present along the main channel of the creek (refer to **Figure 4.3** and **Section 4.2.3**). These soil landscapes are susceptible to sheet and gully erosion and have a low likelihood of mass movement.

Saddlers Creek is an ephemeral creek system with flows only occurring in the creek during storm events or after prolonged periods of heavy rain. Typically the creek system has very low flows, with some pools of permanent or semi-permanent water present, mainly in the downstream reaches. The creek exhibits pH values ranging from 6.9 to 8.7, and electrical conductivities from 760 $\mu\text{S}/\text{cm}$ to 15,500 $\mu\text{S}/\text{cm}$ based on regular water quality monitoring undertaken by Mt Arthur Coal. The creek has significant sections with riparian vegetation and there are significant erosion scarps present along sections of the main creek banks and some of the creek's tributaries. The creek is intercepted by a small dam immediately upstream of Edderton Road. Approximately 2% of the total catchment area of Saddlers Creek lies within the project area.

5.4.1.2 Potential Surface Water Impacts

The key features of the project that have the potential to impact surface water management are summarised below and discussed in further detail in **Section 5.4.1.3**.

In addition to the general landform changes associated with mining and ancillary activities, there will be specific creek and drainage line impacts. These include the direct loss of some sections of the lower order tributaries of Saddlers Creek due to mining impacts and the diversion of some lower order tributaries around the mining area. Further impacts on the upper section of the Saddlers Creek catchment area will result from the construction of haul roads and other internal mine roads and services.

The project also has the potential to influence the water management system and associated water balance for the Mt Arthur Coal complex.

5.4.1.3 Surface Water Management System

Pit Top Water Management

The proposed mining area has a footprint of approximately 195 hectares (refer to **Figure 1.3**). A diversion drain will be constructed to divert clean water from the undisturbed catchment area to the south-west around the mining pit. Several highwall catch dams will also be required. These dams will catch and temporarily store runoff from undisturbed catchment areas that are unable to be directed away from the pit using diversion drains. Water from these dams will either be pumped around the pit or, in rainfall events that exceed their design capacity, will overflow or be pumped into the pit via control structures. These dams are required to safely manage potential surface water flows into the pit.

The proposed conceptual locations of the surface water diversion drain and highwall catch dams are shown on **Figure 5.4**.

Each of the highwall catch dams shown on **Figure 5.4** and specified in **Table 5.1** will be designed to capture runoff from the 100 year Average Recurrence Interval (ARI) 24 hour storm event and will be constructed with a minimum of 1 metre freeboard. Where the design capacity is exceeded these dams will spill into the mining pit and be re-used in the water management system. A series of berms will be placed along the top of the highwall to divert runoff where required into the highwall catch dams. The diversion drain has been designed to convey peak discharges from the critical duration 100 year ARI storm event and will provide a minimum of 1 metre freeboard. The diversion drain will be constructed with 1:3 (vertical:horizontal) side slopes, a base channel 3 metres wide and will be grassed.

Table 5.1 - Dam Design Characteristics

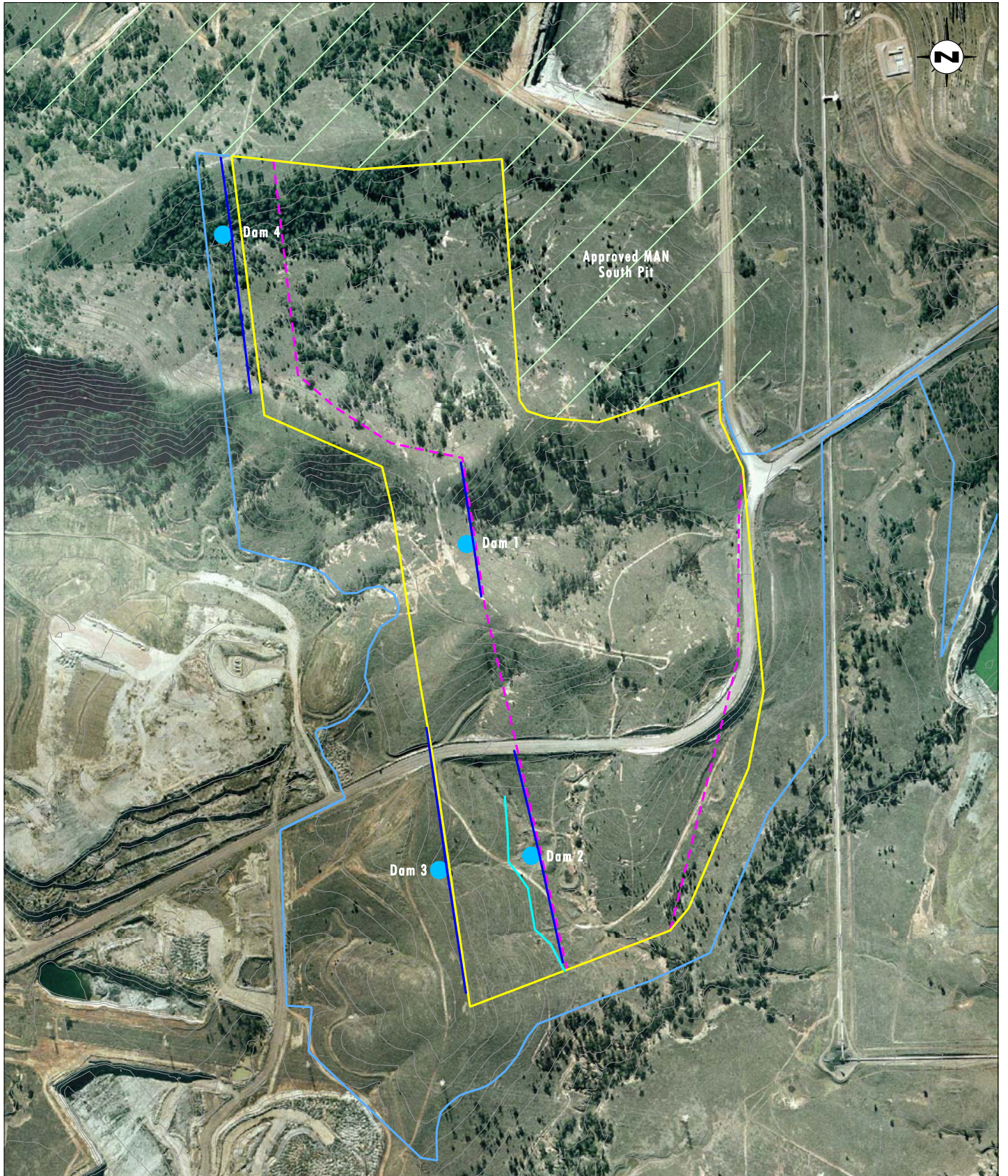
Dam	Catchment Area (ha)	Design Volume (ML)
1	6.2	1.5
2	5.5	1.4
3	9.1	2.3
4	44.5	11

In-Pit Water Management

Water that collects in pit will be managed by a series of diversion / catch drains and will be stored in temporary sumps in the base of the pit. Water will be pumped from these sumps into the central Mt Arthur Coal water management system and be re-used on site for dust suppression and process water.

Overburden Emplacement Area Water Management

The proposed emplacement areas will be located in existing mining areas that are currently internally draining. These areas will remain internally draining until rehabilitation works are complete and the final rehabilitated landform drainage system is installed. Prior to establishing the final rehabilitated landform there will be small areas in the north and south of the emplacement area which will be externally draining. Runoff from these areas will be treated prior to release into downstream catchment areas by establishment of catch drains and sedimentation dams designed in accordance with the criteria contained in the Blue Book (Landcom, 2004) or subsequent revision or alternate guideline recommended at the time by DPI and/or DWE.



Source: Mt Arthur Coal

0 0.25 0.5 0.75 km
1:15 000

Legend

- Approved MAN Mining Area
- Approximate New Disturbance Footprint
- 21 Year Mine Plan
- 10 Year Mine Plan
- Berm
- Diversion Drain
- Dam

File Name (A4): R02_V1/2000_094.dgn

FIGURE 5.4

**Proposed Surface Water
Management Conceptual Layout**

A series of catch drains will be established to convey runoff from the overburden emplacement areas to sedimentation dams. The catch drains will be designed to convey peak discharges from critical duration 1 in 20 year ARI storm events. The sediment dams will be designed in accordance with the Blue Book (Landcom, 2004) or subsequent revision or alternate guideline recommended at the time by DPI and/or DWE to ensure an appropriate treatment standard is achieved. The water from the dams will be re-used on site in the water management system. It is proposed to complete initial revegetation works on all overburden emplacement areas within six months of completion of final shaping and re-topsoiling.

The drainage system will be designed to ensure that all catchments serviced by the catch drains will be small and as a consequence flow durations following critical storm events will be short. All catch drains will be grassed and will be constructed to convey peak discharges during a 1 in 20 year ARI event at less than erosive velocities for the respective materials. All catch drains will be designed to meet the above criteria.

The section of the overburden emplacement area within the Drayton West Pit void will require only minimal drainage works for the majority of the project life, as this area currently drains to the south-western corner of the pit and this area will not be used for emplacement of overburden until approximately Year 15. This area allows use of this portion of the void to store water for operational purposes as desired. Mt Arthur Coal will manage the water level in this void to ensure that sufficient capacity is retained to capture runoff from a 1 in 100 year storm event to ensure that overspilling of the void does not occur. Post approximately Year 15 of the project, Mt Arthur Coal will commence filling of the south-western portion of the void and drainage controls will be established in accordance with the criteria discussed above.

Once final reshaping of the emplacement area is complete, the emplacement areas will become externally draining where practically possible. Whilst rehabilitation work are completed and become established, sedimentation from these shaped areas will be managed through installation of a drainage system in accordance with The Blue Book (Landcom, 2004) or any subsequent revision or alternate guideline recommended at the time by the relevant government authorities, ensuring that water running off the rehabilitated emplacement areas achieves a suitable water quality.

5.4.1.4 Water Balance

Existing Mt Arthur Coal Water Balance

The existing water balance for Mt Arthur Coal (including the MAN and Bayswater mining areas) has been assessed based on information regarding site water demands and sources provided by Mt Arthur Coal and on information about future development of open cut operations based on information contained in the MAN EIS (URS, 2000).

Existing Sinks

Non-potable water demands for Mt Arthur Coal are as follows:

- based on 2005 records, net CHPP water usage of approximately 1500 ML per year to wash 6.75 Mt ROM coal. Predicted future processing water demands are based on a usage rate of 174 L/t ROM which will be achieved, in part, through increased recovery of water from tailings (refer to **Section 3.2.4**);
- materials handling, including stockpile and process dust suppression and plant washdown of 417 ML per year;
- haul road dust suppression – estimated to range from approximately 700 ML per year to 1500 ML per year depending on climatic conditions and use of dust reducing agents as

required in worst-case years. Continued improvements by Mt Arthur Coal in 2006 in the efficiency of sprays on water trucks and road conditions have led to reductions in haul road water consumption; and

- potable water – approximately 60 ML per year.

Mt Arthur Coal also has a licence under the Hunter River Salinity Trading Scheme (HRSTS) to discharge surplus mine water to the Hunter River in approved discharge periods. This discharge point has not been used by Mt Arthur Coal to date.

Existing Sources

Water sources for the existing operations include surface water runoff and infiltration to pits, groundwater contributions and external water supplies.

The water management system captures runoff from the footprint of the mining disturbance area. This area contains the open cut mining pits, overburden emplacement areas, haul roads and infrastructure areas. Based on 2006 aerial survey information, the catchment area of the water management system is approximately 1860 hectares. This will increase to a maximum of approximately 3060 hectares as approved mining operations progress.

Runoff from the current water management system catchment area is expected to range between 1100 ML per year for a dry rainfall year to 4200 ML per year for a wet rainfall year, with runoff volumes to increase as the mine footprint expands.

Groundwater inflows contained in the MAN EIS (URS, 2000) for the MAN and Bayswater mining areas have been used in this calculation of the existing water balance. Predicted groundwater inflows for the approved exploration adit are also included in the existing water balance. Catchment inflows have been calculated by the water model using mine development plans contained in the MAN EIS (URS, 2000) and allowing for both initial and ongoing loss.

The predicted groundwater inflows for the currently approved MAN and Bayswater mining areas are detailed in the MAN EIS (URS, 2000) and shown in **Table 5.2**. Groundwater inflows for 2005 were estimated by Mt Arthur Coal to be in the order of 425 ML.

Table 5.2 – Existing Groundwater Sources for Representative Years

Calendar Year	Groundwater Sources (ML/year)			
	MAN Mining Area	Bayswater Mining Area	Exploration Adit	Total
2007	751	150	113	1014
2009	849	150		999
2014	1094	150		1244
2022	1206	150		1356

Source for MAN and Bayswater mining areas: URS, 2000

Water is also available from off-site sources including:

- treated sewage effluent from Muswellbrook supplied by MSC;
- Drayton Mine; and
- Hunter Regulated River Water Source.

Mt Arthur Coal currently receives treated effluent from MSC for use on site. MSC also supplies a proportion of additional treated effluent to the Muswellbrook Golf Club. The effluent supplied to Mt Arthur Coal is initially treated on site in constructed wetlands and then transferred to the Bayswater Raw Water Dam for use. Approximately 780 ML of effluent was sourced during 2005 and approximately 660 ML during 2006. The available supply from MSC effluent is expected to be on average 750 ML per year, ranging from 600 ML per year to 900 ML per year. The amount available is dependent on meteorological conditions and other water users. Mt Arthur Coal is currently negotiating with Council to seek to extend this supply until at least May 2009.

Mt Arthur Coal has also historically sourced water from the neighbouring Drayton Mine. This water is mine water quality and is suitable for use in dust suppression or in the CHPP. Water sourced from Drayton Mine is stored in the Bayswater Raw Water Dam prior to use on site and has historically been in the order of 500 ML to 600 ML per year. Approximately 615 ML of water was sourced from Drayton Mine during 2005 with less than 50 ML of water sourced during 2006.

Mt Arthur Coal currently holds 15 licences for water extraction from the Hunter River with a combined equivalent allocation of 3107 unit shares of regulated river (general security) access licences and 342 unit shares of regulated river (high security) access licences. These licences are currently being transferred to Water Access Licences (WALs) under the *Water Management Act 2000*.

In addition to the general and high security shares above, Mt Arthur Coal has an allocation of approximately 150 unit shares of supplementary water. Mt Arthur Coal is also currently finalising acquisition of additional WALs totalling 950 general security shares. These licences will provide contingency measures for additional external water supply.

The amount of water that can be extracted from the Hunter Regulated River Water Source using WALs is based on Available Water Determinations (AWD) which are announced at least annually by the NSW Government. At full supply levels, 1 ML of water can be extracted for each WAL unit held. The Water Sharing Plan for the Hunter Regulated River Water Source specifies that the minimum AWD during drought conditions is planned to be set at 75% for high security and 0% for general security.

If the AWDs were set at the minimum levels, Mt Arthur Coal would have an available water allocation of 260 ML per year from the Hunter River as AWDs (for currently held WALs). However, when AWDs are less than 100%, extractions under uncontrolled flow events can occur. If the AWDs for the year are set to a 'minimal' level, i.e. 75% for high security and 0% for general security, up to 25% of high security (making a total of 100%) and 75% of general security of the maximum allocation can be accessed during uncontrolled flow events based on current rules.

An analysis of Hunter River flows has indicated that in the past five years, numerous flow events have occurred that would have met the current criteria for uncontrolled flow events. In periods where the AWDs are set to minimum levels, Mt Arthur Coal's current WALs would allow extraction of up to approximately 2420 ML per year under uncontrolled flow event conditions. The total of controlled and uncontrolled water available under Mt Arthur Coal's

licences in this situation equates to approximately 2680 ML per year. With the additional 950 general security unit shares being purchased, the total water potentially available under Mt Arthur Coal's current licences during these periods, assuming sufficient uncontrolled flow events occur, would be approximately 3400 ML per year.

Current Water Balance

The estimated water balance based on an a dry rainfall year (10th percentile), average rainfall year (50th percentile) and wet rainfall year (90th percentile) for the existing operations taking into account the assumptions and data discussed above, is shown on **Figure 5.5**. The balance does not include external sources (i.e. Hunter River water, treated effluent or water imported from Drayton Mine). The balance assumes the use of bituminous dust suppressants on haul roads during dry rainfall periods. The performance of these dust suppressants have been tested at Mt Arthur during December 2006 and January and February 2007 and found to be effective.

Figure 5.5 indicates that over the approved 21 year life of Mt Arthur Coal the water balance is predicted to range between a water deficit of approximately 2210 ML per year in 2009 during a dry rainfall year to a water surplus of approximately 1140 ML per year in 2022 with a wet rainfall year.

Mt Arthur Coal has extensive on site water storage capacity, totalling more than 3500 ML, which will be used during periods of higher rainfall to store water for use during dry periods. This potential storage capacity includes use of mining voids as required, in addition to existing dams. Stored water may be sourced from runoff capture within the mine water management system or from external supplies such as treated effluent and water from other industrial operations (e.g. neighbouring Drayton Mine). Careful management of on site water storage and maximisation of water efficiency will assist with management of water deficits in dry years. Mt Arthur Coal has been able to demonstrate this ability to manage water during extended dry periods such as the current year when Government restrictions have been as low as 8% for general security allocations.

The predicted water deficit for the currently approved operations can be met by utilising on site stored water and supplementing this with external water from MSC effluent, Drayton Mine (and other industrial water sources where available) and, where required, utilising Mt Arthur Coal's existing water licences for the Hunter Regulated River Water Source.

Mt Arthur Coal's extensive on site water storage capacity will be used as a priority over any discharge opportunities that arise under the HRSTS. The latter years of the existing operations water balance also assumes ongoing capture of water from the majority of rehabilitated overburden emplacement areas. Once rehabilitated areas in the MAN and Bayswater No. 3 mining areas are established and have appropriate drainage controls in place, treated runoff from these areas could be released to the surrounding natural drainage systems reducing the catchment of the mine water management system and the potential water surplus predicted in these years.

Predicted Mt Arthur Coal Water Balance with South Pit Extension

The proposed South Pit Extension will be integrated into the existing Mt Arthur Coal complex water management system. The project will result in an increase in catchment area of up to approximately 500 hectares of the water management system. This additional catchment area is made up of the mining footprint and its upslope catchment areas and the proposed overburden emplacement area in Drayton's West Pit.

The South Pit Extension is expected to produce only minor groundwater inflows of up to 47.5 ML per year over the life of the project. This compares to predicted inflows in the MAN

Existing Mt Arthur Coal Predicted Water Balance (No External Supplies or Discharges)

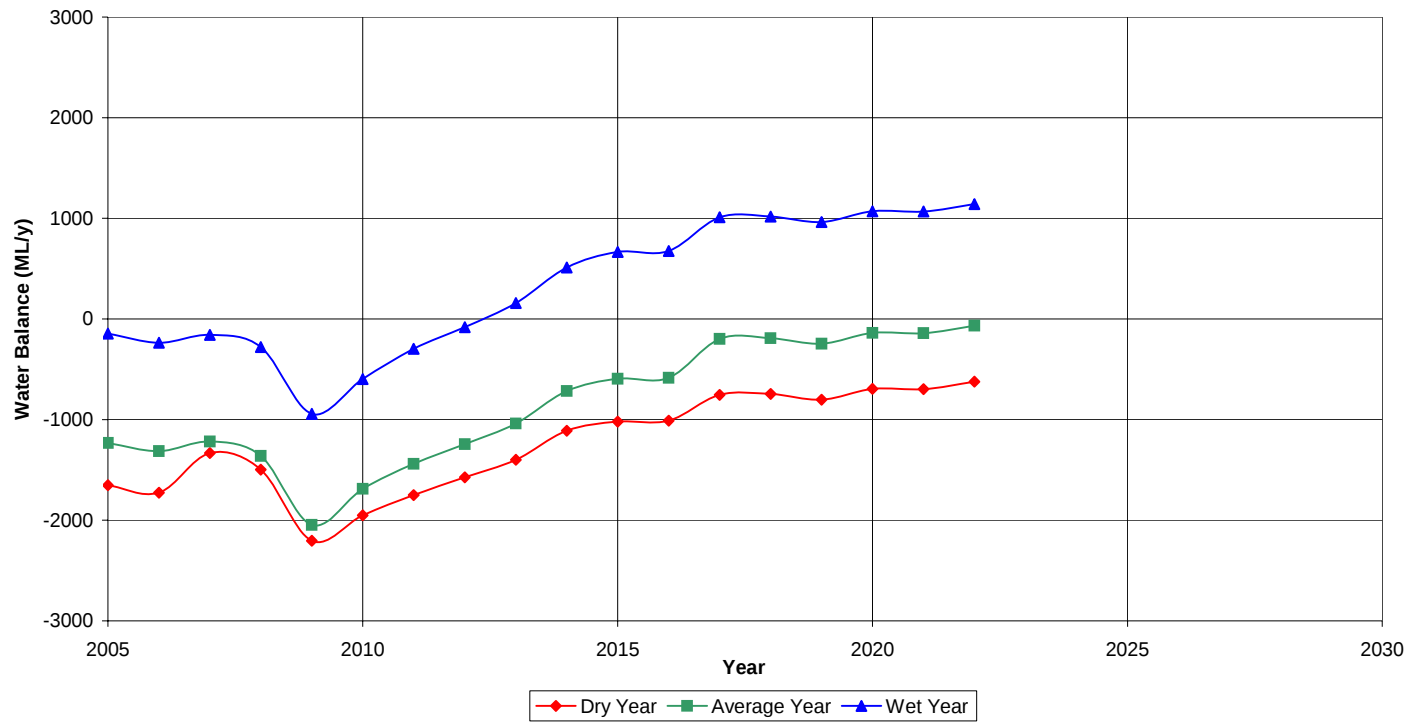


FIGURE 5.5

Existing Mt Arthur Coal
Water Balance

EIS (URS, 2000) and approved exploration adit for the 2007 mining operations of approximately 1014 ML per year to approximately 1360 ML per year during 2022. The project is therefore expected to result in only a minor increase in total groundwater inflows of approximately 3.9%.

The project will also result in a small section of additional haul road, including additional in pit haul roads. However, this is not expected to result in significant changes to dust suppression requirements as equipment operating in the South Pit Extension area would otherwise have been operating in currently approved mining areas. Therefore, the total volume of water required for dust suppression is expected to remain similar to the currently predicted requirements for the combined Mt Arthur Coal operations.

The project will not influence the water requirements for the CHPP as total approved production levels will not be increased as a result of this project.

The water balance detailed above for the currently approved Mt Arthur Coal operations was remodelled to include the proposed South Pit Extension.

The estimated water balance based on an a dry rainfall year (10th percentile), average rainfall year (50th percentile) and wet rainfall year (90th percentile) for Mt Arthur Coal's future operations including the proposed South Pit Extension taking into account the assumptions and data discussed above, is shown on **Figure 5.6**. The balance does not include external sources (i.e. Hunter River water, treated effluent or water imported from Drayton Mine).

In summary, the project is predicted to result in an increase of available water for the Mt Arthur Coal water management system due to an increase in the mining footprint without changing water demands. This increase is estimated to range from 450 ML for a dry rainfall year to 865 ML during a wet rainfall year.

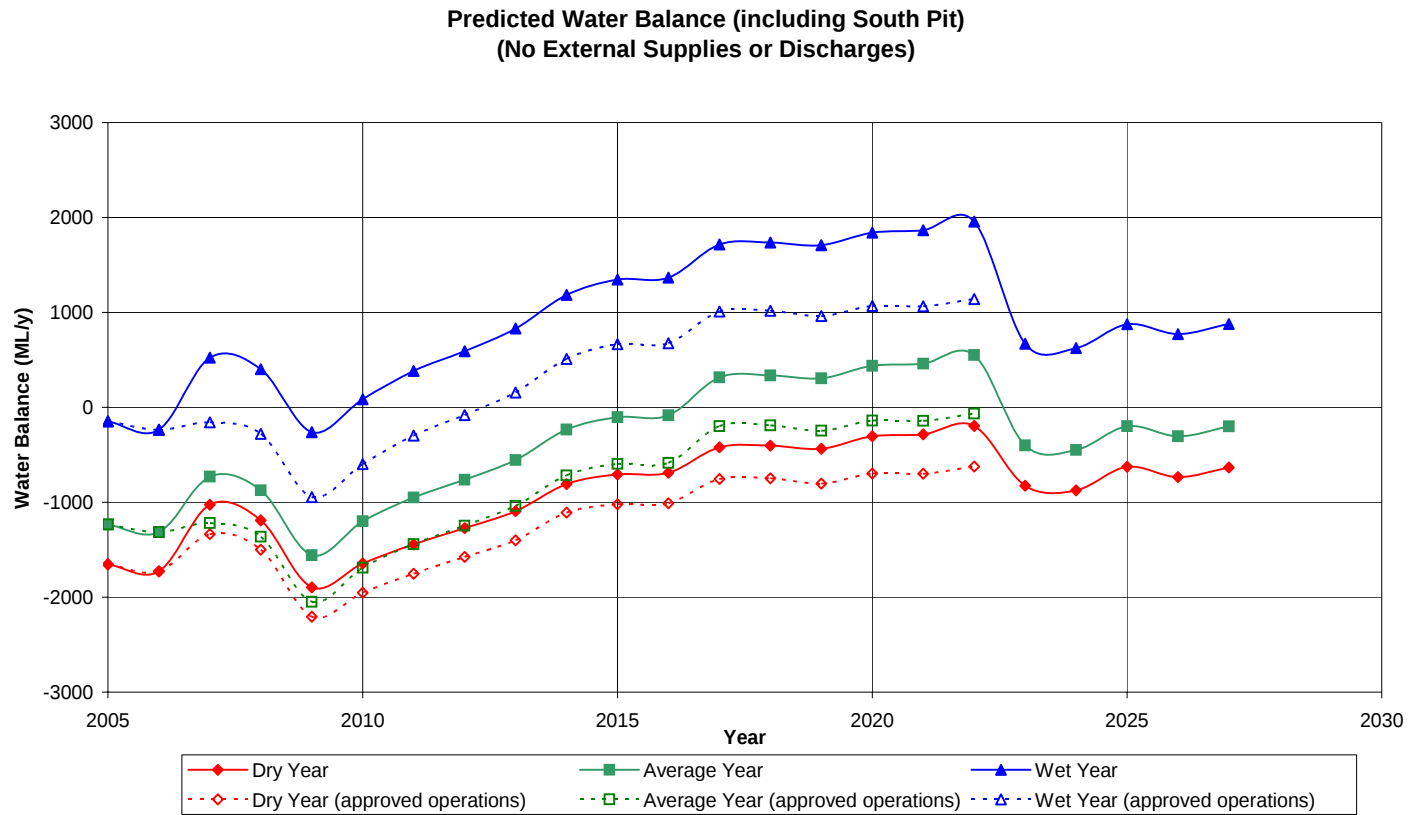
Potential Impacts on External Water Sourcing and Discharges from Site

Mt Arthur Coal currently brings external water to site from various sources to meet water demands and it is expected that these external sources will be required on an ongoing basis. However, the additional supply volumes resulting from the proposed extension will assist in reducing the reliance on external supplies.

As shown on **Figure 5.6**, the revised water balance including the South Pit Extension Project is estimated to range from a water deficit of approximately 1890 ML per year in 2009 for a dry rainfall year to a water surplus of approximately 1960 ML per year in 2022 for a wet rainfall year. In the latter years of the project, areas of completed rehabilitation could be made externally draining therefore reducing the overall catchment of the water management system and reducing the currently predicted water surplus.

Mt Arthur Coal will continue to utilise existing on site sources, including runoff within the mine water management system, groundwater inflows and water stored on site in preference to imported water. Mt Arthur Coal will utilise MSC effluent and Drayton Mine water in preference to sourcing water from the Hunter Regulated River Water Source (under currently held licences).

As the project itself is not expected to result in increased water demand, it is considered that the management of on site storage and existing external water supplies will continue to meet Mt Arthur Coal's needs. The maximum predicted water deficit (based on a 10th percentile dry rainfall year) of 1890 ML per year is considered to be able to be met by using a combination of onsite water storage, MSC effluent, possible water from Drayton Mine or other industrial water sources currently being investigated by Mt Arthur Coal and, as required, existing Hunter River licences. The use of external water sources required to meet this deficit would



Note: Dust Suppressants used on Haul Roads during Dry rainfall

FIGURE 5.6
**Predicted Mt Arthur Coal Water
Balance with South Pit Extension**

depend on a range of factors, but could include 750 ML to 900 ML of MSC effluent, minimal water from Drayton Mine (as this deficit would only occur in dry periods) and potentially water from other industrial sources (accurate predictions are unable to be made). The remaining deficit, up to 1140 ML per year, would be made up from on site storage and use of WALs for the Hunter Regulated River Water Source.

Should any discharges of water from the site be required, this requirement will be met by using Mt Arthur Coal's credits under the HRSTS. No changes to the frequency of external discharge requirements are predicted as a result of this project.

5.4.1.5 Water Quality Assessment

Surface water quality on site is monitored on a monthly basis and is on average slightly alkaline (average pH = 8.7) with pH ranging from 7.6 to 10.0. The electrical conductivity of water on site averages approximately 3300 $\mu\text{S/cm}$ and ranges from 290 $\mu\text{S/cm}$ to 5300 $\mu\text{S/cm}$. It is considered that this water quality is representative of the overall water quality within the pit water management system as these values have been taken from the two dams that form the central storage and transfer dams for the site.

Water quality monitoring data indicates that for the surrounding catchment areas the water quality is similar to that measured on site. On average pH is 8.3 (ranging from 7.3 to 9.5) and electrical conductivity of 2930 $\mu\text{S/cm}$ (ranging from 545 $\mu\text{S/cm}$ to 5000 $\mu\text{S/cm}$).

It is predicted that the groundwater inflows into the proposed mining area will be generally alkaline with a pH of about 8 and have high electrical conductivity of 7000 $\mu\text{S/cm}$ to 9000 $\mu\text{S/cm}$ (refer to **Section 5.4.2**). This is consistent with quality of groundwater inflows into the existing mining areas. The predicted inflow volumes are very small compared to the predicted total supply from total pit inflow (i.e. < 3%) and are not considered likely to significantly affect total site water quality.

As the predicted additional inflows to the site are small relative to the existing inflows and water demands and the quality of predicted inflows are consistent with the existing site water quality, the project is expected to have a negligible impact on existing site water quality.

Salinity Budget

The currently approved Mt Arthur Coal complex is predicted to potentially require discharges of mine water from the site during wet rainfall years near the end of the life of the project. Discharges are only likely to be required if consecutive wet years occurred and when available storage volumes are low. Any discharges required would be in accordance with the HRSTS. The South Pit Extension Project is not expected to change the frequency of external discharge required for Mt Arthur Coal's operations and will not affect site water quality.

The project is not predicted to result in any changes to water quality in Saddlers Creek or its tributaries as all pit water will be retained within the mine water management system and runoff from overburden emplacement areas will be treated to remove sediment. The quality of this runoff is predicted to be of similar quality to existing surface water flows from the undisturbed catchment. There is also predicted to be a reduction in the discharge of poor quality water from the Permian aquifers to the upper section of Saddlers Creek (refer to **Section 5.4.2.3**) which may result in a slight improvement in water quality in Saddlers Creek.

5.4.1.6 Flooding

As a part of the water management assessment for the project, the extent of flooding in Saddlers Creek in the vicinity of the project area was determined to investigate the potential

impacts of flooding in Saddlers Creek on the project. The method and results of the flooding investigation are provided in **Appendix 7**.

As shown in **Figure 5.7**, the extent of flooding predicted for the 1 in 100 year ARI nine hour duration storm event is approximately 25 to 30 metres on either side of the centre line of Saddlers Creek in the vicinity of the project area. The model also indicates that flooding in the tributary of Saddlers Creek running through the South Pit Extension area is a result of runoff from the local catchment rather than backwater effects from the main arm of Saddlers Creek. Therefore, once the catchment area for the tributary of Saddlers Creek is removed as a consequence of the pit extension, modelling indicates that the proposed mining pit will not to be flooded by storm events up to and including the 1 in 100 year ARI storm event. As also indicated on **Figure 5.7**, the predicted 1 in 100 year ARI flood extent for the main arm of Saddlers Creek is unlikely to affect the proposed service corridor, with maximum flood levels being approximately two metres lower than the ground surface elevation at the edge of the service corridor. It should be noted that a small section of the tributary of Saddlers Creek will cross through the service corridor for the project. Consequently, culverts will need to be installed underneath haul roads that cross this tributary.

5.4.1.7 Annual Flow Volumes

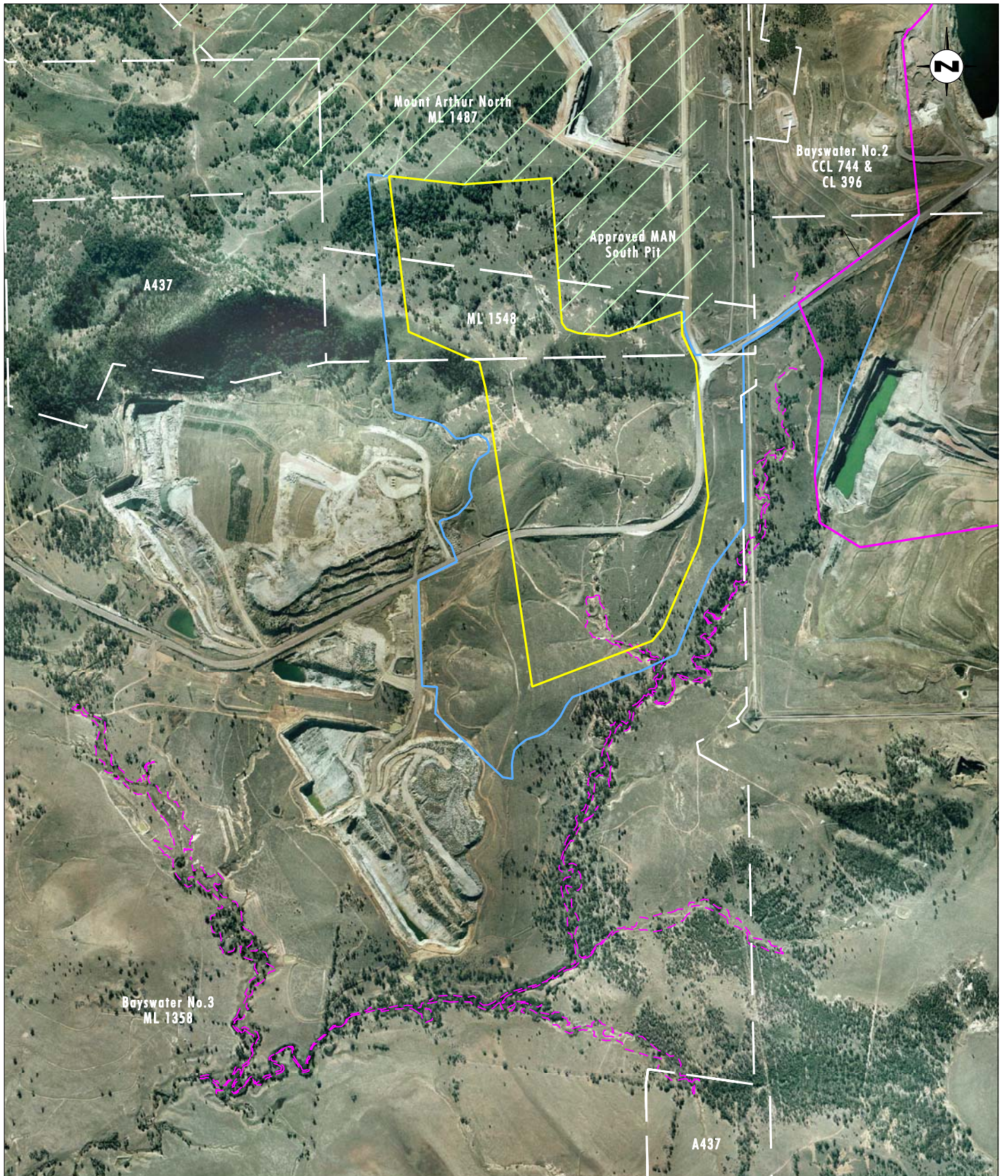
The South Pit Extension mining area, at its full extent, will remove approximately 195 hectares from the catchment area of Saddlers Creek (refer to **Figure 5.4**). Runoff from this section of the catchment will be captured in the mine water management system. The total catchment area of Saddlers Creek (excluding the areas currently captured by the Mt Arthur Coal and Drayton water management system) is approximately 8740 hectares. The 195 hectares that will become part of the mine water management system equates to approximately 2% of the current catchment area of Saddlers Creek. As such, it is considered that annual runoff into Saddlers Creek will be reduced by approximately 2% due to the proposed South Pit Extension.

5.4.1.8 Sediment and Erosion Controls

The project will result in ongoing disturbance and handling of soils and overburden material within the project area. Controls measures will be implemented to mitigate the erosion and sediment export potential from disturbed areas. These controls will be designed and constructed to a standard consistent with *Managing Urban Stormwater: Soils and Construction* (Landcom, 2004) (the Blue Book) and Guidelines for Establishing Drainage Lines on Rehabilitated Minesites (Draft) (DLWC, 1999) or subsequent revisions.

Water quality and sediment and erosion control measures to be implemented as part of the project to minimise impacts on the surrounding environment will include:

- clearly identifying and delineating areas required to be disturbed and ensuring that disturbance is limited to those areas, clearing as little vegetation as required and minimising machinery disturbance outside of these areas;
- limiting the number of tracks established;
- construction of sediment dams to capture and treat runoff from disturbed catchment areas that do not flow into the mining pit. These dams will be designed to treat water to a standard such that any overflows do not exceed 50 mg/L for rainfall events within the dam design capacity (design capacity as per The Blue Book or subsequent revisions);
- construction of drains upslope of areas to be disturbed to convey clean runoff away from most disturbed areas;



Source: Mt Arthur Coal

0 0.5 1 1.25 km
1:25 000

Legend

- Mining and Exploration Lease Boundary
- Approved MAN Mining Area
- South Pit Extension Mining Area
- Additional Overburden Emplacement Area
- Approximate New Disturbance Footprint
- Flood Extent

FIGURE 5.7

Existing 1 in 100 Year Flood Extent

- constructing road and earthworks cut and fill batters (excluding the mining pit and emplacement areas) at slopes of 1V:3H or less, where possible, to maximise long term stability;
- reshaping, topsoiling and vegetating road and cut and fill batters as soon as practical;
- progressively stripping and stockpiling topsoil for later use in rehabilitation (direct placement of freshly stripped topsoil will be undertaken where possible);
- regular maintenance of all erosion control works and rehabilitated areas;
- regular inspections of haul roads to ensure that drainage is working effectively and that the haul roads are stable, particularly after rain;
- prompt revegetation of areas as soon as earthworks are complete; and
- appropriate controls for potential hydrocarbon spill for externally draining sediment and erosion control dams constructed for management of runoff from the haul road near Saddlers Creek.

5.4.1.9 Surface Water Monitoring

Mt Arthur Coal currently has an extensive environmental monitoring program in place, including surface water monitoring both within the mine water management system and in the surrounding environment. The existing monitoring program components that relate to surface water management include:

- meteorological monitoring at three locations surrounding Mt Arthur Coal's operations;
- surface water monitoring (both within the mining area for environmental management purposes and in surrounding natural drainage lines); and
- monitoring of Hunter River water pumping and any discharges under the HRSTS.

The current surface water monitoring system provides coverage of Mt Arthur Coal's operational area and surrounds and as the South Pit Extension area is located centrally within existing mining areas, the existing monitoring locations will appropriately monitor impacts associated with the project.

In addition to the above monitoring program, inspections will be undertaken of all sediment erosion and control works on a routine basis and after major storm events to ensure that they are in a functional condition and operating effectively.

An overview of surface water monitoring results will be reported in the Mt Arthur Coal AEMR and distributed to relevant government agencies. Monitoring results will be used to review the effectiveness of the water management system on an ongoing basis. Water usage, on-site water make and external water sourcing will also be monitored and reported in the AEMR.

5.4.1.10 Surface Water Contingency Strategy

An annual analysis of surface water monitoring data will be undertaken and will include time series analysis to identify any trends or changes in surface water quality. Should any negative trends in water quality be identified, an investigation will be implemented to determine if the trend is a result of Mt Arthur Coal's operations. Where required,

management strategies will be implemented to address the identified issues. The monitoring results and trend analysis will be reported to DWE and DoP as part of the AEMR.

Surface water management structures will be designed in accordance with the Blue Book (Landcom, 2004) and Guidelines for Establishing Drainage Lines on Rehabilitated Minesites (Draft) (DLWC, 1999) or subsequent revisions. Ongoing inspections will be undertaken of water management structures to ensure that they are operating effectively and have sufficient capacity to meet water management objectives. Should any deficiencies in the water management system be identified through these inspections, rectification works will be undertaken to resolve identified issues.

The Mt Arthur Coal complex will continue to range from being a net water user to being a net water maker over the project life depending on climatic conditions. As a consequence, there is considerable flexibility in managing the volume of water that is stored on site and that is imported to the site. There is also reasonable flexibility in where water to supply the needs of mining operation is sourced providing a wide range of contingency measures that can be implemented. These include varying the rate that water is drawn from external supplies, seeking new sources of industrial water or recycled effluent and, if necessary, purchasing additional water access licences.

In addition, Mt Arthur Coal acknowledges that sustained periods of water deficit may require modifications to mining operations to reduce water demands on site during these periods. These modifications may include:

- reduction of haul road lengths and widths;
- reduction of storage dam surface areas; and
- ultimately, changes to production levels.

However, the water balance assessment shows that based on historic climatic conditions sufficient water will be available to meet production and environmental management needs.

5.4.2 Groundwater

A comprehensive assessment of potential groundwater impacts associated with the South Pit Extension Project has been undertaken by Australasian Groundwater and Environmental Consultants. The full assessment report is included in **Appendix 8**, with a summary of key findings provided in this section.

5.4.2.1 Existing Groundwater Environment

Three key aquifer systems exist in the local groundwater environment in the general area surrounding the project area. These are:

- alluvium/colluvium along the Hunter River, Saddlers Creek and minor drainage lines;
- weathered bedrock near the ground surface; and
- Permian aquifers (Wittingham Coal Measures).

The following sections describe the characteristics of these three key aquifer systems.

Alluvial Aquifer

Creek valleys and gullies in the project area and surrounds contain deposits of unconsolidated silts, sand and minor fine gravels of mixed colluvial-alluvial origin. These deposits are quite thin and of limited aerial extent and do not have significant groundwater storage capacity. In contrast, the alluvial deposits of the Hunter River approximately 7 kilometres to the north of the project area are a significant source of groundwater.

Field investigations have identified that the upper part of the Saddlers Creek valley near the project area is filled with less permeable unconsolidated silts, forming a colluvial rather than alluvial aquifer.

Shallow Bedrock Aquifer

The shallow bedrock aquifer comprises of surficial soils and weathered bedrock. The depth of the aquifer is variable and depends on the depth of weathering and the extent and frequency of permeable fracture systems. The shallow bedrock aquifer is likely to consist of perched aquifers at the interface between the soil and bedrock, and zones of higher permeability due to the weathering of bedrock.

Permian Aquifers

Permian deposits occur across the whole of the project area and consist of two hydrogeological units:

- hydrogeologically 'tight' and hence very low yielding to essentially dry sandstone and lesser siltstone that comprise the majority of the Permian interburden/overburden; and
- low to moderately permeable coal seams which are the main water bearing strata within the Permian sequence.

Pumping tests from individual bores within the coal seams have recorded yields in the range of 1.0 L/s to 3.3 L/s.

Recharge and Groundwater Flow

The groundwater surface in the project area and surrounds is a reflection of surface topography, with a groundwater mound beneath the topographically elevated areas of Mt Arthur, Mt Ogilvie and the major ridgeline connecting these two areas. The hydraulic gradient falls towards the Hunter River valley to the north of the project area and Saddlers Creek to the south.

Groundwater recharge is by rainfall infiltration and groundwater flow is towards the lower lying areas where discharge occurs into the alluvial valleys and creeks/rivers.

Groundwater Quality

Groundwater in the Permian aquifers is of poor quality and is typical of coal seam water quality. Monitoring boreholes indicate that total dissolved solids in the coal seams range from 1750 mg/L to 7760 mg/L. pH is generally alkaline at about 8.

Groundwater Users

There are no groundwater users within the vicinity of the South Pit Extension area with all groundwater bores in the vicinity on mine owned land. Private bores exist to the west of the

project area and to the north-west in the Hunter River alluvial zone, well outside the predicted zone of depressurisation from this project.

5.4.2.2 Existing Mining Impact on Groundwater Regime

A review of the existing groundwater environment has shown that so far, mining in the MAN area has not had any significant impact on the groundwater regime as the majority of the mining operations are still above the groundwater table. No significant groundwater inflows to the mine have been recorded to date.

In the Bayswater No. 3 mining area, only Saddlers Pit which is located just north of Saddlers Creek is expected to have influenced the groundwater levels in the Saddlers Creek colluvium/alluvium. Until recently, this pit had been inactive for approximately three years and the groundwater levels around the pit had partially recovered.

5.4.2.3 Groundwater Impact Assessment

A detailed groundwater model was developed for the South Pit Extension Project to determine the potential impact of the project on the local groundwater regime. The model included all currently approved operations in the MAN mining area, plus proposed operations in the South Pit Extension area. The key findings relating to the potential impact of the South Pit Extension area on the groundwater regime area included below.

Mine Water Make

The groundwater model identified that during the first years of operation in the South Pit Extension area when mining operations are near the surface, no significant groundwater inflow into the pit will occur. Groundwater inflows are expected to commence around Year nine of mining, rising steadily with the advancing mine. In Year 15 of mining in the South Pit Extension area, shortly before the completion of the currently approved life of the MAN mining area, groundwater inflows in the extension area are predicted to reach a maximum rate of approximately 0.3 ML/day. This flow rate is expected to remain constant through to Year 21.

Impacts on Water Table

The impact of mining in the South Pit Extension area on the local groundwater table will be largely insignificant for the majority of the project life due to the existing impact associated with the approved MAN operations. Only towards the end of the South Pit Extension Project are some impacts attributable to the project, with the key impact period occurring following the completion of the existing approved life of MAN (noting that Mt Arthur Coal intends to seek approval to continue the MAN operation beyond the currently approved 21 year period based on currently available information).

The South Pit Extension Project is not predicted to have an impact on the local groundwater table until around Year 10 of mining operations. The impact at this time will, however, be minor in comparison with the cone of depressurisation around the approved MAN mining area.

By Year 21 of mining within the project area, drawdown within the pit is predicted to vary between 80 metres and 100 metres. The cone of depression around the South Pit Extension is expected to merge with the cone of depression around MAN.

Following the completion of mining, the rate of recovery of the final void water levels will depend on the amount of groundwater inflow, surface water runoff into the void, inflow from

spoil seepage and precipitation as well as the amount of evaporation from the lake surface. Final void recovery is discussed further in **Section 5.10**.

There are no adverse groundwater impacts predicted to result from overburden emplacement in former mining areas at Bayswater No. 2 and Drayton's West Pit, with emplacement in these voids likely to result in some localised re-establishment of groundwater levels.

Impact on Saddlers Creek

The South Pit Extension Project will not have a significant additional impact on the Saddlers Creek colluvium/alluvium beyond that from the existing approved MAN and Bayswater No. 3 operations. Mining in this area will, however, reduce the rate of groundwater discharge from the Permian aquifers to the colluvial/alluvial aquifer of Saddlers Creek.

The early years of the project will not result in any impact on Saddlers Creek. By Year 10 of mining operations, the simulated groundwater drawdown along the northern part of Saddlers Creek near the project area exceeds five metres. This extent of drawdown is likely to limit the hydraulic contact between the Saddlers Creek colluvial aquifer and underlying poorer quality Permian aquifer. As discussed above, the majority of the impact at stage of the project is attributable to the approved MAN mining area as opposed to the South Pit Extension area.

By Year 21 of mining there is predicted to be no groundwater discharge from the underlying Permian aquifer to the Saddlers Creek colluvium along the creek beds to the east and south of the South Pit Extension area. This will result in hydraulic separation of the colluvial aquifer from the underlying Permian aquifer. The Saddlers Creek colluvium will, however, continue to receive recharge from rainfall as well as from surface runoff and near-surface runoff from the weathered bedrock aquifer and it is expected that a perched water table may develop in the colluvial aquifer in the affected area of Saddlers Creek, ensuring ongoing groundwater flow in the colluvial zone.

Impact on Regional Groundwater and the Hunter River

The South Pit Extension itself has no regional impact on the groundwater regime, with any potential impacts associated with the project masked by the impacts of the existing approved operation. Consequently, due to the distance between the South Pit Extension area and the Hunter River alluvium, the project will not impact on the Hunter River alluvial aquifer.

Impact on Groundwater Users

The South Pit Extension area is located centrally within existing mining areas and is distant from any privately owned groundwater bores. The project is not predicted to impact on any private groundwater bores.

Water Quality Impacts

Groundwater discharge to the mining pit will be from the coal seams and as such will be of poor quality. This water will be incorporated into the Mt Arthur Coal mine water management system and will be used onsite for dust suppression and other mining uses.

In the latter years of the project when the discharge of poor quality Permian aquifer water to Saddlers Creek ceases, the northern section of Saddlers Creek is expected to experience an improvement in water quality.

5.4.2.4 Groundwater Contingency Strategy

An annual analysis of groundwater monitoring data will be undertaken and will include a comparison to modelled groundwater impact predictions. The monitoring results and comparison findings will be reported to DWE and DoP as part of the AEMR.

Mt Arthur Coal will explore the potential to establish a groundwater / base flow monitoring system for Saddlers Creek in consultation with DWE to identify any impact the project may have on base flows in Saddlers Creek. Where a suitable approach can be identified, a base flow measurement program will be implemented with results reported to DWE.

5.5 Noise and Blasting

A comprehensive noise and blasting assessment was completed for the project by Wilkinson Murray Pty Limited. A summary of the key findings of the assessment is included below, with the full assessment report included in **Appendix 9**.

5.5.1 Noise Assessment

The noise impact assessment provides details of the operational noise criteria, predicted noise levels resulting from the project, an assessment of these noise levels against the relevant criteria and an assessment of cumulative noise impacts. The noise assessment was completed in accordance with the NSW Industrial Noise Policy (INP) (EPA 2000).

5.5.1.1 Existing Acoustic Environment

Mt Arthur Coal has an extensive noise monitoring system in place, including real-time directional noise monitoring and periodic noise monitoring undertaken on a quarterly basis. The status of compliance with noise limits is reported externally to the community and relevant government agencies as part of the Mt Arthur Coal AEMR, with the most recent AEMR completed for 2005 (Mt Arthur Coal, 2006).

This monitoring has confirmed that the existing acoustic environment that surrounds the MAN and Bayswater No. 3 mining areas is affected by a range of mining and non-mining activities. These include mine truck haulage, overburden handling and dumping, mine dozer activities, coal handling and rail transport, public road traffic, construction noises, agricultural activities and birds, crickets and other natural sources.

In 2005, periodic noise monitoring found that noise from the operation was below the relevant noise limits at all locations. This was an improvement from the previous year when two noise limit exceedances were recorded (Mt Arthur Coal, 2006). Mt Arthur Coal manages exceedances in accordance with MAN Noise Management Plan requirements to minimise the potential for recurrences.

The directional noise monitoring system results from 2005 also identified that Mt Arthur Coal is complying with relevant maximum noise limits, however, some monitored levels were recorded above noise limits during night-time periods on some days. Response measures were taken following each event that minimised the potential for recurrences consistent with the MAN Noise Management Plan. Mt Arthur Coal's noise limits (as contained in the MAN development consent) are set on a 10% exceedance basis and these periodic elevated noise levels did not therefore result in exceedances of the MAN development consent acquisition criteria. The recorded number of days in which monitored levels exceeded limits was reduced from 2004, indicating an overall reduction in impacts from continued focus and efforts to reduce off-site noise levels.

5.5.1.2 Operational Noise Criteria

An ambient noise survey was carried out during the preparation of the MAN EIS during 1999 at residential locations surrounding the Mt Arthur Coal operations. An assessed Rating Background Level (RBL) or background noise value was determined for each location in consultation with DECC (then Environment Protection Authority). It is considered appropriate to use these assessed background noise levels when setting criteria for the South Pit Extension Project, as any new ambient noise measurement data would be likely to be affected by mining noise from approved Mt Arthur Coal operations.

The assessed background noise levels are presented in **Table 5.3** and have been used to determine the noise assessment criteria for the project in accordance with the NSW INP. The criteria relate to both noise from the project alone (intrusive criteria) and cumulative noise from all industrial sources (amenity criteria). The calculated intrusive and amenity noise goals for the project are also detailed in **Table 5.3** for daytime (7.00 am-6.00 pm), evening (6.00 pm-10.00 pm) and night time (10.00 pm-7.00 am) periods.

Table 5.3 – Noise Criteria

Residential Location	Assessed RBL (Day/Evening/Night)	Intrusive Criteria (Day/Evening/Night) LAeq,15min	Amenity Criteria (Day/Evening/Night) LAeq,period
Antiene Estate	32 / 35 / 33	37 / 40 / 38 dBA	50 / 45 / 40 dBA
Skellator Stock Route Thomas Mitchell Drive Denman Road	34 / 33 / 32	39 / 38 / 37 dBA	50 / 45 / 40 dBA
Racecourse Road	32 / 31 / 30	37 / 36 / 35 dBA	50 / 45 / 40 dBA
Denman Road West Roxburgh Vineyard and Roxburgh Road	32 / 31 / 30	37 / 36 / 35 dBA	50 / 45 / 40 dBA
South Muswellbrook (including the South Muswellbrook Development Area	30 / 30 / 30	35 / 35 / 35 dBA	50 / 45 / 40 dBA

These criteria also correspond to the intrusive and amenity noise goals in the MAN development consent conditions. Consistent with the approach adopted by DoP for other recent mining projects, it is assumed that any acquisition criteria adopted for the South Pit Extension Project would be 5 dBA above the values shown in **Table 5.3**. This would result in acquisition criteria consistent with the acquisition goals in the MAN development consent conditions.

The noise assessment for this project has assessed noise impacts against the noise criteria determined in accordance with the INP and outlined in **Table 5.3**. Based on the assessment of noise criteria relevant to the project, the Project Specific Noise Levels (PSNLs) that the noise from the project is to be assessed against are the intrusive criteria as these are the most stringent criteria. In addition to assessment of the noise impacts from the project alone, an assessment has also been completed of the combined noise impacts of the project and the approved MAN operations. For this assessment, the total noise impact has been compared to the intrusiveness criteria outlined in **Table 5.3** and also against the assumed noise acquisition criteria for the project (which are consistent with the acquisition criteria for the approved MAN operations).

5.5.1.3 Operational Noise Impact Assessment

Calibration of Noise Model

Noise levels surrounding the MAN mining area have been continuously monitored by four permanent BarnOwl directional noise monitoring units since mining operations began at MAN in 2002. Mt Arthur Coal also produces annual predictions of noise levels arising from the MAN operation to assist in minimising noise impacts as part of annual mine planning (typically focussing on worst case winter periods). These predictions are subsequently compared with actual noise level measurements taken by the BarnOwl monitors. These comparisons have shown that the noise models developed for the MAN operation are over-predicting noise impacts associated with the operation, particularly under the worst case scenarios that involve complex temperature inversion conditions. For example, the comparison of predicted and measured noise levels for July 2005 (worst case winter period for 2005) showed that predicted levels under worst case weather conditions were up to 9 dBA above measured noise levels.

Given this trend of noise models over predicting noise impacts for the MAN operation, it was considered appropriate to undertake a model calibration exercise. The calibration exercise found that temperature inversion values used in modelling were causing the over predictions, with modelling of a range of different temperature inversion strengths identifying that a temperature inversion strength of 4 °C per 100 metres when modelling night time operations resulted in well correlated predictions of noise with actual measured noise impacts. This temperature inversion value has therefore been used in the assessment completed for the South Pit Extension Project. It should be noted that the use of this value provides a more conservative approach to that outlined in the NSW Industrial Noise Policy (EPA 2000), which recommends applying a temperature inversion strength of 3 °C per 100 metres.

Noise Modelling Methodology

Noise levels were predicted for three representative worst case operational scenarios for the South Pit Extension Project. The years modelled were Years 5, 10 and 15 of the South Pit Extension Project, which correspond approximately with MAN EIS Years 10, 15 and 21 respectively. The modelled noise included all mining equipment plus the MAN infrastructure that would be used to handle and process the coal.

Modelling was completed for worst case winter night periods as the extensive previous modelling and monitoring undertaken for the existing Mt Arthur Coal operations has shown that predicted and measured noise levels are highest during winter night time, largely as a result of adverse meteorological conditions. It is considered that if modelled operational noise levels comply with noise criteria during winter nights, they are likely to comply at all other times.

In addition to modelling the noise impacts of the project alone, the combined impacts of the project and the approved MAN operations have also been assessed. This included remodelling the approved MAN operations that will be undertaken concurrently with the proposed South Pit Extension operations. Predictions were made for worst case winter nights in Years 5, 10 and 15 of the South Pit Extension Project, which correspond approximately with MAN EIS Years 10, 15 and 21 respectively.

Haulage routes and plant locations were modelled to represent worst-case scenarios for each respective year for all scenarios.

Predicted Noise Levels at Residences

South Pit Extension Project Operations

The worst case predicted noise levels for the South Pit Extension Project operations alone are shown in **Table 5.4** for Years 5, 10, and 15. Predictions have been made for locations that are representative of the surrounding residential locations (refer to **Figure 5.8**).

Table 5.4 – Predicted Noise Levels for Worst Case South Pit Extension Project Operations during Worst Case Winter Night Periods

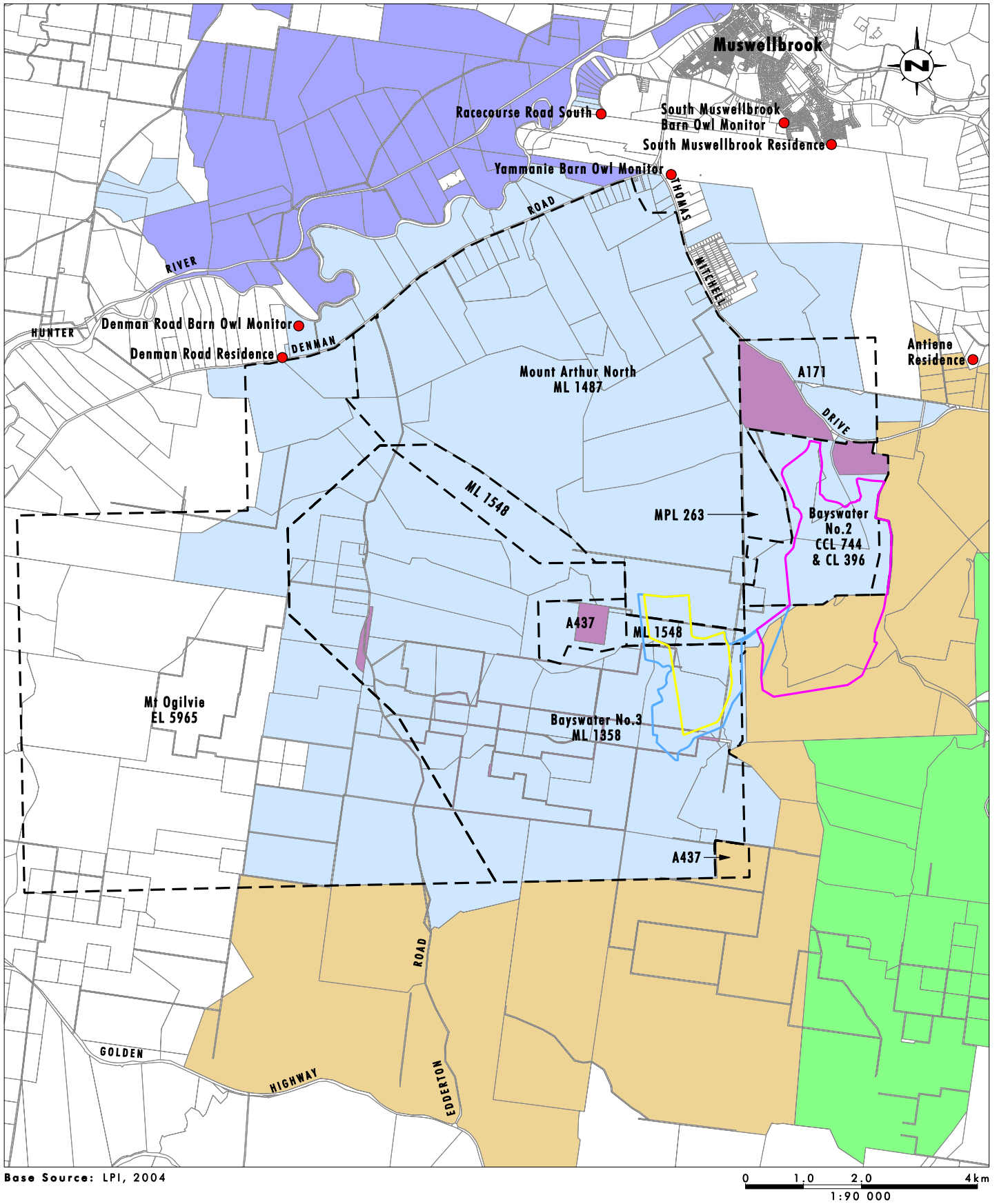
Location	South Pit Yr 5 Total Noise Level ($L_{Aeq, 15mins}$)	South Pit Yr 10 Total Noise Level ($L_{Aeq, 15mins}$)	South Pit Yr 15 Total Noise Level ($L_{Aeq, 15mins}$)	Project Specific Noise Level (PSNL) ($L_{Aeq, 15mins}$)
Yammanie BarnOwl Monitor	31	32	32	37
Sth Mus. Residence	31	32	32	35
Sth Mus. BarnOwl Monitor ¹	31	31	31	35
Antiene Residence	32	33	34	38
Racecourse Rd Sth	30	30	30	35
Denman Rd BarnOwl Monitor ¹	27	28	28	35
Denman Rd Residence	23	24	24	35

¹ Assessment location is not a private residential location. Denman Rd BarnOwl Monitor site is owned by Mt Arthur Coal with the Sth Mus. BarnOwl Monitor site owned by Muswellbrook Shire Council.

Table 5.4 shows that the predicted noise levels from the proposed South Pit Extension Project during worst case conditions and assuming worst case operating scenarios are below the project specific noise criteria for all modelled scenarios.

Combined South Pit Extension Project and Concurrent MAN Operations

The worst case predicted noise levels for the combined South Pit Extension Project operations and concurrent approved MAN operations are shown in **Table 5.5** for the South Pit Extension Project Years 5, 10, and 15. Predictions have been made for the same locations as for the South Pit Extension Project alone. Noise contours for each scenario are provided in **Appendix 9**. For comparative purposes, the noise level predicted for the MAN operations alone (based on the MAN EIS (URS, 2000)) is also contained in **Table 5.5**.



Base Source: LPI, 2004

Legend

- Mining and Exploration Lease Boundary
- South Pit Extension Mining Area
- Additional Overburden Emplacement Area
- Approximate New Disturbance Footprint
- Noise Assessment Location
- Mt Arthur Coal Owned Land
- Macquarie Generation Owned Land
- Bengalla Owned Land
- Anglo Coal Owned Land
- Crown Land
- Private Land

FIGURE 5.8

Noise Assessment Locations

Table 5.5 – Predicted Noise Levels for the Combined Worst Case South Pit Extension Operations and Concurrent Approved MAN Operations During Worst Case Winter Night Periods

Location	South Pit Extension Yr 5 / MAN Yr 10 Total Noise Level ($L_{Aeq, 15mins}$)	South Pit Extension Yr 10 / MAN Yr 15 Total Noise Level ($L_{Aeq, 15mins}$)	South Pit Extension Yr 15 / MAN Yr 21 Total Noise Level ($L_{Aeq, 15mins}$)	Project Specific Noise Level ($L_{Aeq, 15mins}$)	Assumed Intrusive Night-time Acquisition Criteria (PSNL +5 dBA) ($L_{Aeq, 15mins}$) ²	Worst Case MAN EIS Noise Level for Corresponding Years ($L_{Aeq, 15mins}$) ³
Yammanie BarnOwl Monitor	39	37	40	37	42	39
Sth Mus. Residence	36	35	35	35	40	33
Sth Mus. BarnOwl Monitor ¹	36	35	36	35	40	35
Antiene Residence	34	34	35	38	43	38
Racecourse Rd Sth	38	38	38	35	40	41
Denman Rd BarnOwl Monitor ¹	38	38	38	35	40	39
Denman Rd Residence	35	36	36	35	40	37

¹ Assessment location is not a private residential location. Denman Rd BarnOwl Monitor site is owned by Mt Arthur Coal with the Sth Mus. BarnOwl Monitor site owned by Muswellbrook Shire Council.

² These assumed criteria are the same as the acquisition criteria contained in the development consent for the approved MAN operations (with the exception of Yammanie which is 43 dBA in the MAN consent).

³ Derived from noise contours contained in the MAN EIS (URS, 2000).

Table 5.5 shows that the combined noise levels from the proposed South Pit Extension operations and concurrent approved MAN operations are generally consistent with the noise levels predicted in the MAN EIS (URS 2000) for the MAN operations alone. As discussed below, the South Pit Extension Project makes minimal contribution to total noise levels from Mt Arthur Coal's operations in the context of the noise from the approved MAN operations. Noise from the combined proposed South Pit Extension operations and concurrent approved MAN operations will, however, exceed the PSNLs for the South Pit Extension Project at following residential locations:

- South Muswellbrook by up to 1 dBA. The incremental impact attributable to the South Pit Extension Project in the worst case year is predicted to be 0.5 dBA;
- Denman Road residence west of the project area by up to 1 dBA. The worst case predicted noise level for the combined operations of 36 dBA is 1 dBA less than the maximum of 37 dBA predicted for the approved MAN operations. The incremental impact attributable to the South Pit Extension Project in the worst case year is predicted to be 0.3 dBA;
- Racecourse Road by up to 3 dBA. The worst case predicted noise level for the combined operations of 38 dBA is 3 dBA less than the maximum of 41 dBA predicted for the approved MAN operations. The incremental impact attributable to the South Pit

Extension Project in the worst case year is predicted to be 0.2 dBA. It should also be noted that the majority of potentially noise affected residences along Racecourse Road are now owned by mining companies (refer to **Figure 5.8**); and

- Yammanie by up to 3 dBA. The worst case predicted noise level for the combined operations of 40 dBA is only 1 dBA more than the maximum of 39 dBA predicted for the approved MAN operations. The incremental impact attributable to the South Pit Extension Project in the worst case year is predicted to be 0.5 dBA.

The assumed acquisition limits for the project (and the acquisition limits for the approved MAN operations) will be met at all locations.

Cumulative Noise Assessment

In addition to the assessment of noise impacts associated with the project alone and of the noise impacts of the project combined with the approved MAN operations as included in **Section 5.5.1.3** above, a cumulative noise assessment has been completed to assess the impact of all industrial sources on surrounding residences. This assessment is undertaken against the amenity criteria which were discussed in **Section 5.5.1.2** and outlined in **Table 5.3**.

The amenity criteria applicable to cumulative noise impacts from all industrial operations during night time periods (10.00 pm to 7.00 am, this is the worst case noise impact period) is 40 dBA for all residential locations (refer to **Section 5.5.1.2**). As no residences surrounding Mt Arthur Coal's operations would be exposed to noise from more than two existing industrial operations (i.e. Mt Arthur Coal and another industrial operation e.g. Bengalla or Drayton mines), the adopted amenity criterion for Mt Arthur Coal operations alone would be 37 dBA (this value is 50% of 40 dBA as noise is measured on a logarithmic scale).

Studies of measured directional noise data undertaken for Mt Arthur Coal show that the $L_{Aeq,9hr}$ noise level (parameter by which night time noise amenity is assessed) is typically 3-4 dBA below the measured $L_{Aeq, 15mins}$ noise level (level calculated for assessment against intrusive goals). This occurs as noise from mining equipment is not constant and therefore the noise levels for a given 15 minute worst case period ($L_{Aeq, 15mins}$) are not sustained over a longer averaging period. Applying this difference to the predicted worst case $L_{Aeq, 15mins}$ noise levels contained in **Table 5.5** indicates that the amenity criterion will be met in worst case periods for the Mt Arthur Coal operations at all residential locations. Therefore, the noise modelling results also demonstrate that the combined South Pit Extension and concurrent MAN operations will not result in exceedance of cumulative noise goals.

A specific assessment was also completed to assess cumulative impacts for the Antiene area, which also experiences rail noise impacts associated with Mt Arthur Coal's operations. This assessment is detailed in **Appendix 9** and has shown that the combined operations will comply with the relevant amenity criterion, with the inclusion of rail noise impacts.

5.5.1.4 Noise Management

Mt Arthur Coal has an extensive noise management program in place for its existing operations and strives for best practice management of noise impacts. The noise assessment completed for the project has found that the project will comply with all relevant noise criteria. The assessment has also found that the project will make minimal incremental contribution to the overall noise levels from Mt Arthur Coal's operations in worst case noise periods. However, the combined noise from the project and the approved MAN operations that will occur concurrently will result in exceedances of the project specific noise criteria of up to 3 dBA during worst case periods. The assumed acquisition criteria for the project (and the approved MAN acquisition criteria) will be met at all locations.

Mt Arthur Coal will strive to limit potential noise impacts associated with the project and to meet, where possible, the project specific intrusive criteria through implementation of all reasonable and feasible noise management measures.

Key measures currently being successfully implemented at Mt Arthur Coal and that will be applied to the South Pit Extension operations include:

- planning controls such as considering seasonal influences on noise impacts during mine planning, to avoid or otherwise minimise activities carried out in exposed areas during high risk periods;
- operational controls such as separate day and night time dumping areas, use of shielded dumping areas in adverse weather conditions and use of real-time noise monitoring data and text message alerts to pit supervisors (OCEs) to assist operations and environmental staff in proactive management of noise impacts;
- engineering controls including noise attenuation, where feasible, on mobile and stationary equipment that is potentially generating significant noise (equipment attenuation will be used as required to achieve off-site noise levels in combination with other planning and operational controls); and
- real-time, directional noise monitoring equipment to provide high quality data to assess compliance and assist with minimising impacts.

Mt Arthur Coal will continue to review, and assess for feasibility, emerging noise management technology over the life of the project.

The South Pit Extension Project will also add increased flexibility to the existing MAN mining operations in managing noise impacts by providing well shielded mining and overburden dumping locations for worst case noise periods. This additional flexibility may assist in minimising the noise impacts of the MAN operations in worst case periods.

Monitoring of noise from operations undertaken as part of the South Pit Extension Project will be completed in accordance with the MAN development consent.

5.5.2 Blasting Assessment

5.5.2.1 Existing Blasting Environment

Blasting impacts are a key issue for Mt Arthur Coal and in recent years has been the main cause of community complaints. A total of 30 complaints were received regarding blasting in 2005, all related to operations in the MAN area. In 2005, blasting accounted for approximately 48% of all complaints, with the number of blasting complaints reducing slightly from 2004 when 34 blasting complaints were received.

In 2005, a total of 194 blasts were fired. All blasts complied with the maximum statutory limits for airblast (120 dBL) and ground vibration (10 mm/s) at non-company owned residences. All blasts were also below the 5% exceedance limits of 115 dBL and 5 mm/s. The average of results at all sites was generally low compared with blasting limits, being 0.33 mm/s for ground vibration and 99.9 dBL for airblast (Mt Arthur Coal, 2006).

Over the years, Mt Arthur Coal has implemented a number of initiatives in an attempt to reduce the number of blast complaints. These measures have included further modifying blast design and firing parameters and undertaking risk assessments and assessments of weather conditions prior to every blast.

5.5.2.2 Impact Assessment

Blasting Criteria

DECC has guidelines for blasting based on human comfort levels. These guidelines have been adopted from Australian and New Zealand Environment and Conservation Council (ANZECC) guidelines and are as follows.

Overpressure

The recommended maximum level for airblast is 115 dB Linear Peak. This level may be exceeded on up to 5% of the total number of blasts over a period of 12 months, however, the level should not exceed 120 dB Linear Peak at any time.

Ground Vibration

The recommended maximum level for ground vibration is 5 mm/s peak particle velocity (ppv). The ppv level of 5 mm/s may be exceeded on up to 5% of the total number of blasts over a period of 12 months, however, the level should not exceed 10 mm/s at any time.

The blasting limits contained in the development consent for the MAN operations are consistent with these ANZECC goals. The development consent also specifies that blasting operations may only take place between 9.00 am and 5.00 pm, Monday to Saturday inclusive.

The above blasting criteria have been used to assess the potential impacts of blasting to be undertaken for the South Pit Extension Project.

Blasting Impact Assessment

Mt Arthur Coal designs all blasts to comply with the above blasting criteria and as demonstrated in **Section 5.5.2.1** is currently complying with these limits at the existing operations. The proposed South Pit Extension area is further away from the nearest residential receivers than the existing mining areas and therefore, blasting impacts will be readily manageable as part of the project.

The frequency of blasting will not change from the currently approved situation, with blasting to occur on up to a daily basis within the Mt Arthur Coal operational area, subject to geological and mining conditions and environmental constraints. Blasting design within the South Pit Extension area will also need to consider the Transgrid transmission line which is located to the south of the mining area. Mt Arthur Coal has a long history of working closely with Transgrid regarding blasting within the vicinity of this powerline, which passes through the existing Saddlers Pit in the Bayswater No. 3 mining area. This working relationship will be maintained for operations in the South Pit Extension area.

No public roads are located within 500 metres of the mining area, with the project therefore not requiring any public road closures due to blasting.

Blasting in the MAN mining area is managed in accordance with the MAN Blasting/Vibration Management Plan. This plan includes control measures for blasting design to minimise potential overpressure, vibration and other impacts associated with blasting. The plan also outlines the process for notifying residents of blasts and consulting with neighbouring mining operations to ensure appropriate spacing between blasts. Blasting operations within the South Pit Extension area will be undertaken in accordance with this plan (or its relevant

update). The plan will be revised to specifically refer to the project during the next scheduled review, should the project be approved.

5.6 Air Quality

A comprehensive air quality assessment was completed for the project by Holmes Air Sciences in accordance with relevant DECC guidelines. A summary of the key findings of the assessment is included below, with the full assessment report included in **Appendix 10**.

5.6.1 Air Quality Criteria

The following section summarises the current air quality assessment criteria specified by DECC for assessing impacts from mining activities. These criteria relate to dust deposition and dust concentration. The air quality goals (excluding 24 hour PM₁₀ which is project specific) relate to the total dust burden in the air and not just the dust from the project. Therefore, some consideration of background levels needs to be made when using these goals to assess impacts (refer to **Section 5.6.2**).

Dust concentration refers to airborne dust and is measured in micrograms per cubic metre ($\mu\text{g}/\text{m}^3$). Relevant criteria for dust concentration are defined in terms of two classes, total suspended particulate (TSP) and PM₁₀. TSP relates to all suspended particles which are usually in the size range of zero to 50 micrometres (μm). Particle sizes larger than 50 μm are measured in dust deposition levels. PM₁₀ refers to particulate matter with a diameter less than 10 μm . TSP measurements include PM₁₀ particles.

Goals for dust concentration are referred to as long term (annual average) and short term (24 hour maximum) goals. Relevant goals for TSP and PM₁₀ are outlined in **Table 5.6**.

Table 5.6 – DECC Assessment Criteria for Particulate Matter Concentrations

Pollutant	Standard / Goal	Averaging Period	Agency
Total suspended particulate matter (TSP)	90 $\mu\text{g}/\text{m}^3$	Annual mean	National Health & Medical Research Council
Particulate matter < 10 μm (PM ₁₀)	50 $\mu\text{g}/\text{m}^3$	24-hour maximum	DECC
	30 $\mu\text{g}/\text{m}^3$	Annual mean	DECC long-term reporting goal
	50 $\mu\text{g}/\text{m}^3$	(24-hour average, 5 exceedances permitted per year)	National Environment Protection Council

Dust deposition levels refer to the quantity of dust particles that settle out of the air as measured in grams per square metre per month ($\text{g}/\text{m}^2/\text{month}$) at a particular location. DECC expresses dust deposition criteria in terms of an acceptable increase in dust deposition over the existing background deposition levels as shown in **Table 5.7**.

Table 5.7 – DECC Criteria for Dust Deposition

Pollutant	Averaging Period	Maximum Increase in Deposited Dust Level	Maximum Total Deposited Dust Level
Deposited dust	Annual	2 $\text{g}/\text{m}^2/\text{month}$	4 $\text{g}/\text{m}^2/\text{month}$

5.6.2 Existing Air Quality Environment

Mt Arthur Coal has an extensive dust monitoring network in place that measures both dust deposition and airborne dust concentration (PM_{10}). The current monitoring network consists of eight high volume air samplers, measuring PM_{10} on a six day cycle, four real-time samplers measuring PM_{10} and 21 dust deposition gauges. A summary of the monitoring findings for the past two years is included below.

In 2004 and 2005 the annual average PM_{10} concentrations were below both the MAN development consent goal of $50 \mu g/m^3$ and also the current DECC assessment criterion of $30 \mu g/m^3$ at all monitoring locations. The highest level was recorded at the South Muswellbrook site in 2004 with $28.2 \mu g/m^3$. The analysis of dust monitoring results (refer to **Appendix 10**) also found that average PM_{10} concentrations in 2005 were lower than the 2004 records at all sites except Denman Road West where a minor increase (17.9 to $18.9 \mu g/m^3$) was reported. Annual average TSP concentrations were also below both the development consent goal and DECC assessment criterion of $90 \mu g/m^3$ at all monitoring locations in both 2004 and 2005.

One maximum 24-hour average PM_{10} concentrations above the MAN development consent limit of $150 \mu g/m^3$ was recorded at the South Muswellbrook site in 2004, due to a possible contamination event, with all other recorded values below this limit. Monitoring results from several of the monitoring sites have recorded maximum 24-hour average concentrations above the current DECC goal of $50 \mu g/m^3$, with these maxima being generally due to widespread dust events, such as regional dust storms and bushfires.

The 2004 and 2005 dust deposition data also suggests that dust deposition in the area has declined slightly over this period. Dust deposition measurements generally reflect the influence of activities occurring very close to the monitoring site and are also particularly susceptible to contamination by bird droppings, insects and other localised issues. Thus, the average from all sites has been calculated to provide an indication of annual average fallout levels in the project area. The measured average annual dust deposition levels across all monitoring sites was $3.1 g/m^2/month$ in 2004 and $2.6 g/m^2/month$ in 2005.

5.6.3 Air Quality Impact Assessment

The air quality assessment has considered three years of mining in the South Pit Extension area. These years are South Pit Extension Year 5, 10 and 15 which coincide approximately with MAN operations for Year 10, 15 and 21 respectively.

The predictive air quality modelling for the South Pit Extension Project identified that:

- maximum 24-hour average PM_{10} concentrations are predicted to be of the order of $20 \mu g/m^3$ or less beyond the ML boundaries. This is below the DECC's $50 \mu g/m^3$ goal;
- annual average PM_{10} concentrations are predicted to be $5 \mu g/m^3$ or less beyond the ML boundaries. TSP concentrations are predicted to be less than $10 \mu g/m^3$. Background concentrations need to be considered for annual average PM_{10} and TSP when comparing the model predictions with the air quality criteria, as discussed further below; and
- dust deposition is predicted to be $1 g/m^2/month$ or less beyond the ML boundaries. This is below the $2 g/m^2/month$ goal for the project considered alone.

To provide an assessment of the incremental impact of the predicted dust emissions from the South Pit Extension Project on total local dust levels, the calculated dust levels for each

operational scenario were added to the measured background dust levels for the local area (i.e. including dust contributions from existing Mt Arthur Coal and other mining operations). The calculations were completed for each of Mt Arthur Coal's high volume air sampler monitoring locations which are considered to be representative of the surrounding nearest residential receiver locations.

This assessment found that with the project operating cumulative annual average PM₁₀ and TSP concentrations are predicted to be below the 30 and 90 µg/m³ goals respectively at all locations. Cumulative annual average dust deposition was also predicted to be maintained below the 4 g/m²/month goal.

In summary, the results from the dispersion modelling suggested that the incremental increase to off-site dust concentrations and deposition levels due to activities associated with the project would be small and are not expected to cause air quality goals to be exceeded at the nearest sensitive receptor locations.

5.6.3.1 Comparison to MAN EIS Predictions

Another objective of the air quality assessment was to compare the impacts of the combined MAN and South Pit Extension operations with impacts presented in the MAN EIS (URS, 2000). The extent of impacts predicted in the EIS compared with impacts predicted for the combined MAN and South Pit Extension Project are shown in **Appendix 10**. The assessment shows that the annual average PM₁₀ impact zone for the combined operations is close to the impact zone defined in the EIS, with marginally lower dust levels to the north-west near potentially sensitive receivers along the Hunter River. The expansion of the impact area to the south-east associated with the South Pit Extension Project only affects mine owned land and there are no residences located in this area.

Annual average TSP and dust deposition levels exhibit a similar trend to annual average PM₁₀ with slight decreases to the north-west and slight increases to the south-east on mine owned land.

5.6.4 Air Quality Management

Operational dust controls associated with the South Pit Extension Project will be managed consistent with the MAN Operational Dust Management Plan. The key features of this plan include:

- real-time and periodic monitoring including strong wind speed alerts;
- operational dust controls, including
 - haul road dust suppression
 - progressive rehabilitation
 - sprays and dust curtains on drills
 - minimisation of ground disturbance
 - enclosures and sprays on coal handling infrastructure (e.g. conveyors, CHPP, rail facility); and
- procedures for management of short-term dust episodes due to climatic conditions.

This plan will be revised to specifically address the South Pit Extension Project as part of its next scheduled review.

5.7 Spontaneous Combustion

Two different groups of coal seams occur in Mt Arthur Coal's operational area, the Greta Coal Measures in the Bayswater No. 2 area, and the Wittingham Coal Measures in the Bayswater No. 3 and MAN area. The Greta Coal Measures, which are also mined by Drayton, have historically been susceptible to spontaneous combustion, resulting in areas affected by spontaneous combustion at Bayswater No. 2 and Drayton.

Mining has ceased in the Bayswater No. 2 area and areas affected by spontaneous combustion have been progressively treated by Mt Arthur Coal over the last 10 years. At the end of 2005, the total area affected by spontaneous combustion had been reduced to approximately 440 m² (Mt Arthur Coal, 2006) with further reductions achieved in 2006. This project will provide for the completion of capping and rehabilitation of the Bayswater No. 2 mining area, resulting in final remediation of all areas prone to spontaneous combustion.

The Drayton West Pit which will be used for emplacement of overburden from the project is also currently affected by spontaneous combustion. The emplacement of inert overburden material from the South Pit Extension area within this area will assist in remediating spontaneous combustion affected areas. The project will assist in completion of final capping and rehabilitation of this area over the life of the project. Where possible, emplacement activities in the Drayton West Pit will be prioritised in spontaneous combustion affected areas to remediate outbreaks as early as possible. The remediation and completion of final rehabilitation of areas currently affected by spontaneous combustion is a key environmental outcome of the South Pit Extension Project.

The additional mining area proposed as part of the project will mine the Wittingham Coal Measures, which are currently being mined in the Bayswater No. 3 and MAN mining areas. The risk of spontaneous combustion is significantly reduced in these coal measures compared to the Greta Coal Measures. Approximately 0.7% of overburden in the Bayswater No. 3 and 5% of overburden at MAN has been identified as carbonaceous material which could potentially be susceptible to spontaneous combustion, compared to 14% of overburden at Bayswater No. 2 (URS 2000). The lower percentages of carbonaceous material in these two mining areas have led to significantly fewer incidences of spontaneous combustion compared to operation at Bayswater No. 2. During 2005, a small number of small heatings occurred in coal stockpiles and small piles of loose remnant coal in-pit at MAN, however, these areas were readily treated through implementation of Mt Arthur Coal's Spontaneous Combustion Management Plan (Mt Arthur Coal, 2006).

The target coal seams to be mined in the South Pit Extension area are the same as those currently being mined at MAN. The level of spontaneous combustion risk associated with the project is therefore considered to be readily manageable by implementing existing management measures at Mt Arthur Coal. The existing management measures include regular monitoring of at risk areas (including coal stockpiles), separate handling and emplacement of overburden material with an elevated spontaneous combustion risk, control works in areas of outbreak and reporting of any incidences and control progress on a quarterly basis to DECC and DPI in accordance with existing statutory requirements. These measures are detailed in the MAN Spontaneous Combustion Management Plan which will be implemented in the South Pit Extension Project area.

5.8 Greenhouse Gas and Energy

An energy and greenhouse gas emissions assessment has been completed for the project and is included as **Appendix 11**. The assessment provides an estimate of energy consumption and greenhouse gas emissions for the project and provides a summary of the

greenhouse gas management measures that may be applicable to the project. The following section provides an overview of the assessment,

5.8.1 Methodology

The energy and greenhouse gas emissions assessment was completed with regard to the following policies for undertaking a greenhouse gas emissions (GHG) assessment as part of the preparation of an EA:

- the World Business Council for Sustainable Development (WBCSD) and World Resources Institute (WRI) *Greenhouse Gas Protocol* 2004 (GHG Protocol);
- the Australian Greenhouse Office (AGO) *Factors and Methods Workbook December 2005 (Workbook)* (AGO Workbook);
- the draft *NSW Energy and Greenhouse Guidelines (EIA Guidelines) for Environmental Impact Assessment*, Sustainable Energy Development Authority and Planning NSW, 2002 (EIA Guidelines); and
- the NSW Greenhouse Plan developed by the NSW Greenhouse Office (2005).

The GHG Protocol establishes an international standard for accounting and reporting of GHG emissions by entities. Under the GHG Protocol the establishment of operational boundaries involves identifying emissions associated with an entity's operations, categorising them as direct or indirect emissions, and identifying the scope of accounting and reporting for indirect emissions.

Three "Scopes" of emissions (Scope 1, Scope 2, and Scope 3) are defined for GHG accounting and reporting purposes. These scopes are briefly outlined below:

Scope 1 emissions refer to direct emissions associated with a development. Direct GHG emissions are defined as those emissions that occur from sources that are owned or controlled by the entity. Direct GHG emissions are those emissions that are principally the result of the following types of activities undertaken by an entity:

- generation of electricity, heat, or steam. These emissions result from combustion of fuels in stationary sources, e.g. boilers, furnaces, turbines;
- physical or chemical processing. Most of these emissions result from manufacture or processing of chemicals and materials, e.g. the manufacture of cement, aluminium, adipic acid and ammonia, or waste processing;
- transportation of materials, products, waste, and employees. These emissions result from the combustion of fuels in entity owned/controlled mobile combustion sources, e.g. trucks, trains, ships, aeroplanes, buses and cars; and
- fugitive emissions. These emissions result from intentional or unintentional releases, e.g. equipment leaks from joints, seals, packing, and gaskets; methane emissions from coal mines and venting; HFC emissions during the use of refrigeration and air conditioning equipment; and methane leakages from gas transport.

Scope 2 emissions are a category of indirect emissions that accounts for GHG emissions from the generation of purchased electricity consumed by the entity.

Purchased electricity is defined as electricity that is purchased or otherwise brought into the organisational boundary of the entity. Scope 2 emissions physically occur at the facility where electricity is generated. Entities report the emissions from the generation of purchased electricity that is consumed in its owned or controlled equipment or operations as Scope 2.

Under the GHG Protocol, Scope 3 is an optional reporting category that allows for the treatment of all other indirect emissions. Scope 3 emissions are defined as those emissions that are a consequence of the activities of an entity, but which arise from sources not owned or controlled by that entity. Some examples of Scope 3 activities provided in the GHG Protocol are extraction and production of purchased materials, transportation of purchased fuels, and use of sold products and services.

To harmonise the international reporting of GHG emissions the AGO Workbook (December 2005 version) and the EIA Guidelines have adopted the emissions categories outlined in the GHG Protocol. In this context both the AGO workbook and EIA guidelines provide that the scope of emissions that are reported by an entity include both direct (Scope 1) and indirect emissions from a project (Scope 2 and Scope 3 emissions).

In addition the EIA guidelines define reporting boundaries for a particular project. These boundaries are not physical but related to the extent to which emissions are associated with 'upstream' and 'downstream' components of a project and its products. The EIA guidelines consider 'upstream' components to include essential inputs to a project including materials, plant and equipment, whilst 'downstream' include outputs of the project including the use of products or waste or the implications in terms of induced use of products, infrastructure or services.

The current policy framework has historically regarded the assessment and reporting of Scope 3 emissions to be optional and only to be included along with Scope 1 and Scope 2 emissions where an organisation believes that Scope 3 emissions are a significant component of the total emissions inventory. In addition the EIA guidelines specify that the application of 'upstream' and 'downstream' project boundaries should be considered on a case by case basis.

Recent interpretations of the application of GHG assessment to the EIA process has indicated that where a project has a direct link to the contribution of GHG emissions beyond its immediate boundaries, these emissions need to be included in the GHG assessment.

To date the NSW government has not developed policy to further define the application of the assessment of indirect GHG emissions on a project basis. In this context, it is considered that the project will result in the generation of indirect GHG emissions mainly through diesel usage for rail transport, electricity used for conveyors and the combustion of coal. As such the assessment of Scope 3 GHG emissions have been included as part of this assessment. The emissions from the combustion of coal were assessed separately to the remainder of potential emissions from the project.

5.8.2 Energy Consumption

Energy consumption for the South Pit Extension Project was estimated based on scope 1, 2 and 3 emissions. The assessment found that project energy usage will be dominated by diesel usage at approximately 90% with the remaining 10% consisting of electrical energy. This is due largely to the dominance of diesel powered mining equipment. The energy indices for the mining operation are 0.240 GJ per tonne of saleable coal. This is lower than the Australian open cut black coal mining industry average of 0.29 GJ/tonne (AGSO, 2000).

5.8.3 Greenhouse Emissions

The assessment of greenhouse emissions included the assessment of the emissions from coal combustion (refer to **Section 5.8.4**) and an assessment of the remaining Scope 1, 2 and 3 emissions. Scope 1 emissions assessed include the combustion of diesel and electricity onsite, use of explosives, slow oxidation, spontaneous combustion and methane releases onsite. Scope 2 emissions include the electricity consumed onsite and Scope 3 emissions include the diesel consumed for rail transport, electricity consumed by the conveyors and upstream emissions from diesel and electricity usage onsite.

The Scope 1, 2 and 3 annual average GHG emissions for the project are dominated by methane at approximately 50%. Emissions from diesel make up approximately 31% and electricity accounts for approximately 13% of total emissions. Emissions from spontaneous combustion account for approximately 6% of emissions, with explosive use approximately 0.8% and slow oxidation approximately 0.2% of emissions.

The average annual GHG emissions for the project were estimated to be 50,715 TCO₂e. This represents approximately 0.009% of the Australian annual GHG emission rate. The greenhouse indices for the project are 0.053 TCO₂e/tonne of saleable coal. This is comparable to the Australian open cut black coal mining industry average of 0.05 TCO₂e/tonne of saleable coal (AGSO, 2000).

5.8.4 Emissions from Coal Combustion

The GHG emissions from the combustion of the product coal produced by the project (assuming that all product coal is burnt) were determined for the South Pit Extension Project. The annual average greenhouse emissions from the combustion of product coal are estimated to be 2,311,768 TCO₂e per annum. This is approximately equal to 0.006% of annual global GHG emissions of 40,355,714,286 TCO₂e. It should be noted that the annual global GHG emissions of 40,355,714,286 TCO₂e is an extrapolation of the Australian annual GHG emissions based on figure from a media release by the Minister for Environment and Heritage (Campbell 2006), as the determination of global emissions is difficult due to a number of countries not having adequate greenhouse inventories.

It should be acknowledged that there are a range of practical implications of the assessment of indirect GHG emissions, particularly in relation to the issue of double counting of emissions and the assumptions underlying the assessment of indirect emissions. The GHG Protocol specifically acknowledges the importance of the avoidance of double counting of GHG emissions. For instance, at an international scale, double counting needs to be avoided when compiling national (country) inventories under the Kyoto Protocol. The limitations of the assessment of Scope 3 GHG emissions in relation to double counting of emissions should be taken into account in the interpretation of this assessment.

Moreover the interpretation of Scope 3 GHG assessments needs to acknowledge the limitations imposed by the largely speculative assumptions upon which the assessment is based. For instance, this assessment assumes the management of indirect GHG emissions resulting from the project will be managed by relevant international, domestic and project specific regulations of each of the potential end users.

5.8.5 Greenhouse Mitigation Strategies

As part of its commitment to energy management and consistent with BHP Billiton requirements, Mt Arthur Coal will develop and maintain internal energy conservation plans with specific targets for its operations, including the South Pit Extension Project. Mt Arthur Coal will also develop and maintain internal greenhouse gas management programs consistent with internal corporate requirements. For the South Pit Extension Project, the

primary measures that may assist in the reduction of greenhouse gas emissions will be energy efficiency measures, particularly associated with the energy efficiency of mining equipment and coal handling and preparation.

5.9 Visual Impact

5.9.1 Existing Visual Amenity

The upper Hunter Valley has a diversity of landforms, vegetation and land uses resulting in considerable variation in scenic quality. In general terms, scenic quality is considered to improve with increasing diversity of topographic ruggedness, vegetation patterns, natural and agricultural landscapes, and water bodies. Scenic quality is typically considered to decrease with views of the built environment (including both urban and industrial development) and areas of extensive earthworks (e.g. mines and quarries).

The visual character of the upper Hunter Valley region is characterised by a contrast of landscapes from the native vegetation areas on the slopes bordering the valley, to primarily cleared grazing farmland, areas of intensive agriculture along the alluvial river flats, residential areas, major industrial developments and coal mining areas. This visual character pattern also occurs in the area surrounding the Muswellbrook township, with local views of residential areas, the Hunter River and the associated alluvial zone, cleared grazing land, mining areas and native vegetation areas, particularly on higher topographic areas. In terms of mining impacts on the existing visual character of Muswellbrook, views of mining operations at Bengalla Mine, Muswellbrook Coal and Mt Arthur Coal are available from different sectors of the township.

The dominant land uses within and adjacent to Mt Arthur Coal are mining and grazing. Grazing land within the Mt Arthur Coal complex is considered to be of moderate scenic quality with the steeper slopes of Mt Arthur and Mt Ogilvie that have remnant vegetation of higher scenic quality. Mining operations within and adjacent to Mt Arthur Coal's operations reduce the overall visual quality of the area, however over time, the completion of rehabilitation of the more prominent overburden emplacement areas will provide screening of mining operations from the majority of viewing locations. To the north and north-east of Mt Arthur Coal's operations, the Hunter River alluvial zone which is used for intensive agriculture provides areas of moderate to high scenic quality.

Views of Mt Arthur Coal's existing mining operations are possible from several residential locations and public roads including residences at South Muswellbrook, Denman Road to the west and north of the mining area, and at Roxburgh Road to the north-west. Views of mining operations are also available from Thomas Mitchell Drive, Edderton Road, Roxburgh Road and the Racecourse area. As part of the approved MAN project, Mt Arthur Coal is currently completing construction of a visual bund to provide visual screening of its mining operations from South Muswellbrook. This bund is largely completed, however, final earthworks and rehabilitation are ongoing. A recent view of this bund from South Muswellbrook is included as **Plate 5.1**.

Night Scenic Quality

As a result of 24 hour mining operations and other industries in the local area, the night time scenic quality surrounding Muswellbrook is not that of a typical rural town. Management measures to reduce lighting emissions are used by local mining operations and direct night lighting impacts on residential locations are manageable through mine planning and careful placement of lighting plant. A night time glow, however, occurs around each of the mining operations, detracting from the local night time scenic quality.



PLATE 5.1
View of the MAN Visual Bund from South Muswellbrook
- Muswellbrook Industrial Estate in Foreground

5.9.2 Visibility of the Project

The South Pit Extension mining area is shielded from public viewing locations by natural topography and will not be visible from residential locations. The overburden emplacement areas on the Bayswater No. 2 and Drayton West Pit areas will, however, be potentially visible from public viewing locations. The following visual assessment has therefore focussed on the visibility of the proposed overburden emplacement areas.

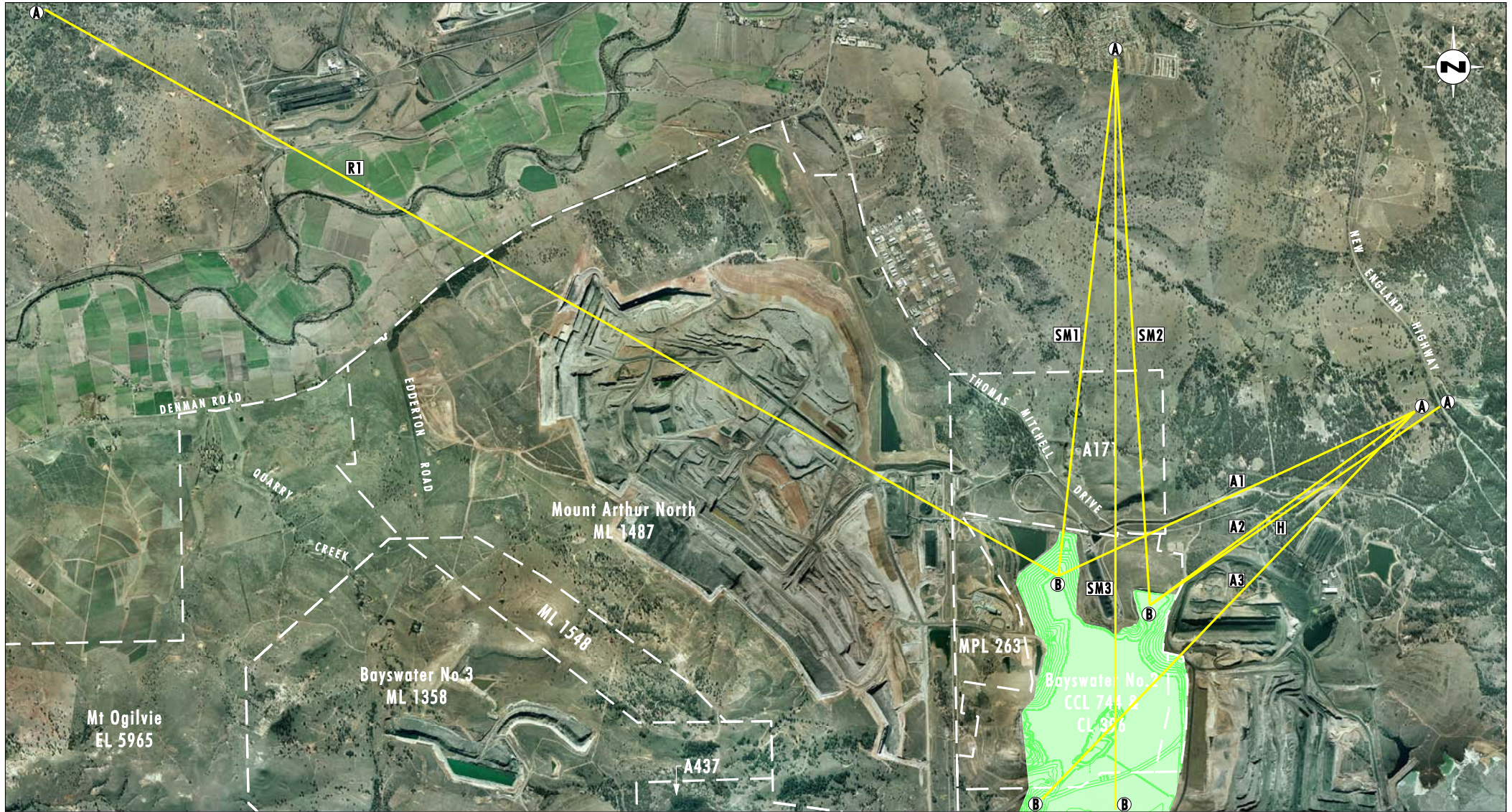
Visually prominent features of the project in the night landscape will be lights associated with mobile plant on overburden emplacement areas and lighting plant on emplacement areas.

5.9.3 Viewing Points and Assessment Methodology

An initial visual assessment was undertaken for the project using the Year 21 landform to identify surrounding locations from which views of the project area may be possible. This assessment found that based on topography alone (i.e. no allowance for screening vegetation), the elevated sections of the overburden emplacement areas were potentially visible from residences at South Muswellbrook, Antiene and Roxburgh Road, and from Thomas Mitchell Drive and the New England Highway. A visual impact assessment was then completed for each of these locations using four representative assessment points. The four assessment points selected are shown on **Figure 5.9** and include locations at South Muswellbrook, Antiene, Roxburgh Road and the New England Highway.

A detailed transect analysis was undertaken for each of these four assessment points. For residential locations at South Muswellbrook and Antiene, three transects were completed for each location, two to the two most northerly elevated points of the overburden emplacement area at the Bayswater No. 2 and one to the highest point of the proposed overburden emplacement area near the boundary of Bayswater No. 2 and the Drayton West Pit. The two most northerly elevated points are the north-western and north-eastern corners of the proposed overburden emplacement area, both at an approximate height of 270 mAHD. The maximum height of the proposed emplacement area will be approximately 290 mAHD in the central section of the emplacement area. The transects completed were:

- assessment point SM1 - from the South Muswellbrook residential area to the north-western corner of the proposed overburden emplacement area, over the existing north pit tailings dam (refer to **Figures 5.9** and **5.10**);
- assessment point SM2 - from the South Muswellbrook residential area to the north-eastern corner of the proposed overburden emplacement area over the former Bayswater product coal stockpiling area (refer to **Figures 5.9** and **5.10**);
- assessment point SM3 - from the South Muswellbrook residential area through the centre of the proposed overburden emplacement area (refer to **Figures 5.9** and **5.10**);
- assessment point A1 - from the Antiene rural residential area to the north-western corner of the proposed overburden emplacement area, over the existing north pit tailings dam (refer to **Figures 5.9** and **5.11**);
- assessment point A2 - view from the Antiene rural residential area to the north-eastern corner of the proposed overburden emplacement area over the former Bayswater product coal stockpiling area (refer to **Figures 5.9** and **5.11**);
- assessment point A3 - view from the Antiene rural residential area to the central portion of the proposed overburden emplacement area (refer to **Figures 5.9** and **5.11**);



Base Source: Mt Arthur Coal

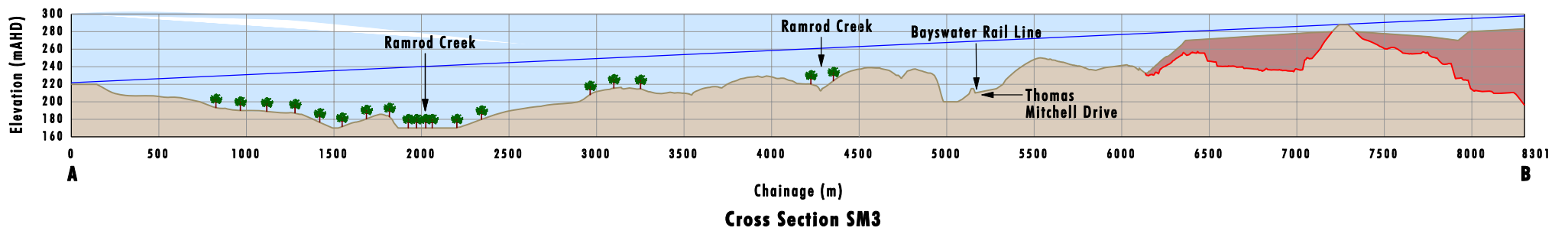
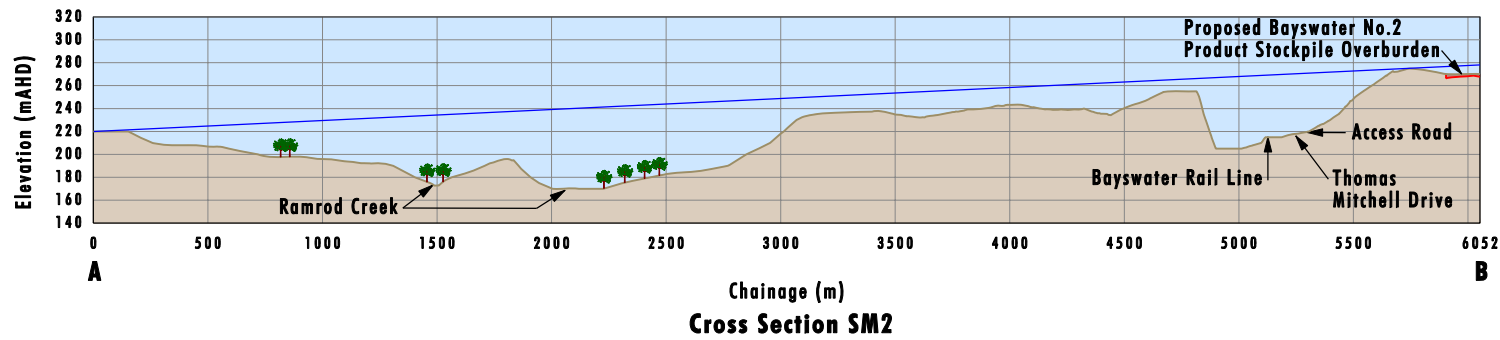
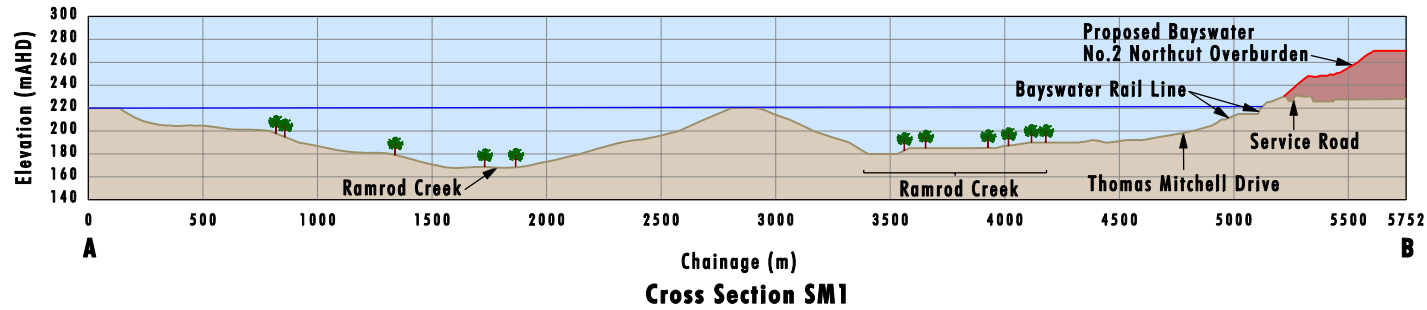
0 1.0 2.0 3km
1:60 000

Legend

- Mining and Exploration Lease Boundary
- Visual Transect Location
- Rehabilitated Area

FIGURE 5.9

Visual Transect Locations



Legend

- Existing Surface
- Proposed Surface
- Unaffected Viewline
- Existing Trees

Vertical Exaggeration 5:1

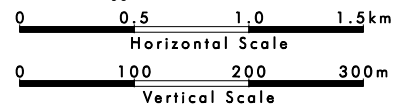
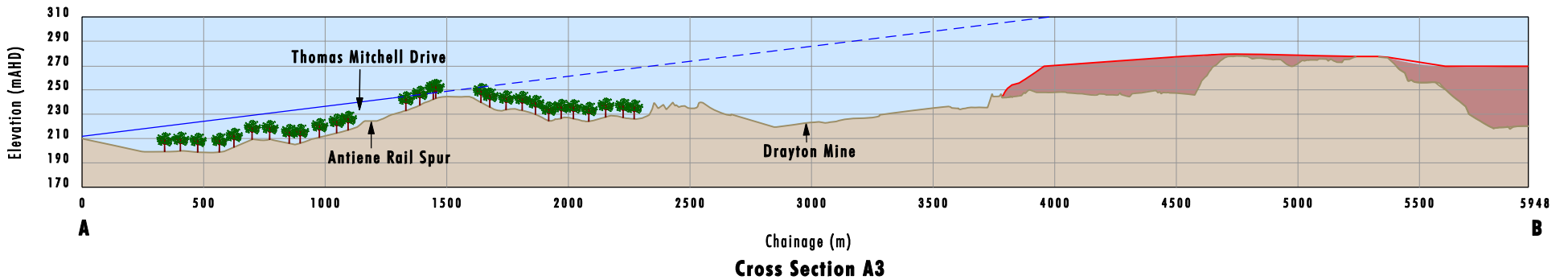
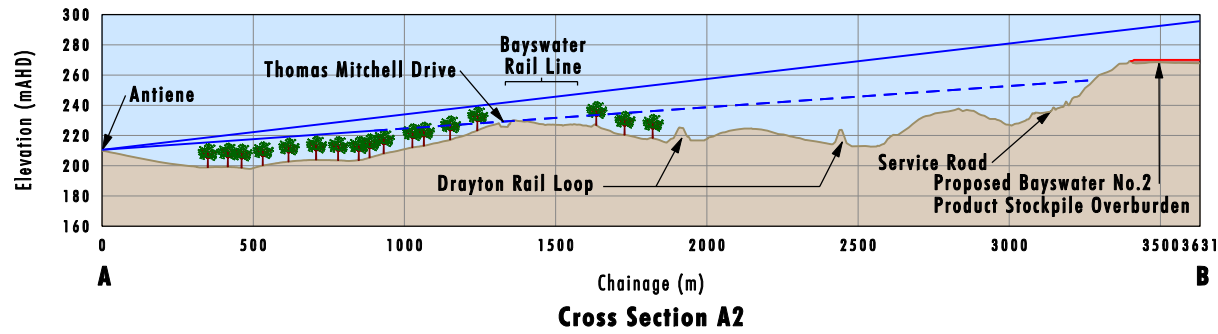
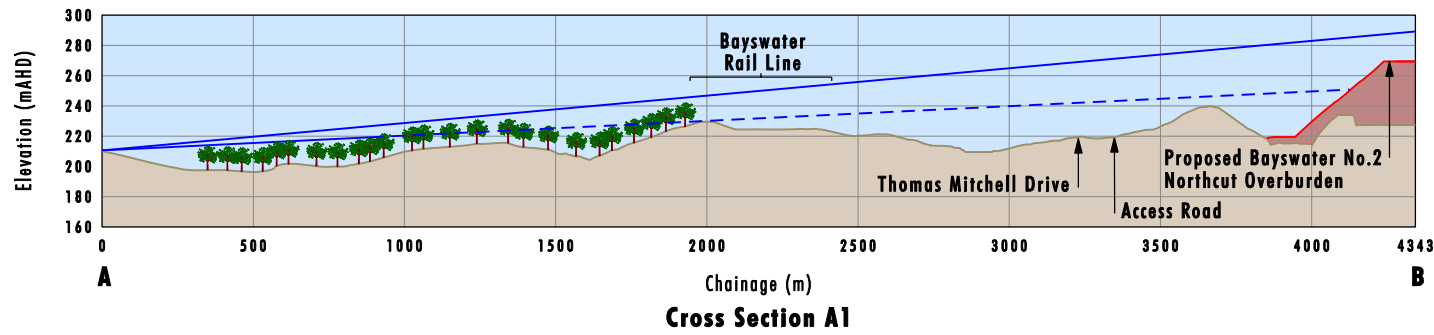


FIGURE 5.10

**Visual Transect Assessment
SM1, SM2 & SM3**



Legend

- Existing Surface
- Proposed Surface
- Unaffected Viewline
- - - Filtered Viewline
- Existing Trees

Vertical Exaggeration 5:1

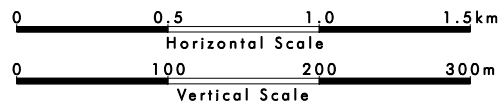


FIGURE 5.11

**Visual Transect Assessment
A1, A2 & A3**

- assessment Point H - view from the New England Highway to the north-eastern corner of the proposed overburden emplacement area over the former Bayswater product coal stockpiling area (refer to **Figures 5.9** and **5.12**); and
- assessment Point R1 - view from Roxburgh Road to the north-west of Mt Arthur Coal to the western edge of the proposed emplacement area (refer to **Figures 5.9** and **5.13**).

The findings of the transect analysis are discussed in **Section 5.9.4** below.

5.9.4 Visual Impacts and Management

As discussed above, the overburden emplacement areas established as part of the project will be visible from some residential locations and public roads. These areas are currently non-rehabilitated disturbed mining areas and the emplacement of overburden and completion of final rehabilitation of these areas as part of the project will improve the visual amenity of the Mt Arthur Coal area in the medium to long term.

For all locations except for Roxburgh Road, which is in an elevated position, visual impacts associated with the project will only be experienced during the completion of the northern faces of the overburden emplacement area. Once these northern faces are established, the remaining emplacement activities will not be visible. Mt Arthur Coal, where possible, will therefore prioritise the completion of the northern end of the emplacement area during the initial five years of the project to establish a bund behind which the remaining overburden emplacement will be completed. The emplacement of overburden over the former North Pit tailings dam may not be possible within this period due to the need to allow sufficient time for tailings to dry out, however, this area will also be completed if possible. Once established, the northern faces of the emplacement area will be rehabilitated as a priority, including the planting of screening vegetation to assist in minimisation of visual impacts.

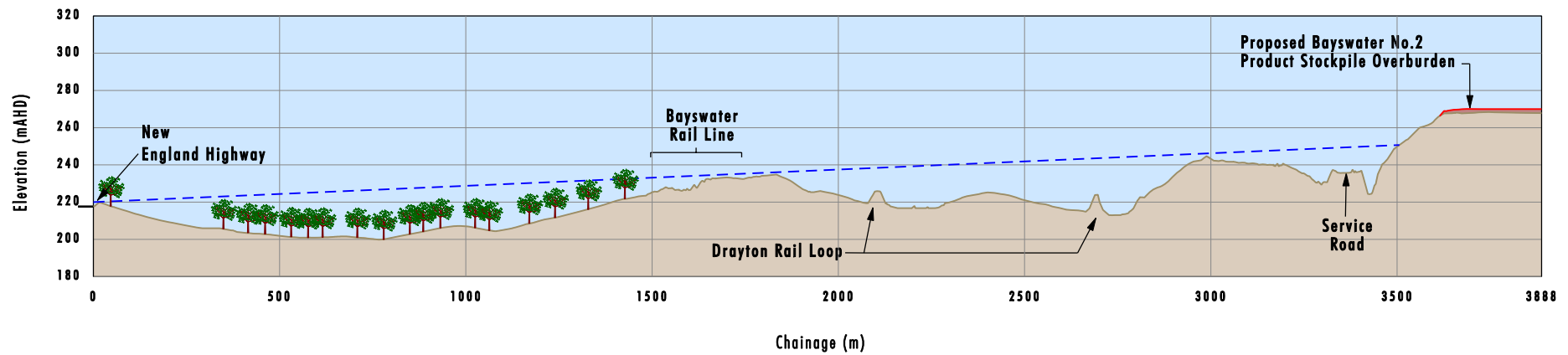
The findings of the detailed transect assessments are discussed below.

South Muswellbrook (transects SM1, SM2 and SM3)

Three transects were completed of views from South Muswellbrook as shown on **Figure 5.10**. The results of the transect analysis show that there will be some views of the northern face of the overburden emplacement area, however, intervening topography will limit views of the emplacement area over the former Bayswater No. 2 product coal stockpile. The emplacement area over the former north pit tailings dam will be visible, but will be over 5 kilometres from the nearest residence. The central section of the emplacement area which will be the most elevated section will not be visible following the completion of the northern faces which will provide shielding. Residences with south facing views at South Muswellbrook currently have views of overburden emplacement activities at Mt Arthur Coal's MAN mining area (refer to **Plate 5.1**), with some also having views of overburden emplacement areas at Bengalla Mine. In the context of these existing views, the distance between the residences and the emplacement area and Mt Arthur Coal's commitment to prioritise completion of the visible northern faces, the proposed overburden emplacement area is not considered likely to significantly change the existing visual character of the South Muswellbrook area.

Antiene (transects A1, A2 and A3)

The transect assessment for the Antiene area shows that based on topography alone, there will be some views of the northern face of the overburden emplacement area over the former north pit tailings dam (refer to **Figure 5.11**). As indicated on the transect, however, this potential view will be screened by existing vegetation and therefore no visual impacts are



Legend

- Existing Surface
- Proposed Surface
- Unaffected Viewline
- - - Filtered Viewline
- 🌳 Existing Trees

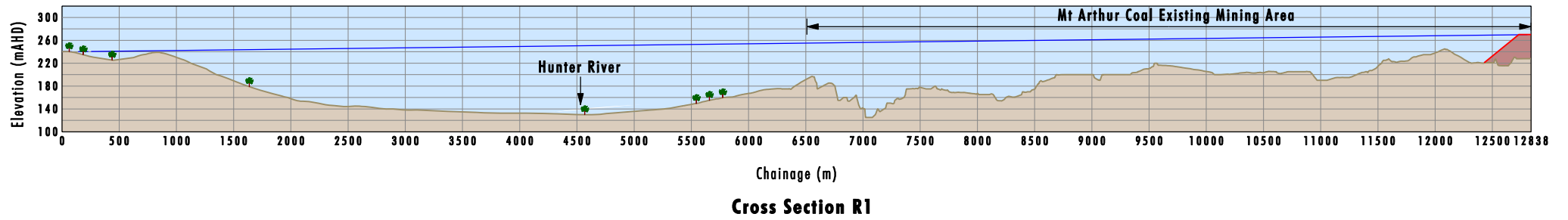
Vertical Exaggeration 5:1

0 200 400 800m
Horizontal Scale

0 40 80 160m
Vertical Scale

FIGURE 5.12

Visual Transect Assessment H
(New England Highway)



Legend

- Existing Surface
- Proposed Surface
- Unaffected Viewline
- Filtered Viewline
- Existing Trees

Vertical Exaggeration 5:1

0 1.0 2.0 3km
Horizontal Scale

0 200 400 600m
Vertical Scale

FIGURE 5.13

Visual Transect Assessment R1
(Roxburgh Road)

expected. Views of the remaining sections of the emplacement area will be screened by existing topography (refer to **Figure 5.11**).

New England Highway (transect H)

Filtered long distance views of the overburden emplacement area may be visible from the New England Highway, however, existing vegetation along the edge of the highway is likely to largely screen potential views (refer to **Figure 5.12**). Any potential filtered views that are possible will be of very short duration due to the speed of traffic. Given the existing views of mining areas and power generation infrastructure from the Highway, such views are considered unlikely to significantly affect the existing visual character of this roadway.

Roxburgh Road (transect R1)

Residences on Roxburgh Road to the north-west of the project area will have distant views of the overburden emplacement area (refer to **Figure 5.13**). These residences are located on an elevated ridgeline approximately 12.5 kilometres from the closest edge of the emplacement area. From their elevated position, these residences currently have views of the MAN mining area with management strategies implemented to minimise impacts on significantly affected residences in accordance with the MAN development consent.

In the case of the South Pit Extension Project, the overburden emplacement areas will only affect existing mining areas and therefore will not significantly alter the existing views from this location. In the medium to long-term, the completion of rehabilitation of the emplacement area will improve the visual amenity of the area.

Given that the proposed overburden emplacement area is further from viewing locations than the existing MAN mining area, is over 12 kilometres from the potential viewing locations and will be established in existing mining areas, it is considered unlikely to significantly alter the existing visual amenity of the Roxburgh Road area.

Thomas Mitchell Drive

Views of the northern faces of the overburden emplacement area will be visually prominent to vehicles travelling on Thomas Mitchell Drive until the rehabilitation of these areas is complete. As discussed above, completion of dumping and rehabilitation in these areas will be prioritised in the first five years of operations, where not constrained by the former north pit tailings dam. Given the existing mining views from Thomas Mitchell Drive and the likely high proportion of traffic associated with either mining operations or the Muswellbrook Industrial Estate, this impact is not considered to be significant.

Night Lighting

The project is considered unlikely to significantly change night lighting impacts as Mt Arthur Coal has existing controls in place to prevent direct night lighting impacts on residential locations. These controls will be implemented for operations undertaken as part of the South Pit Extension Project and include:

- designation of separate day and night-time dumping locations so that night-time operations are undertaken in visually shielded locations where possible;
- use of louvres or shields on lighting plants in exposed dump areas to reduce fugitive light emissions; and
- procedures for the use and placement of lighting plant to ensure they are placed in locations that do not impact on surrounding residences.

Given that the currently approved equipment fleet for MAN and Bayswater No. 3 will continue to be used, the overall number of night time working locations will not change from the currently approved situation and therefore night lighting impacts from these sources are expected to remain unchanged. There may be a decrease in lighting impacts given the location of the project area in a generally low lying area shielded from surrounding residences, particularly the new mining east of Mt Arthur and emplacement areas in Drayton's West Pit.

Proposed Visual Controls

As the majority of visual impacts associated with the project relate to the northern faces of the overburden emplacement area, the overburden emplacement schedule will be designed to prioritise completion of this area in the first five years of operations. This will establish a bund behind which the remaining overburden emplacement activities can occur, providing visual screening. As discussed previously, the emplacement of overburden over the former North Pit tailings dam may not be possible within this period due to potential for ongoing use and the time required for tailings to adequately dry out. This area will, however, be completed in the first five years if possible. Once established, the northern faces of the emplacement area will be rehabilitated as a priority.

5.10 Rehabilitation and Decommissioning

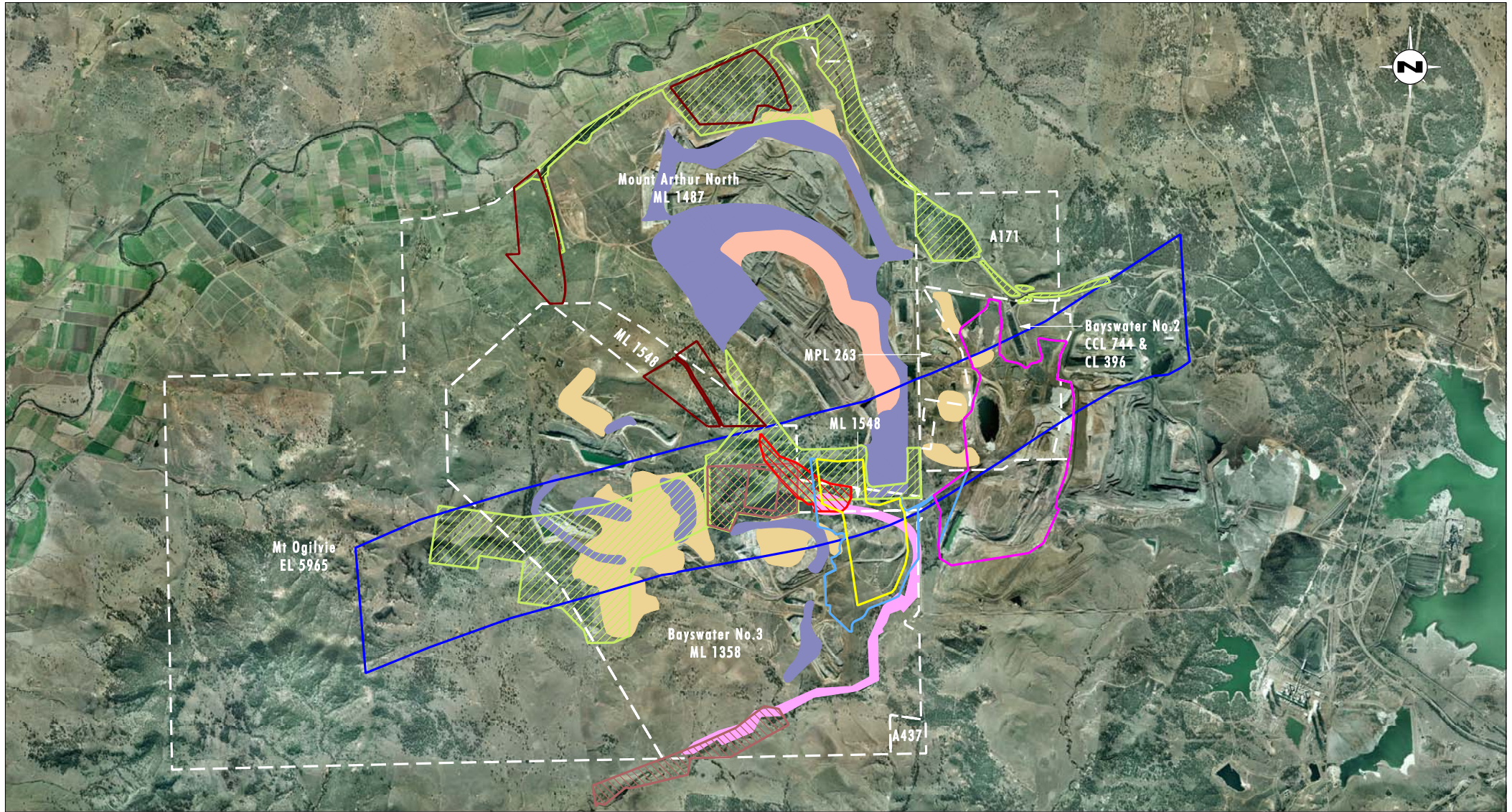
5.10.1 Mt Arthur Coal Complex Rehabilitation & Habitat Management Strategy

The rehabilitation strategy for the Mt Arthur Coal complex has a number of key objectives including:

- rehabilitation of mined land to achieve a land capability that is comparable with the pre-mining land capability;
- allow productive post mining land use(s);
- rehabilitation is progressive during the mine life;
- increased areas of native vegetation and fauna habitat;
- improved linkages between existing remnant vegetation areas; and
- consistency with the DPI Synoptic Landscape Plan (NSW DMR, 1999).

Mt Arthur Coal also has a commitment to effective management of non-mining areas within its land holdings, including the establishment of habitat management/improvement zones and Aboriginal archaeology management and conservation areas.

As the Mt Arthur Coal operational area covers an extensive area of land, a Mt Arthur Coal complex wide rehabilitation and habitat management strategy has been developed to ensure that the above rehabilitation objectives are met. The strategy also integrates and builds on Mt Arthur Coal's previous commitments regarding habitat management and improvement, and creation of vegetation corridors between key remnant vegetation areas. **Figure 5.14** shows the existing rehabilitation and landscape strategy which includes:



Base Source: Mt Arthur Coal

0 1 2 4 km
1:90 000

Legend

- Mining and Exploration Lease Boundary
- Additional Overburden Emplacement Area
- South Pit Extension Mining Area
- Approximate New Disturbance Footprint
- Regional Habitat Links (Synoptic Plan, NSW DMR 1999)

- Heritage Management Zone
- Planned Conservation Areas
- Habitat Management/Improvement Zones
- *Corymbia maculata* Regeneration Area
- Existing Rehabilitated Areas Planted with Trees

- Proposed Mine Rehabilitation - Native Trees
- Proposed Commercial Forestry
- Proposed Wildlife Corridor and Habitat Enhancement Area (Bayswater No.3 EIS)

FIGURE 5.14

Existing Mt Arthur Coal Rehabilitation and Landscape Strategy

- conservation areas;
- habitat management areas;
- a spotted gum regeneration area established as part of an offset for clearing of this regionally significant community for the MAN project;
- a wildlife corridor and habitat enhancement area discussed in the Bayswater No. 3 EIS (Resource Planning, 1993);
- existing rehabilitated areas; and
- proposed rehabilitation areas for Mt Arthur Coal's existing approved mining operations.

Also shown on **Figure 5.14** is the regional habitat linkage relevant to Mt Arthur Coal's operational area from the DPI's Synoptic Landscape Plan (NSW DMR, 1999).

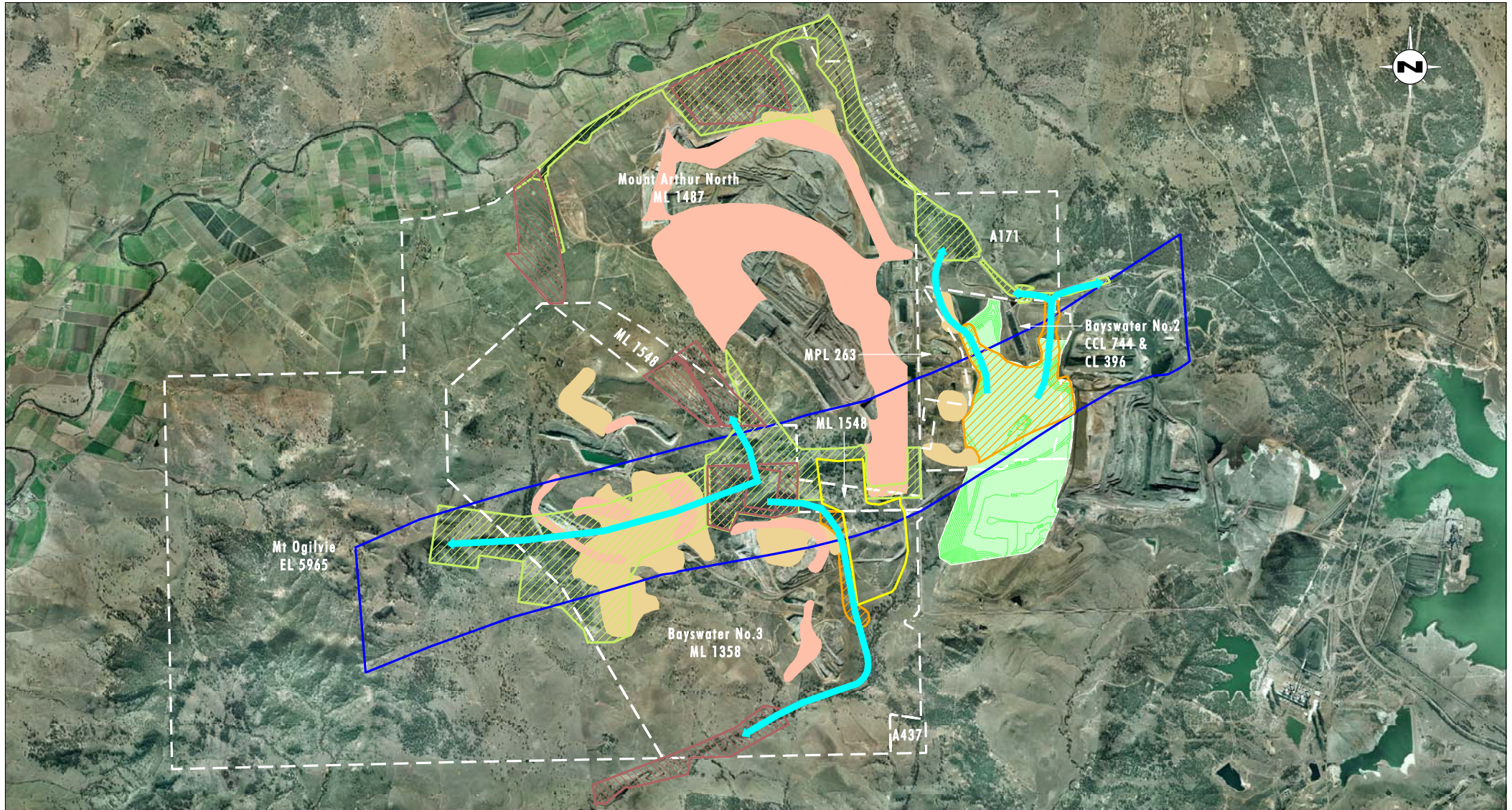
As shown on **Figure 5.14**, the proposed South Pit Extension Project will interact with the existing rehabilitation and landscape management strategy in place at Mt Arthur Coal. Specifically, the project will impact on the following components of the existing strategy:

- part of the current habitat management / improvement zone (specified in the MAN Flora and Fauna Management Plan);
- part of the wildlife corridor and habitat enhancement area that was proposed in the Bayswater No. 3 EIS to improve connectivity between the habitats of Mt Arthur and Saddlers Creek; and
- part of the Spotted Gum (*Corymbia maculata*) regeneration area established as part of the MAN Project (MAN Flora and Fauna Management Plan). This area was established in response to a condition in the MAN development consent that required:

strategies to supplement planting of *Corymbia maculata* Open Forest patches to strengthen the remaining area of the vegetation community. Planting on the site should seek to enhance the existing open forest structure, utilising seed stock from the site.

The existing rehabilitation and landscape management strategy has been revised in light of the proposed South Pit Extension Project and is shown on **Figure 5.15**. The key features of the strategy are:

- modifying the VCA process underway for the proposed Mt Arthur conservation area to ensure that it provides for appropriate protection of the ecological values of this area (approximately 100 hectares of native vegetation and fauna habitat) in perpetuity, in addition to protection of archaeological values;
- linkage of the Saddlers Creek riparian corridor to the Mt Arthur remnant vegetation area by a vegetation corridor (resulting in establishment of approximately 45 hectares of native woodland/forest vegetation);
- further fencing of the Saddlers Creek riparian vegetation zone and encouragement of natural regeneration of the Hunter Floodplain Red Gum Woodland Complex community;
- establishment of a substantial area (approximately 250 hectares) of native vegetation on rehabilitated overburden emplacement areas in the Bayswater No. 2 area to replace the



Base Source: Mt Arthur Coal

0 1 2 4 km
1:90 000

Legend

- Mining and Exploration Lease Boundary
- South Pit Extension Mining Area
- Rehabilitated Area
- Existing and Previously Proposed Rehabilitation Area - Native Trees
- Regional Habitat Links (Synoptic Plan, NSW DMR 1999)
- Heritage Management and Conservation Areas

- Habitat Management/Improvement Zones
- Proposed Vegetated Corridors - South Pit Extension Project
- Local Corridors

File Name (A4): R02_V1/2000_116.dgn

FIGURE 5.15

**Revised Mt Arthur Coal Rehabilitation
and Landscape Strategy Incorporating
South Pit Extension Project**

areas of vegetation cleared as a result of the project to ensure a net gain of each vegetation community impacted by the project (refer to **Figure 5.15**);

- establishment of a vegetated linkage between the Mt Arthur remnant vegetation and vegetated areas at Antiene in accordance with the regional habitat linkage proposed in the Synoptic Landscape Plan; and
- establishment of vegetated linkages to connect rehabilitation areas with remnant vegetation areas on Mt Arthur Coal land.

The proposed rehabilitated habitat areas and linkages shown on **Figure 5.15** will be established by seeding or planting of selected native species with the aim of establishing vegetation communities that are representative of communities currently found within Mt Arthur Coal's operational area, including:

- Central Hunter Spotted Gum – Ironbark - Grey Box Forest;
- Central Hunter Ironbark - Grey Box Woodland; and
- Central Hunter Bulloak Forest Regeneration.

The remaining rehabilitated areas will be grassland areas, with predominantly improved pastures and select native grasses (which are commercially available) used as part of the species mix.

To achieve Mt Arthur Coal's commitment to a net gain of woodland / forest areas as part of the project, the following minimum areas of each vegetation community will be established as part of the rehabilitation project:

- at least 48 hectares of Central Hunter Spotted Gum – Ironbark - Grey Box Forest;
- at least 5 hectares of Central Hunter Bulloak Forest Regeneration; and
- at least 0.5 hectares of Hunter Floodplain Red Gum Woodland Complex via assisted regeneration of the Saddlers Creek riparian zone.

The Mt Arthur Coal rehabilitation and landscape management strategy will be regularly reviewed and revised as part of the ongoing rehabilitation planning process at Mt Arthur Coal, with details of the implementation of the strategy included in MOPs submitted to DPI for approval. Progress in implementing the strategy will be reported in Mt Arthur Coal's AEMR.

5.10.1.1 Post Mining Concept Plan

The post mining land use for the Mt Arthur Coal complex will be a mixture of grazing land, commercial forestry, habitat areas and Aboriginal archaeology conservation areas consistent with the current approvals for the MAN and Bayswater No. 3 projects. The proposed South Pit Extension Project will build on these existing strategies, providing increased areas of native flora and fauna habitat and additional grazing land.

5.10.2 Rehabilitation Techniques and Criteria

The proposed rehabilitation program for the South Pit Extension Project has been designed to provide a stable, non-eroding post-mining landform that provides for the following:

- complies with regulatory requirements;
- effectively remediates areas affected by spontaneous combustion;
- minimises the visual impact of the mine on surrounding areas by prioritising the completion of dumping and rehabilitation of the northern faces of the emplacement area;
- minimises the potential for water quality impacts;
- minimises the generation of wind blown dust;
- minimises the impact on native flora and fauna;
- enhances the ecological conservation value of the project area and surrounding areas; and
- enables productive post-mining land use(s).

Mt Arthur Coal has extensive experience in achieving successful mine rehabilitation, with rehabilitation works being completed for various mining areas on site over the last 15 to 20 years. Mt Arthur Coal has also undertaken a number of rehabilitation research projects including topsoil management and establishment of native trees and grasses, providing further information for successful rehabilitation planning.

The detailed rehabilitation program for this project will be designed in consideration of this knowledge and experience and will be continually reviewed and refined over the life of the project to achieve the best possible outcomes.

Landform Design and Planning

The overburden emplacement area landform design is shown on **Figure 3.5**. The landform design shown on **Figure 3.5** is a bulk emplacement area landform only and will be refined as part of detailed mine planning should the project be approved. The detailed emplacement area design will be included in Mt Arthur Coal's MOP that will require DPI approval prior to mining and overburden emplacement activities commencing. The dumping schedule will also be subject to further detailed planning should the project be approved to facilitate timely completion of the northern faces of the emplacement area and provide for enhanced progressive rehabilitation opportunities.

The emplacement areas will be designed to achieve a stable final landform compatible with the surrounding environment. This will involve the reshaping of the majority of overburden emplacement slopes to 10 degrees or less. Should slopes exceed 10 degrees, additional drainage and revegetation works will be carried out to ensure adequate sediment and erosion control and groundcover establishment is achieved. All slopes will be less than 14 degrees unless otherwise approved by DPI.

The land affected by the South Pit Extension Project is Class V and Class VI land. The rehabilitation strategy will be designed to achieve these land capabilities, although the extent of Class V land may be limited by the availability of topsoil. Due to the age of the Bayswater No. 2 mining area, the majority of topsoil was not stored for use in rehabilitation works for much of this mining history and consequently there is expected to be a shortfall of useable material. Mt Arthur Coal is currently investigating rehabilitation techniques for areas with limited topsoil and will provide further details of the proposed strategy to address this issue in relevant MOP applications. Although topsoil for use in rehabilitation of the Bayswater No. 2 area is limited, with good land management practices, the structure and fertility of the topdressing layers can improve considerably over time.

Monitoring and Maintenance of Rehabilitation Areas

Rehabilitated areas will be monitored on a regular basis to ensure that rehabilitation objectives are met and that sustainable revegetation and long-term sediment and erosion control is achieved. Rehabilitation monitoring will include regular inspections of rehabilitated areas to assess stability, effectiveness of drainage structures, revegetation success and health and identify any weed or feral animal issues.

Maintenance works will be undertaken as required to resolve issues identified by monitoring. This may include re-seeding or planting with tubestock, weed control, additional fertiliser applications, desilting or repair of drainage works and sedimentation dams, regrading of eroded areas and replacement of lost topsoil. Consistent with the sub-lease agreement / partial-lease transfer, Mt Arthur Coal will manage the initial rehabilitation and maintenance of the area of the Drayton West Pit that is subject to this proposal. If a sub-lease is entered into, beyond this term Anglo Coal will be responsible for the long-term rehabilitation maintenance for this area in accordance with the sub-lease agreement. If a partial-lease transfer proceeds, this will be the responsibility of Mt Arthur Coal.

Rehabilitation monitoring results will be used to assist in the continual improvement and refinement of rehabilitation techniques used at Mt Arthur Coal.

5.10.3 Decommissioning of Bayswater No. 2 Infrastructure

The proposed overburden emplacement area at Bayswater No. 2 will involve dumping over the former infrastructure area, including the former CHPP, workshop, store and deployment areas. Operations transferred from many of these facilities to the new MAN facilities once construction of MAN was complete and the CHPP is now unused. The other facilities continue to be used for new equipment assembly and contractor maintenance and servicing activities. Prior to emplacement of overburden over the area currently occupied by these facilities they will need to be decommissioned.

A detailed decommissioning plan will be prepared as part of the MOP for the area and provided to DPI for approval prior to the commencement of relevant works. Key decommissioning activities will include:

- salvage of all useable equipment and machinery prior to demolition of infrastructure and buildings;
- removal of scrap metal and other potentially recyclable material for recycling;
- investigation and management of any areas of potential contamination;
- removal of any useable coal from coal pads and investigation of encapsulation requirements for the remaining material;
- removal of all non-inert waste material for disposal at a licensed waste management facility; and
- disposal of inert waste material on-site within appropriate areas of overburden emplacement.

To assist with the decommissioning planning process, a Phase 1 contamination assessment has been completed for the Bayswater No. 2 infrastructure area. The contamination assessment found that there are small areas of potential hydrocarbon contamination around

these facilities which, based on current information, are considered easily manageable from treatment processes that could be applied on and off site. This finding is not unexpected due to the age of the Bayswater No. 2 infrastructure area which has been used for over 30 years.

A Phase 2 contamination assessment will be completed as part of the detailed decommissioning planning and implementation process to determine the extent of contamination in the identified areas. Following the completion of the Phase 2 assessment, a detailed remediation action plan will be prepared for the area. This plan will investigate a number of options for identified contaminated areas:

- encapsulation where it can be demonstrated where there is no risk of future environmental harm; or
- where there is a risk of future environmental harm, treatment on site or removal for disposal at an appropriately licensed facility.

These works will be implemented as Phase 3. Following the completion of the Phase 3 remediation works, a Phase 4 assessment will be completed to validate the effectiveness of remediation works. This phase will be completed prior to bulk emplacement of overburden over the area.

It is expected that implementation of a remediation action plan for the area following further investigation of potentially hydrocarbon contaminated areas as part of a Phase 2 assessment, potential contamination issues will be able to be effectively resolved such that there will be no residual land contamination issues in the rehabilitated landscape.

5.10.4 Decommissioning of MAN Infrastructure

As discussed in **Section 3.0**, the South Pit Extension Project will use the existing Mt Arthur Coal infrastructure, with the approval period sought for the project continuing five years beyond the currently approved life of the MAN mining area.

The MAN mining areas is intended to continue beyond its currently approved life, however, should approval for continued mining operations not be granted, the MAN infrastructure will be decommissioned at the cessation of the South Pit Extension Project. The decommissioning of these facilities will be carried out in accordance with the approved rehabilitation concept plan for the MAN project and be detailed in the Mine Closure Plan to accompany the final MOP submitted to DPI.

5.10.5 Conceptual Final Void

The conceptual final void resulting from the South Pit Extension Project assuming closure at the end of the 21 year approval life sought was discussed in **Section 3.2.6** and shown on **Figure 3.6**. One of the key aims of the final void strategy for this project was to not result in an additional final void in the Mt Arthur Coal area. Two final voids were approved as part of the MAN project, with the final void from the South Pit Extension Project proposed to merge with the southern MAN final void and be designed to achieve a consistent landform. The project will also result in in-filling of existing mining voids in the Bayswater No. 2 and Drayton West Pit areas, producing a net reduction in the number of final voids in the area.

The MAN southern final void was predicted to be a groundwater sink post mining (URS, 2000). It is considered based on the estimated catchment and groundwater inflows to the extended final void, this situation will not change. As such, no overflows of the final void are predicted to occur.

Mt Arthur Coal is required by the MAN development consent to prepare a Final Void Management Plan for the MAN mining area by year five of operations at MAN. The conceptual final void for the South Pit Extension Project will also be discussed in this plan which will address the following:

- options for future use of final voids;
- re-examination of the validation of groundwater modelling and the potential effects on local and regional groundwater;
- details of the strategy for the long-term management of final voids; and
- management of the catchment for the final void.

5.11 Traffic and Transport

The South Pit Extension Project will not result in any significant change to employee numbers at Mt Arthur Coal or increase in total production from the operation above that currently approved. There is therefore not expected to be any significant change in either light or heavy vehicle movements to and from Mt Arthur Coal as a result of the project. The local road network including the intersections of Thomas Mitchell Drive with both Denman Road and the New England Highway, have been upgraded by Mt Arthur Coal over the past few years to ensure that sufficient capacity is provided for traffic volumes associated with Mt Arthur Coal's operations. There are therefore not expected to be any traffic impacts associated with the project.

As the project will not result in any change to total production from Mt Arthur Coal's operations, there will be no change to rail movements associated with delivery of product coal to the Port of Newcastle.

5.12 Socio-Economic Impacts

As discussed in **Section 5.11** above, the project will not result in any significant changes to current employment levels at Mt Arthur Coal and will therefore not place any additional demands on community infrastructure. As the currently approved infrastructure will be used and overall production levels will not change, there is also not expected to be any change to supply of goods and services to the operations.

The project will if approved, extend the currently approved life of the Mt Arthur Coal operations by five years providing ongoing employment opportunities, however, further open cut resources will exist at the end of the currently approved 21 year life of the MAN mining area and mining operations are planned to continue subject to obtaining future approvals.

The project will provide revenue to the State government through the payment of royalties and taxes, contributing to the NSW economy.

5.12.1 Community Engagement

Mt Arthur Coal currently has a comprehensive community engagement program in place and will continue to implement this program for all future operations, including the South Pit Extension Project. Current mechanisms for community engagement include:

- regular community newsletters;
- operation of two CCCs, either of which could be suitable for reporting to on mine development and performance related to the South Pit Extension area;
- statutory reporting including the AEMR;
- the complaints management process;
- community open days;
- other external communication mechanisms including presentations to community groups, the Mt Arthur Coal web site and membership of local organisations and committees; and
- ongoing resident consultation.

Mt Arthur Coal also has an existing Community Plan that documents the operations approach to community development opportunities, including community partnerships, sponsorships and other programs.

The existing community engagement program will continue to be regularly reviewed and revised by Mt Arthur Coal to ensure that it remains effective and meets the needs of the local community.

6.0 Draft Statement of Commitments

If project approval is granted for the proposed South Pit Extension Project and acted upon, Mt Arthur Coal will commit to the following controls:

- 6.1.1 To carry out the development for the South Pit Extension Project generally in accordance with the Project Application and the Environmental Assessment Report.

Production and life of the project

- 6.1.2 The project approval life will be 21 years from the date of project approval. Closure and rehabilitation activities may continue beyond this 21 year period if undertaken in accordance with an approved Mining Operations Plan.
- 6.1.3 Total annual coal production from Mt Arthur Coal including production from the South Pit Extension Project will remain within the combined production limits of the MAN and Bayswater No. 3 development consents: 15 Mtpa ROM in the MAN consent (DA 144-05-2000); and 3.8 Mtpa product coal (approximately 5 Mtpa ROM coal) in the Bayswater No. 3 consent (DA 210-93).

Hours of Operation

- 6.1.4 Mining and associated activities for the South Pit Extension Project may be undertaken on a 24 hour a day, seven day per week basis (refer to commitment 6.4.2 for blasting times).

Anglo Coal Sub-Lease / Partial-Lease Transfer

- 6.2.1 Mt Arthur Coal will enter into a sub-lease agreement / partial-lease transfer (or other legal agreement with the same effect) with Anglo Coal to enable mining and related activities to be conducted consistent with the proposal outlined in the EA within the Drayton mine Mining Lease. Any sub-lease / partial-lease transfer must be approved by the Minister for Primary Industries before mining or related activities commence in this area. If a sub-lease is entered into, the agreement will include delineation of responsibility for environmental management of this area including water management, rehabilitation, spontaneous combustion and associated approvals (e.g. EPL and MOP).

Noise

- 6.3.1 Mt Arthur Coal will manage operations associated with the South Pit Extension Project (the project alone) such that the noise emissions from the project comply with the noise criteria included in **Table 6.1** below.

Table 6.1 – Noise Criteria for the South Pit Extension Project Alone

Locations as Identified in Schedule B of the MAN Development Consent	Intrusive Noise Criteria (Day/Evening/Night) $L_{Aeq,15min}$
Antiene Estate	37 / 40 / 38 dBA
Skellator Stock Route Thomas Mitchell Drive Denman Road	39 / 38 / 37 dBA
Racecourse Road	37 / 36 / 35 dBA
Denman Road West Roxburgh Vineyard and Roxburgh Road	37 / 36 / 35 dBA
South Muswellbrook (incl. the South Muswellbrook Development Area)	35 / 35 / 35 dBA

- Notes:
- 1) Day period is 7.00 am – 6.00 pm; Evening is 6.00 pm – 10.00 pm; Night is 10.00 pm – 7.00 am.
 - a. $L_{Aeq,15min}$ is the value of $L_{Aeq,15min}$ which shall not be exceeded for more than 10% of the monitoring period for continuous noise monitoring for each season and would include the locality specific range of weather conditions occurring at the time of monitoring.
 - b. All measured or predicted noise levels to be rounded to the nearest decibel.

Where monitoring of noise from the combined Mt Arthur Coal operations (refer to commitment 6.3.4) identifies an exceedance of the criteria in **Table 6.1** above, an investigation will be undertaken to determine if the South Pit Extension is the source of this noise and where this is found to be the case, management controls will be applied with the objective of ensuring compliance.

- 6.3.2 Mt Arthur Coal will manage operations associated with the South Pit Extension Project such that the total noise impacts of the combined South Pit Extension Project and MAN mining operations comply with the relevant noise conditions in the MAN development consent. On this basis, the relevant maximum noise limits for the operation are included in **Table 6.2** below.

Table 6.2 – Noise Acquisition Criteria

Locations as Identified in Schedule B of the MAN development consent	Intrusive Noise Acquisition Criteria (Day/Evening/Night) $L_{Aeq,15min}$	Amenity Noise Acquisition Criteria (Day/Evening/Night) $L_{Aeq,period}$
Antiene Estate	greater than 42 / 45 / 43 dBA	greater than 53 / 48 / 43 dBA
Skellator Stock Route Thomas Mitchell Drive Denman Road	greater than 44 / 43 / 42 dBA	greater than 58 / 48 / 43 dBA
Racecourse Road	greater than 42 / 43 / 40 dBA	greater than 53 / 48 / 43 dBA
Denman Road West Roxburgh Vineyard and Roxburgh Road	greater than 42 / 41 / 40 dBA	greater than 53 / 48 / 43 dBA
South Muswellbrook (incl. the South Muswellbrook Development Area)	greater than 40 / 40 / 40 dBA	greater than 53 / 48 / 43 dBA

- Notes:
- 1) Day period is 7.00 am – 6.00 pm; Evening is 6.00 pm – 10.00 pm; Night is 10.00 pm – 7.00 am.
 - a. $L_{Aeq,15min}$ is the value of $L_{Aeq,15min}$ which shall not be exceeded for more than 10% of the monitoring periods detailed in the noise monitoring program for continuous noise monitoring (refer Condition 6.4.3(a)(i)) or for independent noise investigations (refer Condition 6.4.3(a)(v)), as representative of any season (i.e. December to February, March to May, June to August, or September to November) and would include the locality specific range of weather conditions occurring at the time of monitoring.

- b. LAeq,period is the long-term LAeq noise level over the relevant day, evening or night period, as detailed in the noise monitoring program for continuous noise monitoring (refer Condition 6.4.3(a)(i)) or for independent noise investigations (refer Condition 6.4.3(a)(v)). These periods would be representative of any season (i.e. December to February, March to May, June to August, or September to November) and would include the locality specific range of weather conditions occurring at the time of monitoring.
- c. All measured or predicted noise levels to be rounded to the nearest decibel.

6.3.3 Mining operations in the South Pit Extension area, including mobile equipment sound power levels, will be managed with the aim of achieving the predicted noise levels in **Section 5.5.1.3** of the Environmental Assessment report.

6.3.4 Noise monitoring will be undertaken in accordance with the MAN development consent. The MAN Operational Noise Management Plan shall be revised to specifically refer to the project during its next scheduled review.

Blasting

6.4.1 Blast overpressure and vibration levels from blasting undertaken as part of the South Pit Extension Project will comply with the following criteria

Overpressure

The overpressure level from blasting operations on the premises must not:

- a) Exceed 115 dB (Linear Peak) for more than 5% of the total number of blasts over a period of 12 months; and
- b) Exceed 120 dB (Linear Peak) at any time,

when measured at any point that is located at least 3.5 metres from any building or structure at any nearby residential property or other noise sensitive location, such as a school or hospital, and that is non-Company owned or not subject to a private agreement with the landowner.

Ground Vibration (ppv)

Ground vibration peak particle velocity from the blasting operations at the premises must not:

- a) Exceed 5 mm/s for more than 5% of the total number of blasts over a period of 12 months; and
- b) Exceed 10 mm/s at any time,

when measured at any point within the grounds of noise sensitive locations and within 30 metres of any residences or other noise sensitive location, such as a school or hospital, and that is non-Company owned or not subject to a private agreement with the landowner.

6.4.2 Blasting will only take place between 9.00 am and 5.00 pm, Monday to Saturday inclusive unless otherwise approved by the Department of Environment and Climate Change.

6.4.3 Transgrid will be consulted consistent with current practice when blasting in close proximity to the high voltage transmission line located near to the southern boundary of the mining area.

- 6.4.4 Blasting operations within the South Pit Extension area will be undertaken in accordance with the controls outlined in the MAN Blasting / Vibration Management Plan. The plan shall be revised to specifically refer to the project during its next scheduled review.

Air Quality

- 6.5.1 Operations associated with the South Pit Extension Project will be managed in accordance with the MAN Operational Dust Management Plan. The plan shall be revised to specifically refer to the project during its next scheduled review.
- 6.5.2 During the operation of the South Pit Extension Project, Mt Arthur Coal will ensure that the air quality criteria outlined in **Tables 6.3, 6.4** and **6.5** will be met by the project at any non-mine owned land unless a specific agreement is reached with the landholder in regard to air quality impacts.

Table 6.3 – Long Term Dust Concentration Criteria

Pollutant	Averaging Period	Criterion
Total suspended particulate (TSP) matter	Annual	90 µg/m ³
Particulate matter <10 µm (PM ₁₀)	Annual	30 µg/m ³

Note: Should monitoring identify that the above limits are not met an investigation will be undertaken to identify if Mt Arthur Coal is a major contributor to dust levels at this location with further action subject to the findings from this investigation and as agreed with DoP.

Table 6.4 – Short Term Dust Concentration Criteria

Pollutant	Averaging Period	Criterion	Percentile ^a	Basis
Particulate matter <10 µm (PM ₁₀)	24 hour	150 µg/m ³	99 ^b	Total ^c
Particulate matter <10 µm (PM ₁₀)	24 hour	50 µg/m ³	98.6	Increment ^d

a Based on the number of block 24 hour averages in an annual period.

b Excludes extraordinary events such as bushfires, prescribed burning, dust storms, sea fog, fire incidents, local short duration agricultural activities, illegal activities or any other activity agreed by DoP in consultation with DECC.

c Background PM₁₀ concentrations due to all other sources plus the incremental increase in PM₁₀ concentrations due to the South Pit Extension Project alone.

d Incremental increase in PM₁₀ concentrations due to the South Pit Extension Project alone.

Table 6.5 – Dust Deposition Criteria

Pollutant	Averaging Period	Maximum Increase in Deposited Dust Level	Maximum Total Deposited Dust Level
Deposited dust	Annual	2 g/m ² /month	4 g/m ² /month

Note: Deposited dust is assessed as insoluble solids as defined by Standards Australia, 1991, AS 3580.10.1-1991: Methods for Sampling and Analysis of Ambient Air - Determination of Particulates - Deposited Matter - Gravimetric Method.

Spontaneous Combustion

- 6.6.1 Where possible, emplacement activities in Bayswater No. 2 and the Drayton West Pit will be prioritised to treat spontaneous combustion affected areas to remediate outbreaks as early as possible.

- 6.6.2 The MAN Spontaneous Combustion Management Plan will be applied to operations undertaken as part of the South Pit Extension Project. This plan shall be revised to specifically refer to the project during its next scheduled review.

Aboriginal Heritage

- 6.7.1 Aboriginal site loci within the disturbance area for the South Pit Extension Project (as defined by the 'new disturbance area' shown on **Figure 1.3**) shall be salvaged by surface collection prior to any earthworks. Salvage works will be undertaken in consultation with the Aboriginal community and in accordance with the salvage methodology contained in Appendix 3 of the Aboriginal Archaeology Assessment report (**Appendix 6** of the Environmental Assessment).
- 6.7.2 A report containing the findings of the salvage program and subsequent artefact analysis will be completed within two years of the salvage works and two copies provided to the Department of Environment and Climate Change. Copies will be made available to Aboriginal community groups that participated in the consultation program for this project.
- 6.7.3 Aboriginal site loci (or parts thereof) identified in the project specific archaeological survey for the project and located outside of the disturbance area for the South Pit Extension Project (as defined by the 'new disturbance area' shown on **Figure 1.3** and as listed in Table 8.1 of **Appendix 6**), shall be managed *in situ* and protected by fencing, appropriate signage and notification to relevant site personnel. These loci will be protected and managed under Mt Arthur Coal's Archaeology and Cultural Management Plan (prepared for the MAN mining area) which will be revised to incorporate these loci.
- 6.7.4 If any human skeletal material is uncovered during ground disturbing works all work will cease and the NSW Police Department, Department of Environment and Climate Change and Aboriginal stakeholder groups will be notified. These stakeholders will then be consulted in relation to the development of appropriate mitigation measures.

Water Management

- 6.8.1 Water management controls for all emplacement areas that are externally draining and other areas within the project area outside the pit water management system shall be designed and constructed to a standard consistent generally with Managing Urban Stormwater: Soils and Construction (Landcom, 2004) (the Blue Book) and Guidelines for Establishing Drainage Lines on Rehabilitated Minesites (Draft) (DLWC, 1999) or their subsequent revisions or alternate guidelines as recommended by the Department of Water and Energy or Department of Primary Industries.
- 6.8.2 Sediment dams constructed to capture and treat runoff from disturbed catchment areas that do not flow into the mining pit will be designed to treat water to a standard such that any overflows do not exceed 50 mg/L of sediment for rainfall events within the dam design capacity (design capacity as per the Blue Book or subsequent revisions at the time of completing works).
- 6.8.3 Operational water quality control to be implemented as part of the project to minimise impacts on the surrounding environment will include:
- clearly identifying and delineating areas required to be disturbed and ensuring that disturbance is limited to those areas, clearing as little vegetation as required and minimising machinery disturbance outside of these areas;

- construction of drains upslope of mine disturbance areas to convey clean runoff around disturbed areas where practically possible;
 - constructing road and earthworks cut and fill batters (excluding the mining pit and emplacement areas) at slopes of 1V:3H or less, where possible, to maximise long term stability;
 - regular maintenance of all erosion control works and rehabilitated areas;
 - prompt revegetation of areas as soon as practical following completion of earthworks; and
 - inspections of all major sediment erosion and control works on a regular basis and after major storm events to ensure these are in a functional condition and operating effectively.
- 6.8.4 Water usage, estimated on-site water make (runoff and groundwater inflow) and external water sourcing will be reported in the AEMR.
- 6.8.5 Saddlers Creek itself will not be disturbed as part of mining or related activities with this area protected by management measures, including fencing.

Licences and Approvals

- 6.8.6 Mt Arthur Coal will apply for a licence under Part 5 of the *Water Act 1912* from the Department of Water and Energy for the mining pit prior to the commencement of mining operations in the South Pit Extension area.

Monitoring and Contingency Measures

- 6.8.7 An annual analysis of surface and groundwater monitoring data will be undertaken and will include:
- identification of any changes or long term trends in surface water quality. Should any adverse trends be identified, an investigation will be implemented to determine if the trend is a result of Mt Arthur Coal's operations and if so, will identify management strategies to be implemented to address the identified issues;
 - a comparison to modelled groundwater impact predictions.

The monitoring results and analysis findings will be reported in the AEMR.

- 6.8.8 Mt Arthur Coal will explore the potential to establish a groundwater / base flow monitoring system for Saddlers Creek in consultation with the Department of Water and Energy. Where a suitable approach can be identified, a base flow measurement program will be implemented with results reported on an annual basis in the AEMR, or as otherwise agreed, to the Department of Water and Energy.

Visual

- 6.9.1 The northern faces of the overburden emplacement area at Bayswater No. 2 will be given priority in the first five years of mining operations in the South Pit Extension area to provide visual screening. The emplacement of overburden over the former North Pit tailings dam may not be possible within this period due to the need to allow

sufficient time for tailings to dry out, however, this area will also be completed if possible.

- 6.9.2 Initial revegetation works will be completed on the northern faces of the emplacement area within six months of final shaping unless severe dry conditions prevail.
- 6.9.3 To assist in the visual screening achieved by the northern face of the emplacement area, native trees chosen for their fast-growing and habitat qualities, will be planted along the crest line and adjacent land in this area.
- 6.9.4 Controls to be implemented for operations undertaken as part of the South Pit Extension Project to minimise night time lighting impacts will include:
- designation of specific night-time overburden emplacement locations so that night-time operations are undertaken in visually shielded locations where possible; and
 - use of louvres or shields on mobile lighting plant used in exposed areas (i.e. potentially visible off site) to reduce potential for lighting visibility at night and to reduce fugitive light emissions.

Ecology

- 6.10.1 Mt Arthur Coal will implement an ecological offset package for the project in consultation with the Department of Environment and Climate Change and to the satisfaction of the Department of Planning. This package will include:
- modifying the Voluntary Conservation Agreement process (cultural heritage) underway for the proposed Mt Arthur conservation area to ensure that it provides for appropriate protection of the ecological values of this area in perpetuity, in addition to its archaeological values;
 - a vegetated corridor (approximately 45 hectares) will be established to connect the vegetated habitats of Mt Arthur and Saddlers Creek (refer to **Section 5.2.4.1**). The corridor will be established through seeding / planting of native species;
 - Saddlers Creek near the project area (as defined in Section 6.3.2 of the Ecological Assessment in **Appendix 5** of the Environmental Assessment report) will be fenced off to protect the riparian corridor and encourage natural regeneration. Cattle grazing (other than as a land management tool) will be excluded from this area; and
 - rehabilitation to create additional areas of native vegetation as discussed in commitment 6.10.7 below.
- 6.10.2 All tree clearing will be undertaken generally in accordance with the process outlined in Section 6.3 of the Ecological Assessment (refer to **Appendix 5** of the Environmental Assessment report).
- 6.10.3 The existing Mt Arthur Coal ecological monitoring program will be modified to include a fauna monitoring site on Saddlers Creek to the south of the project area, to be monitored on at least a three (3) yearly basis.
- 6.10.4 Monitoring of rehabilitation success within the South Pit Extension area will also be undertaken on a three (3) yearly basis for the life of the project.

- 6.10.5 Nest boxes will be established as part of the project to offset the loss of tree hollows within the project area as discussed in Section 6.3.2 of the Ecological Assessment (refer to **Appendix 5** of the Environmental Assessment report).
- 6.10.6 Nest boxes installed as part of the project will be monitored on a three (3) yearly basis for the life of the project.
- 6.10.7 To offset the loss of native woodland and forest vegetation, the following minimum areas of each vegetation community will be established as part of rehabilitation or habitat creation works:
- at least 48 hectares of Central Hunter Spotted Gum – Ironbark - Grey Box Forest;
 - at least 5 hectares of Central Hunter Bulloak Forest Regeneration; and
 - at least 0.5 hectares of Hunter Floodplain Red Gum Woodland Complex via assisted regeneration of the Saddlers Creek riparian zone.
- 6.10.8 Consistent with the offset for impacts on the regionally significant spotted gum as part of the MAN project, seed stock from the site will be used to establish spotted gums included in offset plantings, where practical.

Rehabilitation and Decommissioning

Rehabilitation & Habitat Management Strategy

- 6.11.1 Mt Arthur Coal will prepare a Mt Arthur Coal complex wide Rehabilitation and Habitat Management Strategy to guide future rehabilitation works and habitat management strategies for the Mt Arthur Coal operations area. The plan will be submitted to the Director General of the Department of Planning for approval within 12 months of the commencement of mining operations and reviewed at least every five (5) years. Progress in implementing the strategy will be reported in Mt Arthur Coal's AEMR. (Note: this strategy may be incorporated into the site wide Flora and Fauna Management Plan to be developed from existing management plans for site).
- 6.11.2 The rehabilitation and landscape management strategy to be implemented as part of the project will include:
- linkage of the Saddlers Creek riparian corridor to the Mt Arthur remnant vegetation area by a vegetation corridor as shown on **Figure 5.15** (resulting in establishment of approximately 45 hectares of native woodland/forest vegetation); and
 - establishment of substantial areas of native vegetation on rehabilitated overburden emplacement areas in the Bayswater No. 2 area as shown on **Figure 5.15** to ensure a net gain of woodland / forest vegetation as a result of the project and consistent with the Synoptic Landscape Plan.

Rehabilitation Works

- 6.11.3 The detailed emplacement area design will be included in Mt Arthur Coal's Mining Operations Plan (MOP) for approval of the Department of Primary Industries prior to emplacement activities commencing and will aim to enhance progressive rehabilitation opportunities.

Decommissioning of Bayswater No. 2 Infrastructure

6.11.4 A decommissioning plan will be prepared for the Bayswater No. 2 workshop and industrial area as part of the MOP that proposes covering this area with overburden from new mining areas. This plan will be provided to the Department of Primary Industries for approval prior to the commencement of works.

Final Void

6.11.5 Details of the final void associated with the South Pit Extension Project will be included in the Final Void Management Plan, or subsequent revision depending on the date of Project Approval, required to be prepared for the MAN project by year five of operations at MAN.

Drayton West Pit

6.11.6 Mt Arthur Coal will reshape, construct drainage and sow with pasture grasses the Anglo Coal sub-lease / partial-lease transfer areas affected by emplacement activities conducted by Mt Arthur Coal. These works will be conducted in accordance with the terms of the sub-lease / partial-lease transfer and be detailed in the MOP covering activities in this area.

Waste Management

6.12.1 No waste will be disposed of on site except for inert wastes permissible under Mt Arthur Coal's Environment Protection Licence with all other waste disposed of at an appropriately licensed waste management facility.

Annual Reporting

6.13.1 Details of the South Pit Extension operations including compliance with the final Statement of Commitments and any Conditions of Approval, will be reported annually in a AEMR. AEMR reporting for the project will be combined with AEMR reporting for other components of Mt Arthur Coal's operations.

Independent Environmental Audit

6.14.1 Three years after commencement of mining operations in the South Pit Extension area, and every three years thereafter, Mt Arthur Coal will commission and pay the full cost of an Independent Environmental Audit of the project in consultation with the Director-General of the Department of Planning. A copy of the audit report will be provided to the Director-General of the Department of Planning and Department of Primary Industries, Department of Environment and Climate Change, Muswellbrook Shire Council, Department of Water and Energy and members of the Community Consultative Committee relevant to this project. The audit timing will be preferably combined with other independent environmental audits required by Mt Arthur Coal's development consents as agreed by the Director-General of the Department of Planning.

Community Consultative Committee

6.15.1 Mt Arthur Coal will report on activities undertaken within the South Pit Extension area and discuss relevant issues regarding these activities with either the Mount Arthur North or Bayswater No. 3 Community Consultative Committee (CCC) as agreed in consultation with Muswellbrook Shire Council and the Department of Planning.

Consolidation of Environmental Management Plans

- 6.15.2 Within 12 months of obtaining Project Approval, Mt Arthur Coal will consolidate the existing Environmental Management Plans for the currently approved MAN, Bayswater No. 3 and Rail Loading Facility operations with a view to producing a single suite of environmental management plans that cover the entire Mt Arthur Coal complex, including South Pit Extension area. This work will be undertaken in consultation with the relevant Government authorities.

7.0 Conclusion and Justification for the Project

7.1 Project Justification

The additional area of coal proposed to be extracted as part of the South Pit Extension Project is surrounded by existing mining operations undertaken by Mt Arthur Coal and Drayton. Based on current economics, it is considered unlikely that the coal within the project area would be able to be economically recovered as a stand-alone operation and therefore is likely to be sterilised if not extracted by Mt Arthur Coal. The recovery of this resource will also provide revenue to the State government through payment of taxes and royalties.

The project will also provide substantial operational benefits to Mt Arthur Coal by allowing full utilisation of Mt Arthur Coal's currently approved mobile equipment fleet (MAN and Bayswater No. 3) by providing additional working room and a safer working environment. The flexibility of greater working room and overburden emplacement areas will also assist Mt Arthur Coal in actively managing environmental impacts (e.g. noise impacts) by providing greater flexibility to change operations in high risk periods (e.g. adverse climatic conditions).

The proposed extension area is located centrally within existing mining areas and is further away from residential receivers than existing operations, helping to minimise the potential impact of the project on the local community. This EA has demonstrated that the project can be completed without significant changes in the impact of Mt Arthur Coal's operations on the community and without having a significant impact on the local environment. Potential impacts will be managed by implementing the management commitments outlined in **Section 6.0**. Mt Arthur Coal has demonstrated through its existing operations a commitment to best practice management of environmental impacts associated with mining and will implement proven management practices as part of the proposed South Pit Extension.

The emplacement of overburden material at Bayswater No. 2 and Drayton will assist in remediation of areas currently subject to spontaneous combustion and will result in an improved final landform in these areas, providing an environmental benefit as part of the project. The completion of rehabilitation in these areas will also allow Mt Arthur Coal to meet its commitment to complying with the DPI's synoptic landscape strategy for the rehabilitation of coal mines in the Hunter Valley.

7.2 Conclusion

The DGRs seek a conclusion justifying the project, including whether or not the project is in the public interest. The Minister for Planning will determine whether or not the project is in the public interest, however, the project is consistent with relevant objectives of the EP&A Act. On considering the balance of environment and community impacts, it is considered that it would be reasonable for the Minister to conclude that the State, regional and local benefits of the project outweigh the impacts.

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