NORTHPARKES

Managed by Rio Tinto

STEP CHANGE PROJECT

PRELIMINARY ENVIRONMENTAL ASSESSMENT

June 2011

Umwelt

Environmental Consultants

Preliminary Environmental Assessment
Northparkes Step Change Project

Prepared by

Umwelt (Australia) Pty Limited

on behalf of

North Mining Limited

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1.0 Introduction

Northparkes Mines (NPM) is a copper-gold mine located approximately 27 kilometres north of Parkes in central New South Wales (NSW) (refer to **Figure 1.1**). The NPM landholdings are comprised of approximately 6115 hectares which encompass the existing NPM site as well as agricultural landholdings within the surrounding area.

NPM is a joint venture between Rio Tinto (80 per cent), Sumitomo Metal Oceania Pty Ltd. (13.3 per cent) and Sumitomo Corporation (6.7 per cent). Mining operations at NPM commenced in 1993 following an extensive exploration program and the granting of the original development consent. Since that time, NPM have progressed with the development of open cut and underground mining operations, and associated infrastructure, in accordance with previously granted development consents. NPM currently employs over 700 full time equivalent staff, and has established a strong relationship with the local community.

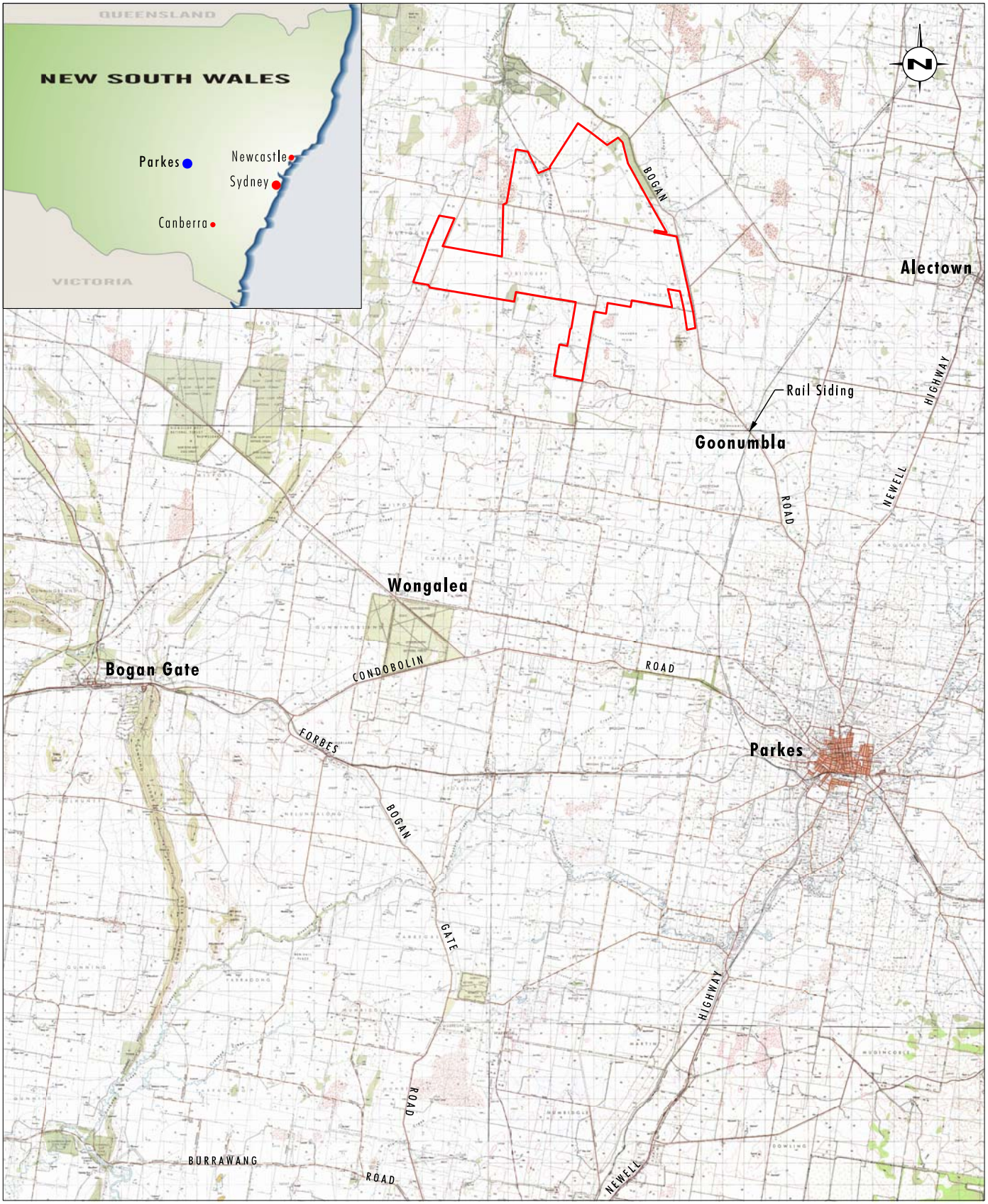
NPM currently operates under PA06_0026 issued in February 2007 by the NSW Department of Planning pursuant to Part 3A of the *Environmental Planning and Assessment Act 1979* (EP&A Act). PA06_0026 allows for the continuation of existing operations as well as the E48 block cave extension. NPM was granted a modification to PA06_0026 in October 2009. The modification to PA06_0026 allows for the construction of an additional Tailings Storage Facility (TSF), a mine and mill upgrade to increase production to 8.5 million tonnes per annum (Mtpa) and an extension to the mine life until 2025.

NPM have undertaken extensive exploration and review of operational scenarios. The review has identified opportunities for the development of a significant resource to provide for expanded operations into the future. The Northparkes Step Change Project (the Project) encompasses the development of further mining operations including depth extensions to three existing ore bodies and the development of one new ore body through underground mining methods. The Project will result in an increase in maximum production from 8.5 Mtpa to 30 Mtpa. As a result of the production increase, the Project also provides for major upgrades to mine infrastructure including the processing plant and tailings management facilities.

The Project was declared a Major Project under the State Environmental Planning Policy (Major Development) 2005 on 9 March 2011. Accordingly, the Project will be determined under Part 3A of the EP&A Act and requires the approval of the Minister for Planning and Infrastructure.

1.1 Project Overview

The key features of the Project are outlined in **Table 1.1** and shown on **Figure 1.2.** Further details of the Project are provided in **Section 2.0**.



Source: NPM (2011), Department of Lands (2006)

0 3.0 6.0 12km
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Legend

Northparkes Project Area

FIGURE 1.1

Locality Map

File Name (A4): R02_2949_003.dgn
20110603 8.38

Source: NPM (2011), LPMA (2011)

0 1 2.5 5km
1:100 000

Legend

- Northparkes Project Area
- Proposed Mining Activities
- Existing/Approved Tailings Storage Facility

FIGURE 1.2

Conceptual Design - Northparkes Step Change Project

Table 1.1 – Key Features of the Project

Major Project Components/Aspects	Proposed Operations
Limits on Extraction	• Increase in processing from a maximum of 8.5 million tonnes per annum (Mtpa) of ore to 30 Mtpa of ore from multiple block caves
Mine Life	• Extension of approved mine life for 16 years
Operating Hours	• 24 hours a day, 7 days per week
Number of Employees	• Up to approximately 930 full time equivalents employees during ongoing operation; and • Up to 1500 full time equivalents employees during Project construction
Mining Methods	• Multiple Underground Block Cave (refer to **Section 2.0**)
Mining Areas	• Depth extensions to the E26, E22 and E48 ore bodies and the development of a new zone of mineralisation at GRP314.
Infrastructure	Construction and operation of: • tailings storage facilities; • 30 Mtpa concentrator to include secondary and tertiary crushing utilising high pressure grinding rolls, ball mills and large cell flotation circuit; • a filtration plant proposed adjacent to an upgraded Goonumbla rail siding facility; • a pipeline connecting the proposed concentrator and proposed filtration plant at the Goonumbla rail siding facility; • extensions and upgrade to ore conveyor network; and • site offices, training rooms and workshop facilities.
Utilities	• Upgrades to existing ancillary infrastructure such as electricity transmission lines and water supply infrastructure
Tailings Strategy	• Development of consolidated Tailings Strategy including: ▪ continuation of tailings disposal to existing and approved tailings storage facilities, including deposition into E27 open cut void; ▪ investigation of tailings deposition into E22 open cut void; and ▪ construction of an additional Tailings Storage Facility (TSF 5).
External Ore Transport	• Use of existing rail infrastructure to transport product to Port Kembla, for loading onto ships for export

1.2 Purpose of the Document

This Preliminary Environmental Assessment (Preliminary EA) has been prepared by Umwelt (Australia) Pty Limited (Umwelt) on behalf of NPM in order to brief relevant government agencies on the Project, introduce the environmental studies available to date and identify key issues to be addressed in the Environmental Assessment (EA) for the Project.

NPM are currently undertaking further refinement of the conceptual project design. As part of the conceptual design process, Umwelt have commenced baseline environmental studies which will inform the further refinement of the Project design. The information outlined in this Preliminary EA is in preliminary form and may be subject to change in the future based on the outcomes of the detailed environmental studies.

References in this document to the 'Project area' relate to proposed mining activities contained within the existing NPM site and land required for the development of mining, surface facilities and infrastructure associated with the Project, as shown on **Figure 1.2**.

2.0 Existing Operations and Description of the Proposed Development

2.1 Project Approval History

NPM has been operating since 1993 following the granting of the original development consent (DA504/90). In February 2007, the NSW Minister for Planning granted PA06_0026 under Part 3A of the Environmental Planning and Assessment Act (EP&A Act). This approval provided for the ongoing operation of the previously approved facilities activities and the extension of underground block cave mining into the E48 Ore Body (refer to **Figure 2.1**). This project was known as the E48 Project.

In October 2009, NPM received two modifications to PA06_0026 under Section 75W of the EP&A Act. Section 75W Modification approval One (Mod1) provided for the construction of the Estcourt Tailings Storage Facility, a mine and mill upgrade to increase production to 8.5 million tonnes per annum and extension of mine life until 2025. Section 75W Modification approval Two (Mod2) provided for the development of a 1200 m^2 warehouse within the approved mine infrastructure area as depicted in **Figure 2.1**. NPM continues to operate in accordance with PA06_0026, with further detail on the existing and approved operations provided in **Section 2.2**.

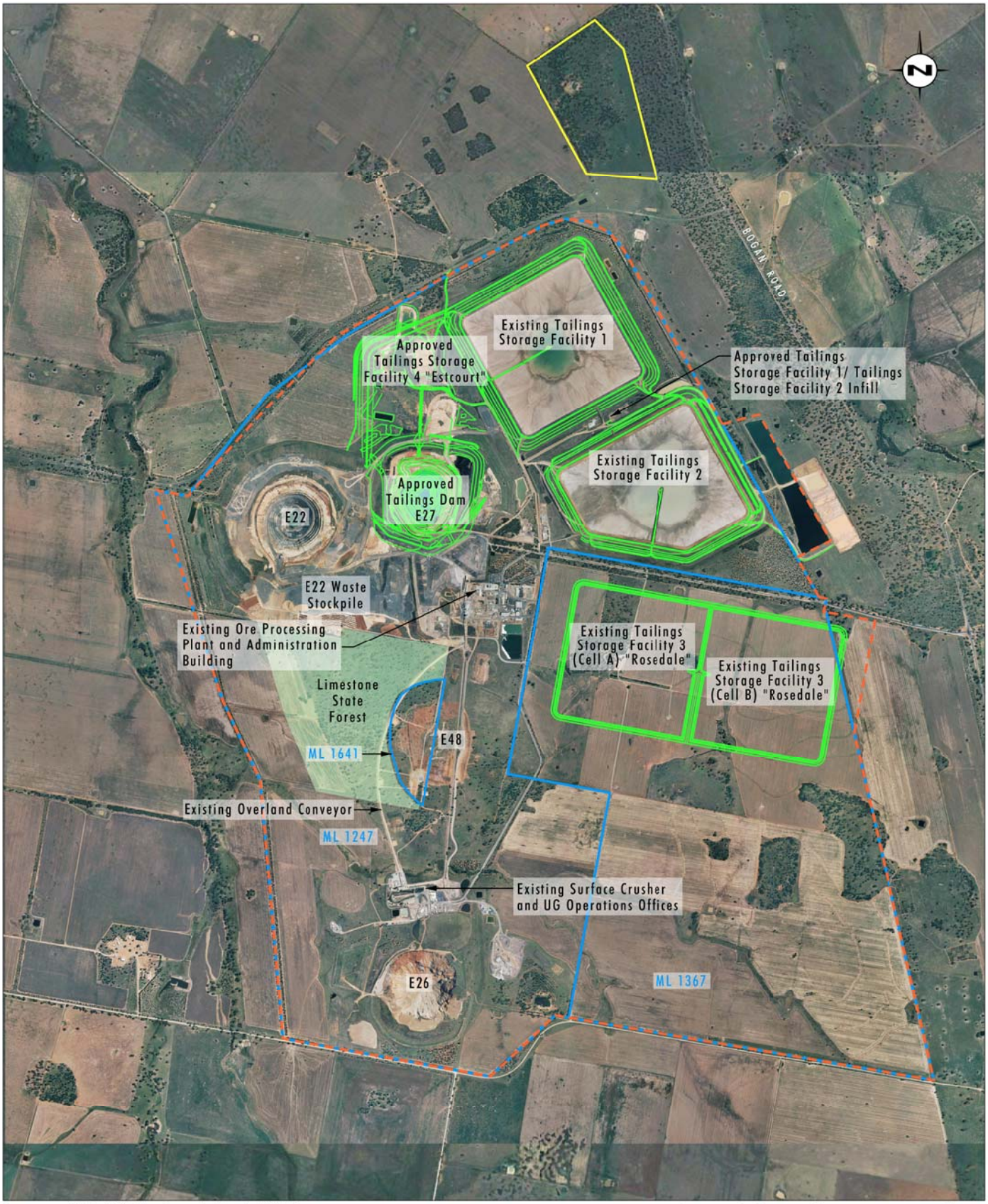
In addition to the existing project approval, NPM operates in accordance with a range of other statutory approvals. **Table 2.1** provides a summary of the major existing statutory approvals for the NPM site, which are shown on **Figure 2.2**.

Table 2.1 – Major Statutory Approvals

Approval No.	Description
PA06_0026	Project Approval, including: • Modification 1 • Modification 2
ML 1247	Mining Lease
ML1367	Mining Lease
ML 1641	Mining Lease
EL 5800	Exploration Licence
EL 5801	Exploration Licence
EL 5323	Exploration Licence
EPL 4784	Environmental Protection Licence
NA	Parkes Shire Council Approval for Road Train Access on Bogan Road (1999)
DA2009/0057	Development Consent (Forbes water pipeline)
HD48307	Limestone State Forest Occupation Permit

2.2 Existing and Approved Operations

Since the granting of the original development consent in 1993, NPM have been developing the mining operations in accordance with relevant approvals. **Figure 2.1** shows existing surface infrastructure at the NPM site which includes the following:



Source: NPM (2011), Google Earth (2010)

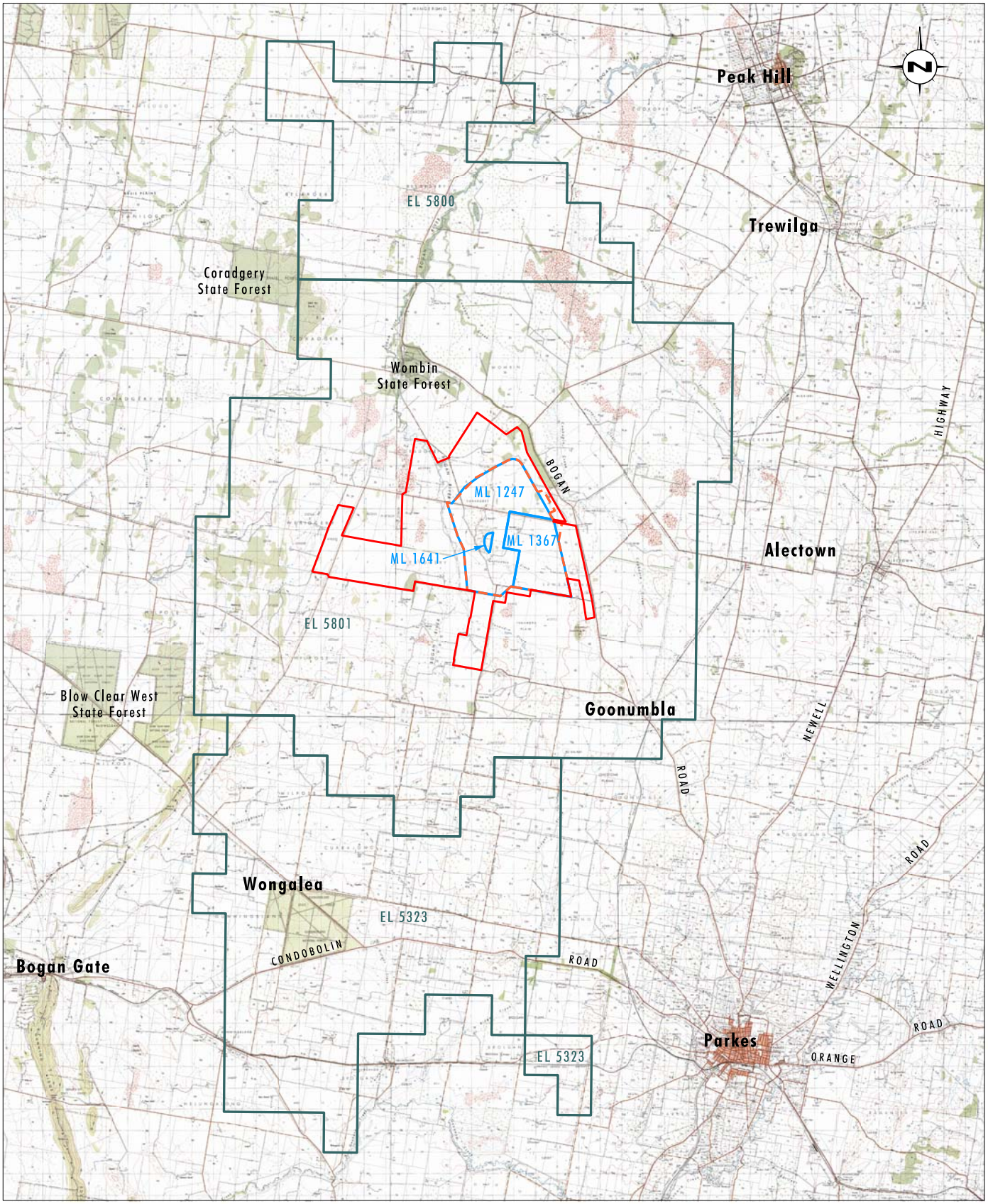
0 0.5 1 2km
1:40 000

Legend

- Mining Lease Boundary
- Existing Development Consent Boundary
- Existing/Approved Tailings Storage Facility
- Biodiversity Offset Area
- Limestone State Forest

FIGURE 2.1

Existing Approved Operations



Legend

- Northparkes Project Area
- Existing Development Consent Boundary
- Mining Lease Boundary
- Exploration Licence Boundary

FIGURE 2.2

Existing Mining Leases and Exploration Licences

- two open cut mines, E22 and E27, surrounded by ore stockpiles, waste rock dumps and a sound bund. Mining has ceased in both the E27 and E22 open cuts;

- E26 underground block cave mine, including associated underground mining infrastructure and resultant surface subsidence affectation area. Surface infrastructure includes the portal, workshops, mining offices, hoisting shaft, ventilation fans and transfer and overland conveyor. Marginal ore stockpiles, waste rock dumps and stockpiles of clay and oxide material are located around the surface affectation area outside the predicted final subsidence limits. Underground mining contractor laydown areas are established on the surface around the mining offices;

- E48 underground block cave mine which commenced operation in 2010;

- ore processing plant including surface crusher, crushed ore stockpiles, active grinding mills, froth flotation area and concentrate storage;

- service infrastructure including administration building and change rooms, core shed, laboratory, emergency response shed, warehouse, workshop and associated roads and electrical infrastructure;

- two existing operational tailings storage facilities (TSF 1 & 2), current construction of TSF 4 Estcourt and associated infrastructure and infilling of E27 void;

- an overland conveyor to transport ore from the hoisting shaft to the ore processing plant stockpiles; and

- road haulage of concentrate to the Goonumbla rail siding for transport to Port Kembla.

In addition to the above infrastructure activities, NPM farms the majority of its landholdings for cropping, including much of the 2456 hectares of land within existing mining leases.

As part of the E48 Project Approval (PA06_0026) NPM were required to provide an adequate offset for predicted subsidence impacts on the Limestone State Forest located within the NPM site. This has been achieved through a number of land swaps and establishment of management agreements between NPM and Forests NSW (refer to **Section 4.1**). The current Limestone State Forest is shown on **Figure 2.1**.

The development of the Estcourt tailings storage facility in accordance with PA06_0026 (Mod 1) required the establishment of a Biodiversity Offset Area. The Biodiversity Offset Area is 65 hectares and is located to the north of the existing NPM site (refer to **Figure 2.1**).

As shown on **Figure 2.1**, NPM has approval under PA06_0026 to construct and operate a number of substantial project components which have not yet been constructed. The components include the following:

- Estcourt Tailings Storage Facility – currently under construction;

- Tailings Storage Facility three (TSF 3) ‘Rosedale’ Cell’s A and B;

- Rosedale Borrow Pit to provide material for the construction of the TSF 3;

- infill between TSF 1 and TSF 2; and

- development of Waste Rock Stockpile to the east of the E26 Subsidence Zone.

2.2.1 Environmental Management

NPM operate and manage the environmental aspects of the existing mining operations under an ISO 14001 certified environmental management system (EMS) to encourage rigour and consistency in environmental management across the site. In addition to meeting the requirements of ISO 14001, the NPM EMS also meets Rio Tinto Environmental Standards and considers all relevant legislation.

The EMS provides standards to ensure NPM manages its environmental aspects in a manner that is planned, controlled, monitored, recorded and audited, using a system that drives continual improvement.

NPM is operated in accordance with a range of environmental management plans required by existing development consents. All management plans are incorporated in the NPM EMS. Central to the implementation of the EMS, and associated environmental management plans, is a comprehensive environmental monitoring program. The key elements of the environmental monitoring program are shown on **Figure 2.3**.

The NPM EMS is regularly audited as part of the ISO 14001 surveillance program, with the most recent audit conducted in March 2010.

2.3 Geology and Resource Description

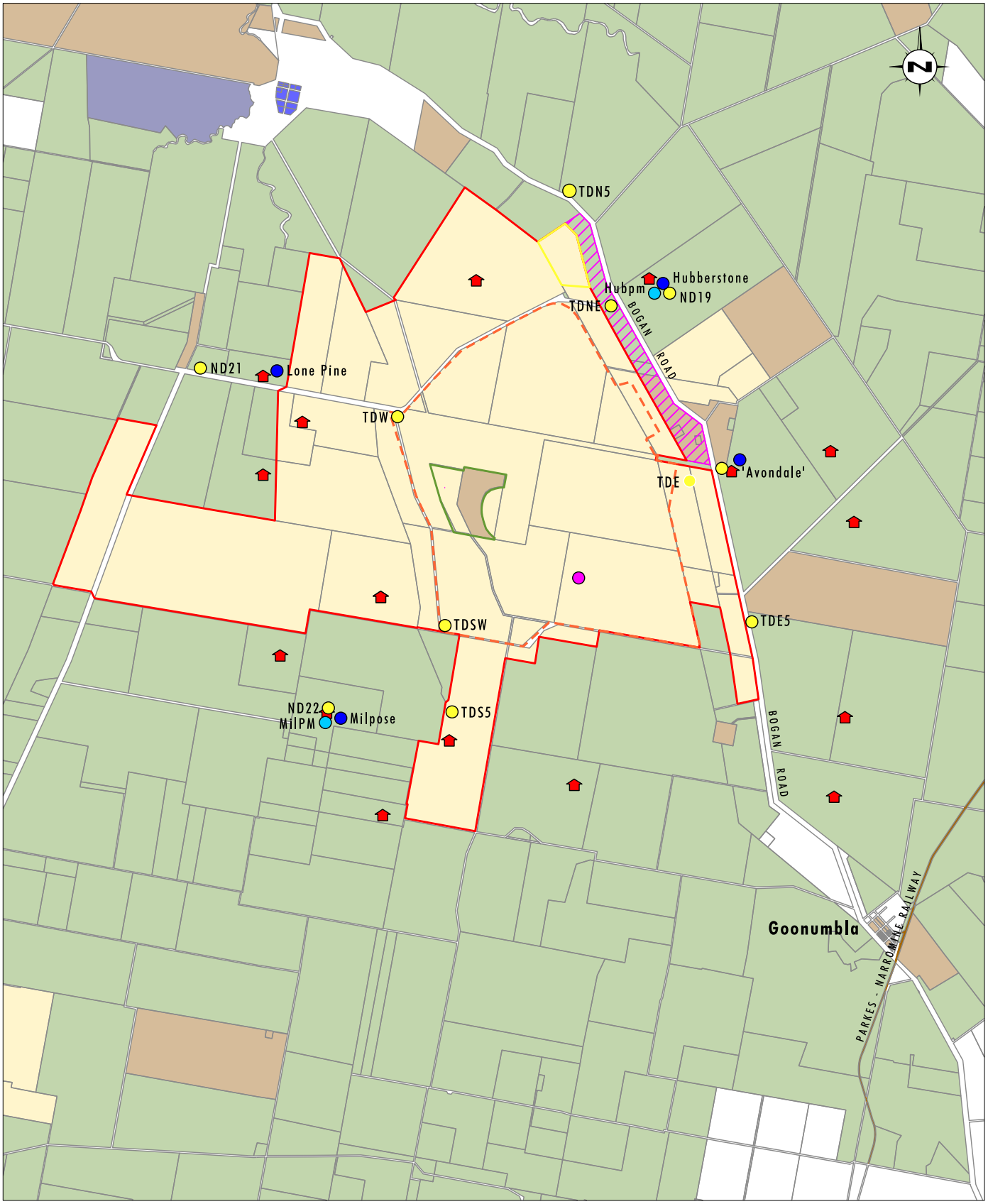
The NPM deposits occur within the Ordovician Goonumbla Volcanics of the Goonumbla Volcanic Complex (Simpson *et al.* 2000). The Goonumbla Volcanics form part of the Junee-Narromine Volcanic Belt of the Lachlan Orogen (Glen *et al.* 1998). At NPM, the Goonumbla Volcanics are a folded sequence of trachyandesitic to trachytic volcanic and volcaniclastic sediments that are interpreted to have been deposited in a submarine environment.

In the NPM region the Goonumbla Volcanics have been intruded by equigranular monzonite stocks. Quartz monzonite porphyry pipes and dykes, some of which are associated with mineralisation, have intruded both Goonumbla Volcanics and the equigranular monzonite stocks.

The NPM deposits are typical porphyry copper systems in that the mineralisation and alteration are zoned around quartz monzonite porphyries. The porphyries form narrow (typically less than 50 metres in diameter) but vertically extensive (greater than 1000 metres) pipes. Mineralisation extends from the porphyries into their host lithology. The E26 and E48 deposits range from 60 to 500 metres in diameter and extend vertically for more than 1300m.

Recent exploration activities have provided extensive deep drill coverage in the mine corridor. This has led to the discovery of additional mineralisation at depth beneath the E26 Lift 2 and E48 Lift 1 block cave mines and at depth beneath the current open pit cut-back at E22. Exploration activities also led to the discovery of the GRP314 system, located only 1 kilometre from E26, in 2004.

The depth extensions of mineralisation beneath the E26 Lift 2 and E48 Lift 1, and the mineralisation at GRP 314 whilst significantly more extensive than the mineralisation exploited by previous block cave mines is of a lower grade. The lower grade of these mineralised zones requires NPM to optimise the current operation to make extraction economically viable.



Source: NPM (2011), LPMA (2011)

0 1 2.5 5km
1:100 000

Legend

- Northparkes Project Area
- Existing Development Consent Boundary
- Biodiversity Offset Area
- Limestone State Forest Boundary
- State Forest of NSW
- Mine Owned
- Local Government Authority
- Freehold
- Department of Lands - Crown
- Travelling Stock Route
- Private and Mine Owned Residences within vicinity of Project Area
- Noise Monitoring Location
- Depositional Dust Monitoring Location
- PM10 Monitoring Location
- Meteorological Station

FIGURE 2.3

Existing Environmental Monitoring Locations

2.4 Proposed Development

As part of the Project, NPM is seeking one consolidated Project Approval to cover previously approved mining operations and the proposed operations for an additional 16 years. The proposed mine plan will continue to be refined as a part of the environmental assessment process to minimise environmental and social impact. The major components of the Project are outlined below and shown on **Figure 1.2**:

- extension of Block Cave underground mining of existing onsite ore bodies, including development of the E26 (Lift 3), E48 (Lift 2) and E22 (Lift 1) deposits and associated underground mine infrastructure (refer to **Figure 2.4**);
- development of block cave underground mining at the GRP314 zone of mineralisation and extension of existing underground mine infrastructure (refer to **Figure 2.4**);
- a new ore processing facility to replace the existing facility capable of processing up to 30 million tonnes per annum (Mtpa) of ore;
- development of consolidated Tailings Strategy including:
    - continuation of tailings disposal to existing and approved tailings storage facilities, including deposition into E27 open cut void
    - investigation of tailings deposition into E22 open cut void and block cave subsidence zones; and
    - construction and operation of an additional Tailings Storage Facility (TSF 5) to the west of existing operations;
- construction and operation of filtration plant and expanded rail load facilities, including the construction of pipeline infrastructure to provide for transport of concentrate (slurry) to filtration plant, and return water pipeline; and
- ancillary infrastructure including upgrades to existing electricity transmission lines, development of a pipeline to transport ore (in a slurry form) and then return recycled water from a filtration plant at the upgraded rail siding facility as well as additional support infrastructure including, conveyors, lay down areas and office facilities.

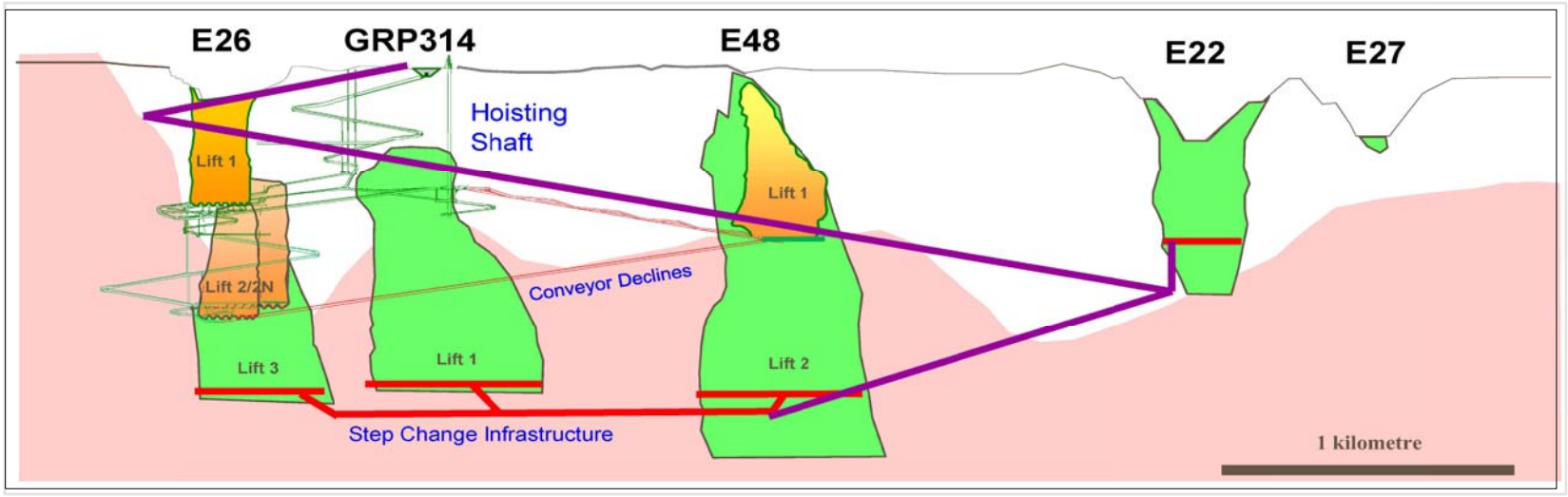
Further detail on these key project components is provided the following sections.

2.4.1 Underground Mining

Block-caving is a large scale production mining method applicable to low grade massive ore bodies with: large dimensions both vertically and horizontally; a rock mass that behaves properly, breaking into blocks of manageable size; and a ground surface which is allowed to subside. **Figure 2.5** is an idealized view of the block caving concept used at NPM.

NPM existing underground block caves use a very efficient mining and material handling process compared to other operations. NPM's typical mine layout comprises a number of highly productive and cost-efficient elements, including energy-efficient electric loaders, high-volume jaw-gyratory crushers and conveyors, most of which is automated. The NPM layout is also based on a single production horizon, eliminating the additional trucking/rail haulage levels.

To successfully extract the target mineralisation zones at minimal operating cost as part of the Project, the existing NPM block cave design successfully used at E26 Lift 2 and E48 has



Legend

- Approved Underground Mining Operations
- Proposed Underground Mining Operations
- Existing Underground Infrastructure
- Proposed Underground Infrastructure

Source: NPM (2011)

FIGURE 2.4

Cross Section of Proposed Underground Mining Operations

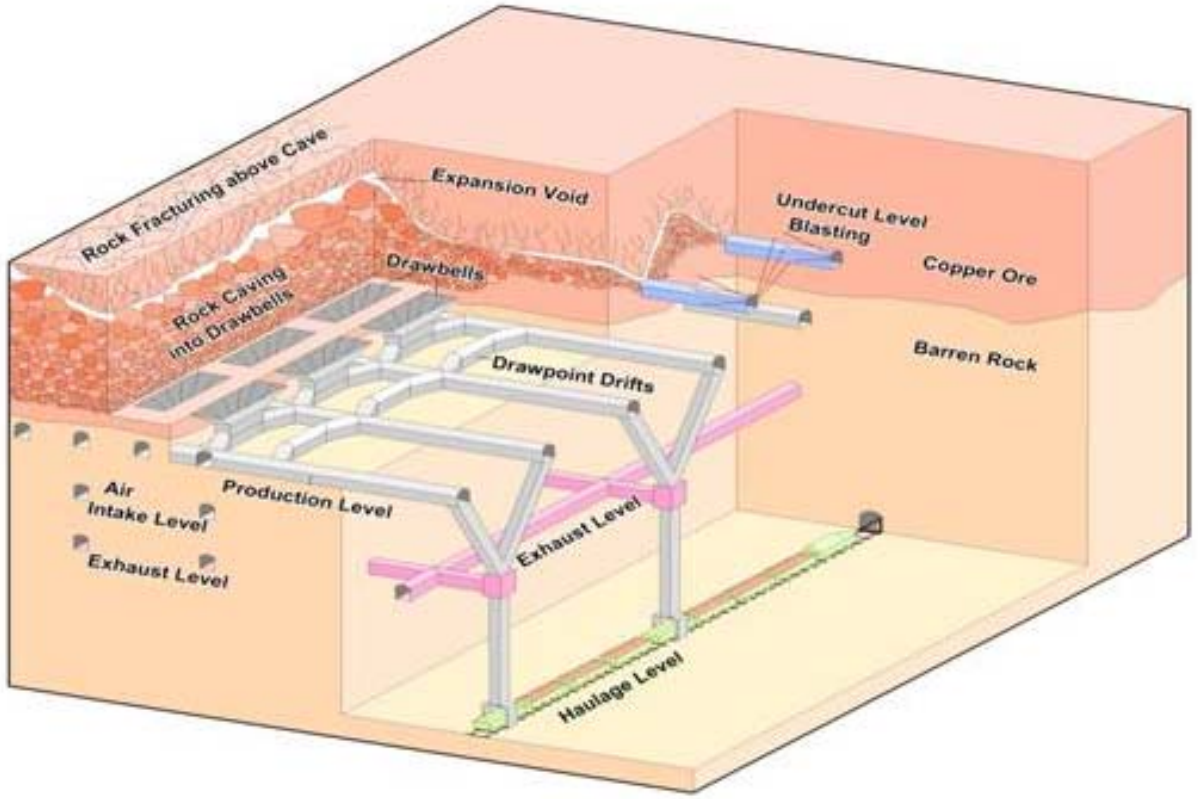


FIGURE 2.5

Example of Underground Block Cave Mining Method

Source: NPM (2011)

been modularised in the Project. This allows NPM to maintain its low operating costs, whilst maintaining the productivity benefits of this design.

The Project will continue mining using the block cave mining method within the three ore bodies at E26, E48 and E22, and the zone of mineralisation at GRP314 as shown in **Figure 2.4**. The Project achieves ore extraction at a rate of 30 million tonnes per annum from multiple block caves using an expanded version of NPM's highly productive block cave layout.

Ore will be trammed by automated electric loaders to jaw-gyratory crushers placed at the margins of each extraction level. Ore from the jaw-gyratory crushers is then conveyed to a centralised material handling system comprising a network of conveyors handling ore to the surface. This network of conveyors also integrates with the existing NPM's conveyor network to enable an increase in production from the existing block cave mines whilst the significant upgrades to mine infrastructure are undertaken.

2.4.2 Ore Handling, Processing and Stockpiling

Ore extracted from each block cave will be crushed underground by a jaw-gyratory crusher before conveying the ore above ground discharging onto a stockpile The ore will be reclaimed from the stockpile by Reclaim Feeders which deliver ore via conveyors to the proposed 30 Mtpa processing plant.

Extracted ore will be treated through a new 30 Mtpa concentrator, with secondary crushing and tertiary crushing utilising high pressure grinding rolls, ball mills and a large cell flotation circuit. The existing onsite concentrator will be decommissioned following the development of the newer larger facility. The location of key ore handling, processing and stockpiling infrastructure is shown on **Figure 2.6**.

The processing plant produces a milled product with a particle size distribution P80 of 100 microns. The milled product will be processed further to produce a bulk intermediate concentrate.

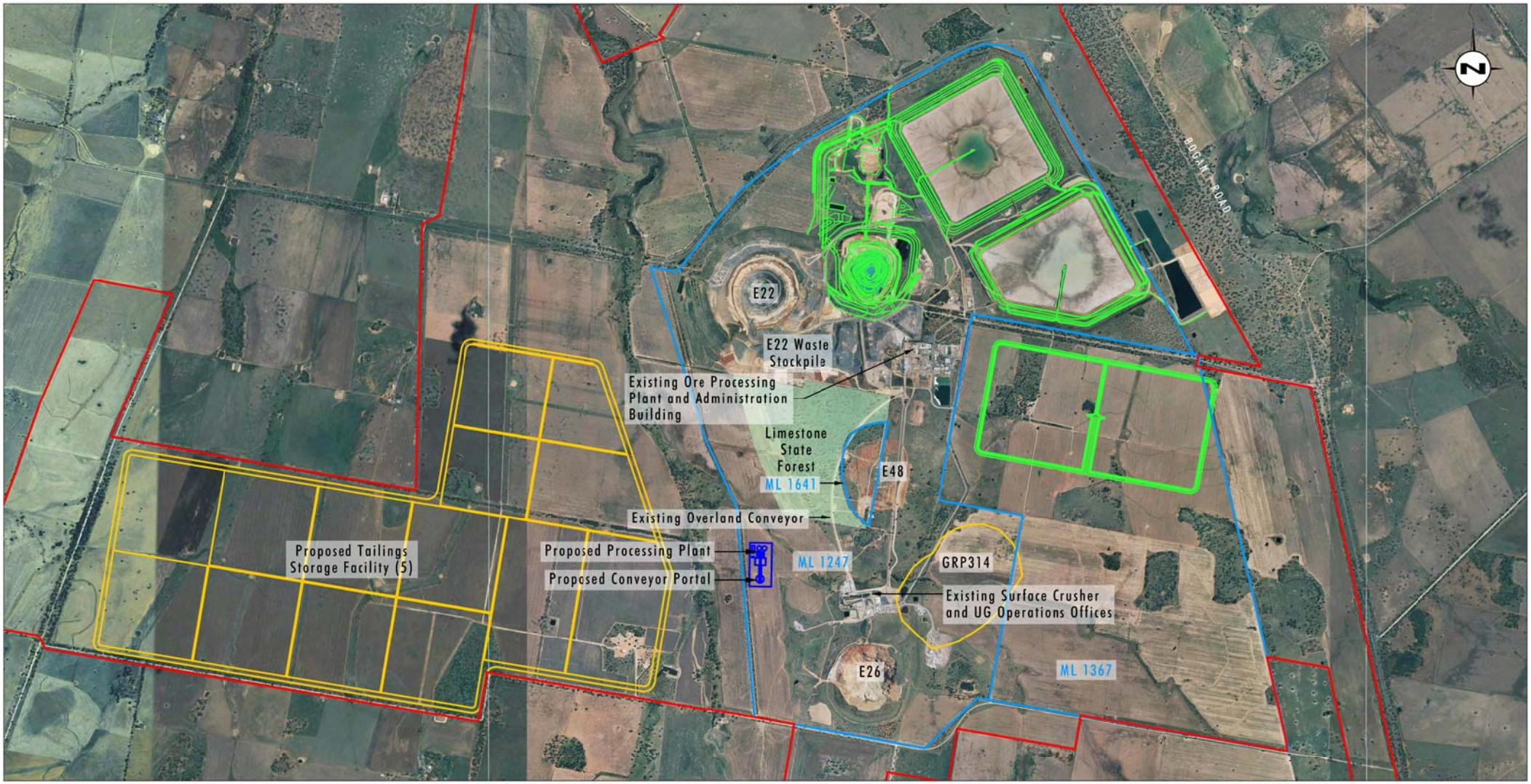
The proposed 30 Mtpa processing plant will be the sites primary user of electricity. A variety of inputs are required to operate the processing plant, including but not limited to: grinding media, flocculant, collector (Potassium Amyl Xanthate and DSP110), frother (Methyl-isobutul Carbinol or MIBC), Sodium Hydrosulphide, Nitric Act and Citric Acid. All inputs will be received by NPM in the required volumes and concentrations. Waste products from the processing plant will be managed to industry best practise standards.

As part of the Project, NPM propose to construct and operate pipeline infrastructure to enable the transport of concentrate, in slurry form, to the rail siding at Goonumbla (refer to **Figure 1.2**), approximately 15 kilometres to the south-east of the mine. The proposed pipeline alignment would also provide for a return water pipeline to provide for water reuse and efficiencies through production (refer to **Section 2.4.4**). The conceptual design for the pipeline infrastructure provides for the construction of the pipeline within the Bogan Road reserve between the NPM site and the rail siding at Goonumbla.

NPM also propose to construct and operate a filtration plant at the rail siding to provide for direct movement of concentrate to the product load out.

2.4.3 Product Transport

Copper concentrate produced as a result of the Project will continue to be transported via rail from an upgraded Goonumbla rail siding.



Source: NPM (2011), Google Earth (2010)

0 1 2 2.5km
1:50 000

Legend

- Northparkes Project Area
- Mining Lease Boundary
- Proposed Mining Activities
- Existing/Approved Tailings Storage Facility
- Limestone State Forest

FIGURE 2.6

Proposed Infrastructure Layout

2.4.4 Water Management and Use

NPM has undertaken preliminary assessments to further understand and refine water use and supply requirements for the Project.

NPM holds Water Access Licences and a Joint Water Supply Licence (with Parkes Shire Council) but does not hold a water use approval which accompanies the supply licence. The main sources of water for Parkes Shire Council, are, a bore field in the Lachlan Valley near Forbes, river water from the Lachlan River and two surface dams near Parkes.

NPM augments the water it receives from Parkes Shire Council with the water recycled from the process plant thickeners and tailings storage facilities, rainfall recovered from the tailings storage facilities and other water storages within the existing mine site. A small amount of groundwater from the mine workings is also included. While the number of water sources provides some flexibility in sourcing water, the Forbes bore field has provided the most reliable source of water during drought.

The Project will require a substantial increase in water supply for the proposed maximum production level of up to 30 Mtpa. As part of the Project, NPM are developing a comprehensive water supply strategy, in order to effectively secure water resources for the Project. The water supply strategy will include:

- detailed investigation of relevant technologies and processing design to maximise water efficiency, retention and reuse as part of ongoing mining operations.
- securing existing water systems and allocations; and
- investigations into further allocations and supply through existing water supply systems – established under relevant legislation;

The water supply strategy will be further developed as part of the detailed project design process and outlined further in the EA.

Further details relating to water supply and balance are discussed in **Section 5.0**.

2.4.5 Tailings Management

Comprehensive tailings strategies are in place at NPM to address operational and environmental aspects of tailings disposal. To date, the bulk of tailings from the processing of E22, E26 and E27 ore have been stored in two storage facilities, Tailings Storage Facility (TSF) 1 and TSF 2 as shown in **Figure 2.1**.

NPM' tailings disposal strategy is based on conventional thickened tailings deposition in tailings storage facilities with central decant water recovery. Deposition has alternated between the TSF 1 and TSF 2, with deposition in one facility while the walls of the other facility are raised. Walls are constructed from clay and rock material recovered from nearby borrow pits and from the E22 and E27 pits. The maximum planned height of TSF1 and TSF 2 is approximately 28 metres.

Tailings deposition commenced in the exhausted E27 pit in 2009. The current tailings deposition strategy involves concurrent alternating deposition in E27 pit, TSF1 and TSF2. A third tailings storage facility at Rosedale TSF 3 was approved as part of the E48 Project approval in 2006.

A fourth tailings facility, Estcourt TSF 4 received planning approval through Modification 1 in 2009 and is currently under construction. The Estcourt TSF 4 is designed to encapsulate the

E27 pit and link to the western wall of TSF1. The sound bund around E27 pit will form the bulk of the southern wall of Estcourt TSF 4.

As part of the Project, NPM are developing a consolidated Tailings Strategy that will incorporate the existing and approved tailings facilities where required. Additional tailings facilities will be required for the Project in line with the increase in mineable reserve and production rates. Accordingly, NPM propose to construct and operate TSF 5.

It is acknowledged that the scale of disturbance associated with the development of TSF 5 is a key environmental risk associated with the Project. Detailed environmental Studies carried out as described in **Section 5.0**, will assess the environmental impacts associated with the development of TSF5. Detailed TSF design will reflect the outcomes of environmental assessment, with final locations to be determined on the basis of minimising environmental and community impact.

2.4.6 Ancillary Infrastructure

2.4.6.1 Administration, Staff Facilities and Site Access

The existing mining operations are supported by both permanent and temporary onsite offices. NPM is investigating a consolidation of administration and staff facilities which will include construction of additional facilities onsite.

Bogan Road will continue to be utilised as the main site access road as illustrated on **Figure 2.6**. This access road will continue to be used for the Project.

2.4.6.2 Ancillary Activities and Services

The existing mine site is currently supported by a range of ancillary services. It is proposed where possible to utilise or modify existing infrastructure to maximise the efficiency of the Project. The locations of new service corridors and ancillary services are yet to be determined. However, key site services required for the Project will include but are not limited to:

- ventilation systems;
- service/distribution boreholes;
- dewatering bores;
- surface water management infrastructure;
- power supply infrastructure – aerial and underground powerlines, substations and switchyards;
- piped services – potable water supply, mine waste water removal, compressed air and process/fire water supply.
- access roads and other minor infrastructure within the Project area;
- underground mine access;
- above ground fuel tanks;
- sewage management;

- fire protection systems;
- laydown areas and drainage; and
- communications infrastructure including fibre optics cable.

2.4.7 Workforce and Hours of Operation

At peak operation, it is proposed that approximately 930 full time equivalent people will be employed by the Project. Mining operations are planned to continue to be undertaken 24 hours per day, seven days per week.

2.4.8 Construction Phase

As part of the Project, NPM propose a significant upgrade and expansion of mine infrastructure. The construction phase of the Project will be undertaken over a period of two to three years as part of the initial stages of the Project. The Project will result in the creation of up to 1500 full time equivalent construction jobs.

2.5 Alternatives and Justification

2.5.1 Project Alternatives

NPM has undertaken detailed concept studies into the proposed mining operation as part of previous studies. Numerous alternative mine and infrastructure plans have been considered. Minimising environmental and community impacts and maximising economic resource recovery have been major considerations in the evaluation of alternative options.

The options assessed included processing of individual resources through the existing mine/concentrator at 6 Mtpa capacity, an expanded capacity of 7 Mtpa, and through new mine/concentrator facilities at 7, 15, 30, 40 and 50 Mtpa. This review concluded that the maximum value was achieved through a 30 Mtpa expansion option. Relative to the other options, the 30 Mtpa expansion option provides a better balance between capital expenditure, operating costs and reserves. Smaller expansions are slower or do not pay back the capital associated with establishing the required infrastructure, including the underground development or the concentrator and have high operating costs which cannot be sustained due to the lower grade nature of the resources. Larger expansions do not have sufficient resource tonnage to justify the larger upfront capital expenditure associated with bringing multiple block caves into production at the same time, based on current technologies and associated capital expenditure.

NPM has also considered the option of not proceeding with the Project. This option was not considered appropriate as it is expected that the environmental and social impacts of the Project can be effectively managed, and not proceeding would result in the loss of the substantial economic benefits of the Project.

As part of the further development of project design, NPM will be undertaking extensive environmental studies to identify and effectively manage the potential environmental and community issues as part of the Project. As this process is ongoing, there is a potential that the key features of the Project may be further refined in order to effectively avoid and minimise the potential environmental and community impacts associated with the Project. Further discussion of alternatives analysis will be included in the EA.

2.5.2 Project Justification

NPM provides substantial economic benefits at Federal, State and local levels whilst maintaining a good working relationship with the community and implementing sound environmental management practices. NPM will build on these attributes of the existing operations through the development and operation of the Project.

The Project will provide the following key benefits:

- employment of approximately an additional 230 full time equivalent operational staff, with many more indirect jobs created through flow-on effects;
- employment of approximately 1500 full time equivalent construction staff over a period of two to three years;
- economic recovery of up to 30 Mtpa of ore with an extended mine life of an additional 16 years;
- payment of significant royalties to the State of NSW;
- significant export earnings for Australia; and
- significant economic benefits to the local community through local employment, purchase of goods and services, and local expenditure both directly and through employee wages.

NPM has demonstrated its commitment to effective environmental management in its existing operations. This management approach will also be implemented during the design, construction and operation of the Project, ensuring that environmental and community impacts will be effectively managed.

Further detailed justification for the Project will be provided in the EA, considering the potential environment and community impacts and benefits.

3.0 Planning Considerations and Consultation

3.1 Planning Considerations

The Project requires approval under Part 3A of the EP&A Act because it is of a class of development listed in Schedule 1 of 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 has a capital investment value of more than $30 million or employs 100 or more people.

The Project was declared a major project in accordance with Clause 6 of State Environmental Planning Policy (Major Development) on 9 March 2011.

The Minister for Planning is responsible for granting approval for the Project Application pursuant to Part 3A of the EP&A Act.

The land which is the subject of the Project Application is wholly within Parkes Local Government Area (LGA) Rural A Zone. The objectives of the Rural A zone, as described in the Parkes Local Environmental Plan (LEP) 1990, are:

a) to enable the continuation of traditional forms of rural land use and occupation and the development of new or changed forms of agricultural enterprise,

b) to enable other forms of development which are associated with rural activity, which require an isolated or rural location, or which support tourism objectives, and

c) to ensure that the type and intensity of development is appropriate in relation to the characteristics of the land, the rural environment, the need to protect agricultural activity from the effects of other development and the costs of providing public services and amenities.

Mining and associated infrastructure is permitted within the Rural A zone. As mining is an activity that is permissible within the Project area, the Minister can approve the Project.

In addition to approval under Part 3A of the EP&A Act, the Project may also require approvals under a number of additional Acts or assessment under State Environmental Planning Policies.

Under s75U of the EP&A Act, if the Project is granted project approval under Part 3A of the EP&A Act, the following approvals, which may otherwise have been relevant, will not be required to carry out the Project.

Table 3.1 - Approvals Legislation that does not Apply

Act	Approval
Fisheries Management Act 1994 (FM Act)	Permit for works or structures within a waterway.
Heritage Act 1977 (Heritage Act)	Disturbance to an item listed on State Heritage Register or Interim Heritage Order; Excavation permit
National Parks & Wildlife Act 1974 (NP&W Act)	Preliminary research permit; consent to destroy relics
Water Management Act 2000 (WM Act)	Water use approval, water management work approval or activity approval

If the Project is granted project approval under Part 3A of the EP&A Act, the following approvals, which will be required for the Project, must not be refused by the relevant approval authority and must be substantially consistent with the terms of the Project approval, in accordance with s75V of the EP&A Act.

Table 3.2 - Approvals Legislation to be Applied

Act	Approval	Authority
Mining Act 1992 (Mining Act)	Mining Lease	Department of Trade and Investment, Regional Infrastructure and Services (Minerals and Energy) (DTIRIS)
Protection of the Environment Operations Act 1997 (PoEO Act)	Environmental Protection Licence	NSW Office of Environment and Heritage (OEH)
Roads Act 1993 (Roads Act)	Permit to impact on a public road	State roads – NSW Roads and Traffic Authority (RTA) Local roads – Parkes Shire Council

The Acts and policies relevant to this Project are listed in **Table 3.3** below with an indication of any approvals likely to be required.

Table 3.3 - Other Potentially Relevant Acts and State Environmental Planning Policies

Planning Provision	Comments	Relevant Licences/Approvals/ Assessments
Commonwealth Legislation		
Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act)	A number of flora and fauna species and migratory species listed in the EPBC Act have been recorded or potentially occur in the Project area and an assessment of the impact of the Project on these species is required. This assessment will be a component of the ecological assessment undertaken as part of the EA.	As outlined in **Section 5.2**, there are a number of Matters of National Environmental Significance with potential to occur within the Project area. A detailed assessment of the impact of the Project on these matters is currently being completed. A preliminary referral to the Commonwealth Minister for Environment is required.
Native Title Act 1993 (Native Title Act)	The Native Title 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.	A search of existing Native Title claims within the existing mine site and the surrounding vicinity will be undertaken as part of the EA for the Project.

Table 3.3 - Other Potentially Relevant Acts and State Environmental Planning Policies (cont)

Planning Provision	Comments	Relevant Licences/Approvals/ Assessments
NSW Legislation – Acts		
Crown Lands Act 1989 (Crown Lands Act)	The Crown Lands Act provides for the administration and management of Crown land in the eastern and central divisions of NSW. Crown land may not be occupied, used, sold, leased, dedicated, reserved or otherwise dealt with unless authorised by this Act or the *Crown Land (Continued Tenures) Act 1989*.	The Project area contains Crown land. The Project design and assessment will consider the impacts to Crown lands.
Water Management Act 2000 (WM Act)	The Project will involve interactions with surface water and groundwater which is the subject of Water Sharing Plans (WSP). The WSPs relevant to the Project include: • WSP for Lachlan River Regulated Water Source 2003; • WSP for the Macquarie and Cudgegong Regulated Rivers Water Source 2003; • WSP for Lower Lachlan Groundwater Source 2003; and • WSP for Lower Macquarie Groundwater Sources 2003. The WSPs for the Upper Macquarie and Upper Lachlan Groundwater Sources is in preparation and are due for implementation during 2011.	NPM already hold a number of water access licences under the WM Act. NPM is currently investigating further requirements for water access licences as part of the water supply strategy for the project. NPM may require an approval for aquifer interference once the WSPs for the Upper Macquarie and Upper Lachlan Groundwater sources are gazetted.
Water Act 1912 (Water Act)	The licensing provisions of the Water Act still apply. The Water Act is administered by the NSW Office of Water. Under the Act, a permit and/or licence must be obtained to extract surface water (Part 2 of the Act) or groundwater (Part 5 of the Act).	NPM already holds a number of licences for interception, monitoring and extraction bores. An approval under Part 5 of the Act will be required for the Project to intercept and extract groundwater from mine workings and for the proposed groundwater monitoring bores.
Threatened Species Conservation Act 1995 (TSC Act)	Under the EP&A Act, impacts on threatened species listed under the TSC Act are required to be assessed.	All threatened species listed in the TSC Act potentially located within the Project area will be assessed in the ecological assessment.

Table 3.3 - Other Potentially Relevant Acts and State Environmental Planning Policies (cont)

Planning Provision	Comments	Relevant Licences/Approvals/ Assessments
Dams Safety Act 1978 (Dams Safety Act)	This Act requires that the NSW Dams Safety Committee (DSC) periodically review large dams that may constitute a hazard to human life and property. These dams are known as prescribed dams and are listed in Schedule 1 of the Dams Safety Act. Any new prescribed dams are to be designed to the satisfaction of the DSC.	Any dams required to be constructed as part of the Project will be subject to assessment in accordance with the DSC requirements to determine if any of these dams will be prescribed dams. The DSC will be consulted as part of the preparation of the EA.
NSW Legislation – State Environmental Planning Policies		
State Environmental Planning Policy 33 – Hazardous and Offensive Development (SEPP No. 33)	SEPP No. 33 requires the consent authority to consider whether an industrial proposal is a potentially hazardous industry or a potentially offensive industry. A hazard assessment is completed for potentially hazardous or potentially offensive development to assist the consent authority to determine acceptability of a Project.	The existing NPM operations are not classed as hazardous or offensive development under SEPP No. 33. An assessment under SEPP No. 33 to determine whether the Project is a potentially hazardous or potentially offensive development will be undertaken to determine whether a hazard assessment needs to be undertaken as part of the EA.
State Environmental Planning Policy 44 – Koala Habitat Protection (SEPP No. 44)	SEPP No. 44 restricts a Council from granting development consent for proposals on land identified as core koala habitat without preparation of a plan of management.	A search of the NSW Wildlife Atlas identified a record of a koala within the Project area. A koala habitat assessment will be undertaken as part of the ecological assessment.
State Environmental Planning Policy (Major Development) (SEPP (Major Development))	As discussed above, the Project is of a class of development listed in the SEPP. The Project therefore requires approval under Part 3A if the EP&A Act and the Minister for Planning will be the consent authority.	The Project will be assessed under Part 3A of the EP&A Act.

Table 3.3 - Other Potentially Relevant Acts and State Environmental Planning Policies (cont)

Planning Provision	Comments	Relevant Licences/Approvals/ Assessments
State Environmental Planning Policy - (Mining, Petroleum Production and Extractive Industries) 2007 (Minerals SEPP)	The Minerals SEPP repeals SEPP No. 37 - Continued Mines and Extractive Industries and SEPP No. 45 - Permissibility of Mining. The Minerals SEPP also removed mining developments from Schedule 1 of SEPP No. 11- Traffic Generating Development, meaning that SEPP No. 11 no longer applies to mining projects. 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 and provides assessment requirements and matters for consideration for mining projects.	The provisions of the Minerals SEPP do not affect the requirement for approval under Part 3A of the EP&A Act for the Project. The EA will be prepared in accordance with requirements of this SEPP.
State Environmental Planning Policy 55 - Remediation of Land (SEPP No. 55)	SEPP No. 55 – Remediation of Land aims to provide a state-wide planning approach to the remediation of contaminated land and to reduce the risk of harm to human health and the environment by consideration of contaminated land as part of the planning process. Under SEPP No. 55, a consent authority must not consent to the carrying out of development on land unless it has considered potential contamination issues.	The Project will be designed to prevent contamination and the storage and handling of chemicals will be undertaken in accordance with Australian Standards and relevant OEH guidelines. A closure and decommissioning strategy, including a contaminated land management strategy, will be developed for the decommissioning and closure of the Project in consultation with DPI. This management strategy will incorporate the investigation and remediation of any contaminated land and will be included in Mining Operations Plans (MOPs) submitted to DPI for approval should this Project be approved.

3.2 Authority Consultation

The authority consultation process for the Project has commenced with initial briefing meetings held with DP&I in early 2011 prior to the lodgement of the Project Application for the Project. The Project Application for the Project was submitted to DP&I in February 2011. Consultation with relevant government agencies will be undertaken throughout the EA preparation.

The key agencies included in the consultation program for the Project will include, but not necessarily limited to:

- Parkes Shire Council;
- Forbes Shire Council;
- Department of Planning and Infrastructure;
- Department of Trade and Investment, Regional Infrastructure and Services – Minerals and Energy;
- Office of Environment and Heritage;
- Department of Primary Industries including NSW Office of Water;
- Lachlan Catchment Management Authority;
- Central West Catchment Management Authority;
- RTA;
- Australian Rail Track Corporation (ARTC);
- Land and Property Information Authority;
- NSW Forests; and
- Dam Safety Committee.

As outlined in **Table 3.3**, there is potential for a number of threatened species listed under the EPBC Act to occur within the Project area. Once the preliminary assessment of impact on these species associated with the Project has been completed, a preliminary referral to the Commonwealth Department of Sustainability, Environment, Water, Populations and Community (DSEWPC) is likely to be made. The DSEWPC will be consulted throughout the preliminary referral process with the aim of integration with the Part 3A process, should the project be declared a controlled action and approval under the EPBC is required.

Consultation with each of these key agencies will be undertaken throughout the preparation of the EA and will focus on specific issues associated with the Project.

3.3 Community Consultation

NPM has developed a comprehensive stakeholder consultation strategy for the Project. The strategy identifies the stakeholders relevant to the Project, the methods of communication proposed for each stakeholder group, the timing of consultation and the feedback mechanisms required.

In consulting with stakeholders, NPM aims to:

- be proactive in its engagement with the community;
- be the primary source of information to the community;
- be transparent and honest in dealings with the community; and
- utilise a range of consultation methods to ensure all stakeholder interests are considered and addressed in a timely manner.

It is likely that the Project will involve a high degree of interest at the local level and also some interest at the regional and broader level. Stakeholders to be consulted in relation to the Project including, but not limited to:

- Local Landholders and the broader community;
- Community Groups;
- Environmental Groups;
- Aboriginal Stakeholder Groups including the Aboriginal Heritage Working Group;
- Industry Groups;
- Functional Stakeholders – employees, contractors, Rio Tinto, Sumitomo, shareholders and commercial partners; and
- State, regional and local media.

The consultation process for the Project will be undertaken in two primary stages which align with the commencement and completion of the environmental assessment. The two primary stages of consultation will include:

- **Stage 1** of the consultation program involves consultation with stakeholders during the early phases of the Project Approval process and the preparation of the EA for the Project. The main purposes of this stage of consultation are to inform stakeholders of the details of the Project and the proposed environmental assessment process, and to identify the issues that the stakeholders would like addressed in the EA.
- **Stage 2** of the consultation program involves consultation with stakeholders following the substantial completion of the environmental studies for the EA. The main purpose of this stage of the consultation program is to update the stakeholders on the status of the Project and provide feedback on the results of the EA.

Stage 1 of the consultation process has commenced with a number of community meetings and initial agency consultation. Continued consultation with stakeholders will be ongoing throughout the preparation of the EA and will continue through the assessment and determination of the Project.

The methods of consultation proposed for the Project will include a variety of mechanisms, such as:

- community information sheets/brochures – incorporated into established community newsletters;
- individual meetings with surrounding landholders;
- NPM CCC meetings;
- meetings with relevant community and environment groups;
- Aboriginal stakeholder consultation;
- presentations to employees and interest groups;
- government agency meetings and presentations; and
- open day/s at NPM.

4.0 Preliminary Environmental Assessment

4.1 Environmental and Community Context

4.1.1 Land Use and Ownership

The existing land use within the Project area has been primarily mining activities since operational infrastructure commenced onsite in 1993. Since initial development, operations at the NPM site have expanded to include open cut and underground mining activities. Prior to the establishment of mining operations, the primary land use in the Project area was characterised by a long history of agricultural land uses, with an emphasis on cultivation activities typical of the surrounding environment.

The area surrounding the proposed Project area is dominated by various large agricultural land holdings predominately cultivated for pastoral or cropping practises. Approximately 4400 hectares of the land adjacent to the NPM site is owned and managed by NPM. NPM farms these landholdings with cropping for wheat and canola being the most common agricultural land uses.

The surrounding locality and region consists of mostly cleared agricultural land with patches of remnant vegetation associated with State Forests. Within the Project area, is the Limestone State Forest, which is currently managed by NPM in consultation with Forests NSW in accordance with land swap and management agreements developed as part of the E48 Project.

Preliminary land use mapping indicates that the area surrounding the NPM site consists of:

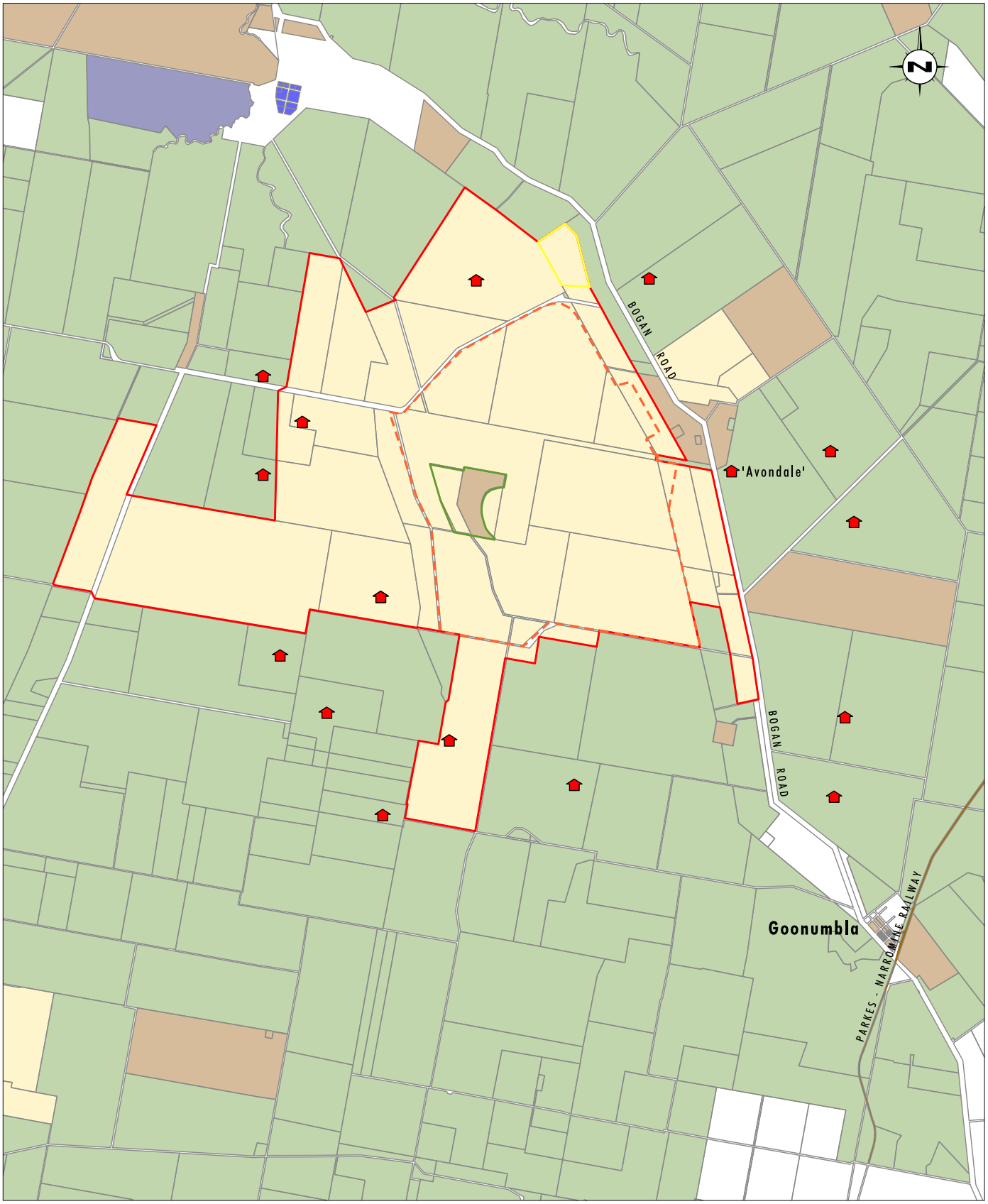
- Agricultural lands (pastoral or cropping practises) which represented the majority of the area surrounding the NPM site and included land not currently mined as well as areas that support some areas of remnant vegetation; and

- Rehabilitated land (revegetation works by NPM or native remnant vegetation) which occur in linear strips along roadways and fence lines as well as in blocks adjacent to remnant vegetation.

The nearest privately owned residence is the ‘Avondale’ Property located to the west of the access road to the NPM site (refer to **Figure 4.1**). Land ownership in the Project area and surrounds with indicative residence locations is shown on **Figure 4.1**. As part of the EA, further ground truthing and land use and ownership mapping, and further identification/verification of residences surrounding the Project area will be undertaken.

4.2 Preliminary Environmental Risk Analysis

To assist in identifying the key environmental and community issues that require further assessment, a preliminary environmental risk assessment has been completed for the Project and is included in **Appendix 1**. The environmental risk assessment was undertaken in accordance with the principles outlined in Australian Standard AS/NZS 4360:2004 Risk Management (Standards Australia, 2004). The risk matrix, consequence table and likelihood table used for the assessment are included in **Appendix 1**. Consistent with AS/NZS 4360:2004, environmental risks have been categorised as low, medium or high for the construction and operational phases of the Project. The key environmental issues identified through this process including water resources (water supply), ecology, Aboriginal cultural



Source: NPM (2011), LPMA (2011)

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Legend

- Northparkes Project Area
- Existing Development Consent Boundary
- Biodiversity Offset Area
- Limestone State Forest Boundary
- State Forest of NSW
- Mine Owned
- Local Government Authority
- Freehold
- Department of Lands - Crown
- Private and Mine Owned Residences within vicinity of Project Area

FIGURE 4.1

Land Ownership

heritage, traffic, agricultural productivity, socio-economic impacts and potential amenity impacts associated with noise, air quality and visual impacts.

The scope of further assessment required for these issues as part of the EA is discussed in further detail in **Section 5.0**. Where appropriate, the proposed controls contained in the preliminary environmental risk analysis will be considered and refined in the detailed investigations and in the Statement of Commitments in the EA.

5.0 Key Environment and Community Issues

The key environment and community issues for this Project have been determined through the preliminary environmental risk assessment discussed in **Section 4.2**. These issues are discussed in **Sections 5.1** to **5.14** below, including a description of the proposed assessment methodology. The assessment of these issues will be completed as part of the EA for the Project.

5.1 Land Resources and Rehabilitation

5.1.1 Existing Land Resources

5.1.1.1 Topography

The Project area is located on the edge of the inland slopes beyond the Great Dividing Range. The existing NPM site is generally flat within some low undulations ranging from 280 mAHD to 300 mAHD. The area surrounding the NPM site is also generally flat with the most significant regional feature being Goonumbla Hill, which extends to a height of 386 mAHD (refer to **Figure 5.1**).

Existing mining activities have resulted in alterations to the natural topography of the NPM site. These changes have primarily consisted of changes in topographical relief from elevations associated with the tailings storage facilities and waste rock stockpiles, and the creation of topographic lows by the open cut mines (E22 and E27) and by subsidence associated with E26 and E48 underground mines.

5.1.1.2 Soils

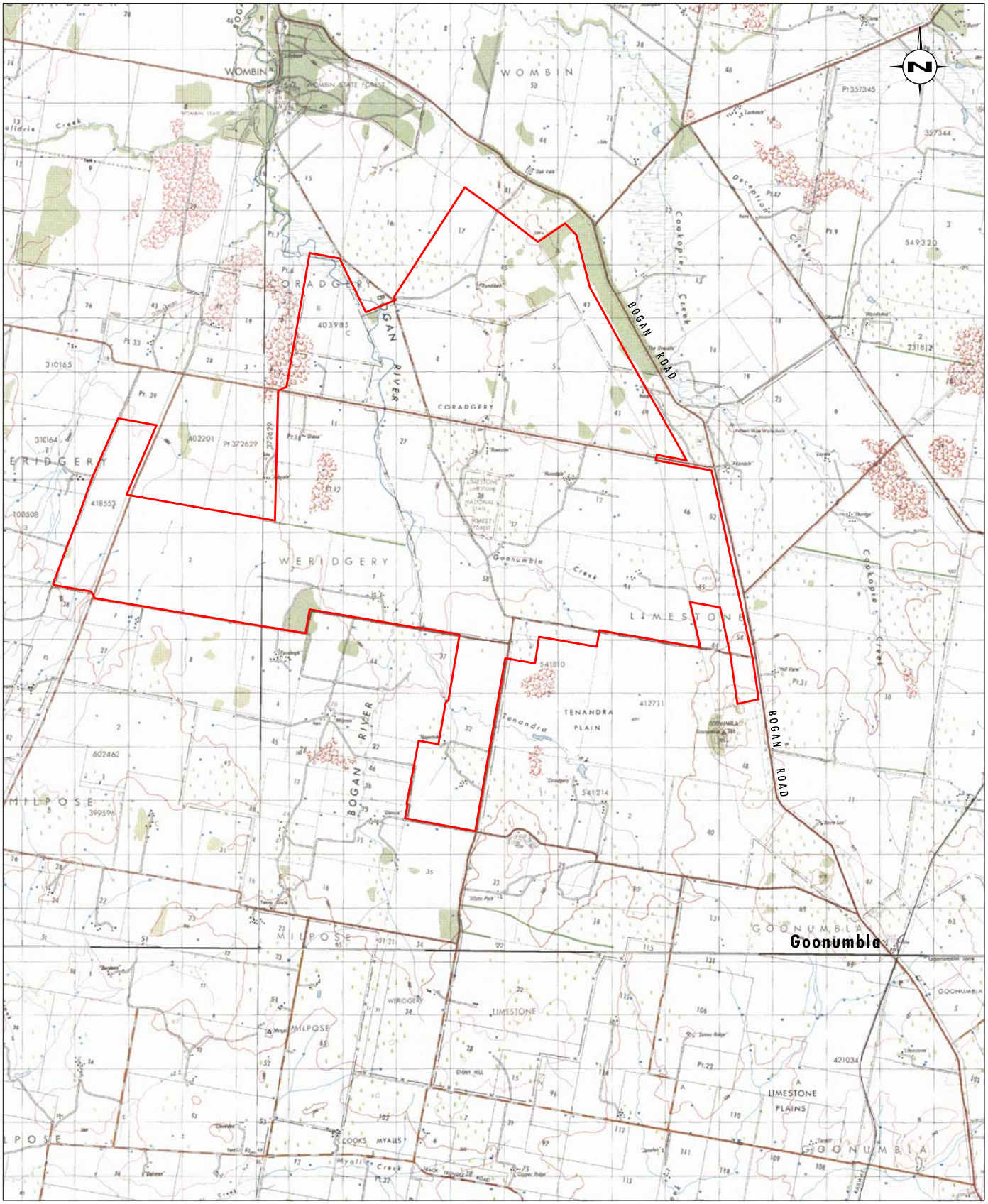
Previous studies completed within the Project area (Corkery 2006) have identified two dominant soil mapping units within the NPM site. Soil Mapping Unit 1 (SMU1) occurs to depths of over 80 centimetres with a firm to hardsetting surface. The topsoil of SMU1 consists of loam, sandy clay loam or clay loam with a pH of 5 to 7. SMU1 is consistently dry and is usually hydrophobic. SMU1 generally occurs within areas of natural topographical elevations and where remnant vegetation is present.

Soil Mapping Unit 2 (SMU2) occurs to depths of approximately 280 centimetres with a firm to self-mulching surface which is sometimes loose, soft or hardsetting. SMU2 consists of silty clay to heavy clay with a pH of 5 to 6. SMU2 is hydrophobic within some areas. SMU2 generally occurs within the areas utilised for farming practices and is the most widely distributed across the NPM site, and surrounding area.

SMU1 and SMU2 range from low to moderate erodibility. The topsoil of both soil mapping units is suitable for rehabilitation purposes. The 2009 EA (GHD 2009) identified that farming practices implemented by NPM such as site soil conservation works, conservation tillage practices, stubble retention and an absence of livestock grazing has helped to minimise erosion and has maintained the soils in a generally stable state across the NPM site and managed lands.

5.1.1.3 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



Source: NPM (2011), LPMA (2011)

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Legend

Northparkes Project Area

FIGURE 5.1

Topography

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capability (Emery, undated). Rural land capability classes for NSW have been developed by the former NSW Soil Conservation Service (now OEH), each class outlines the types of land uses appropriate for a particular area of land and the types of land management practices needed to prevent soil erosion and maintain the productivity of the land. Eight classes of Rural Land Capability were defined by the then Soil Conservation Service for mapping rural lands, as shown in **Table 5.1**.

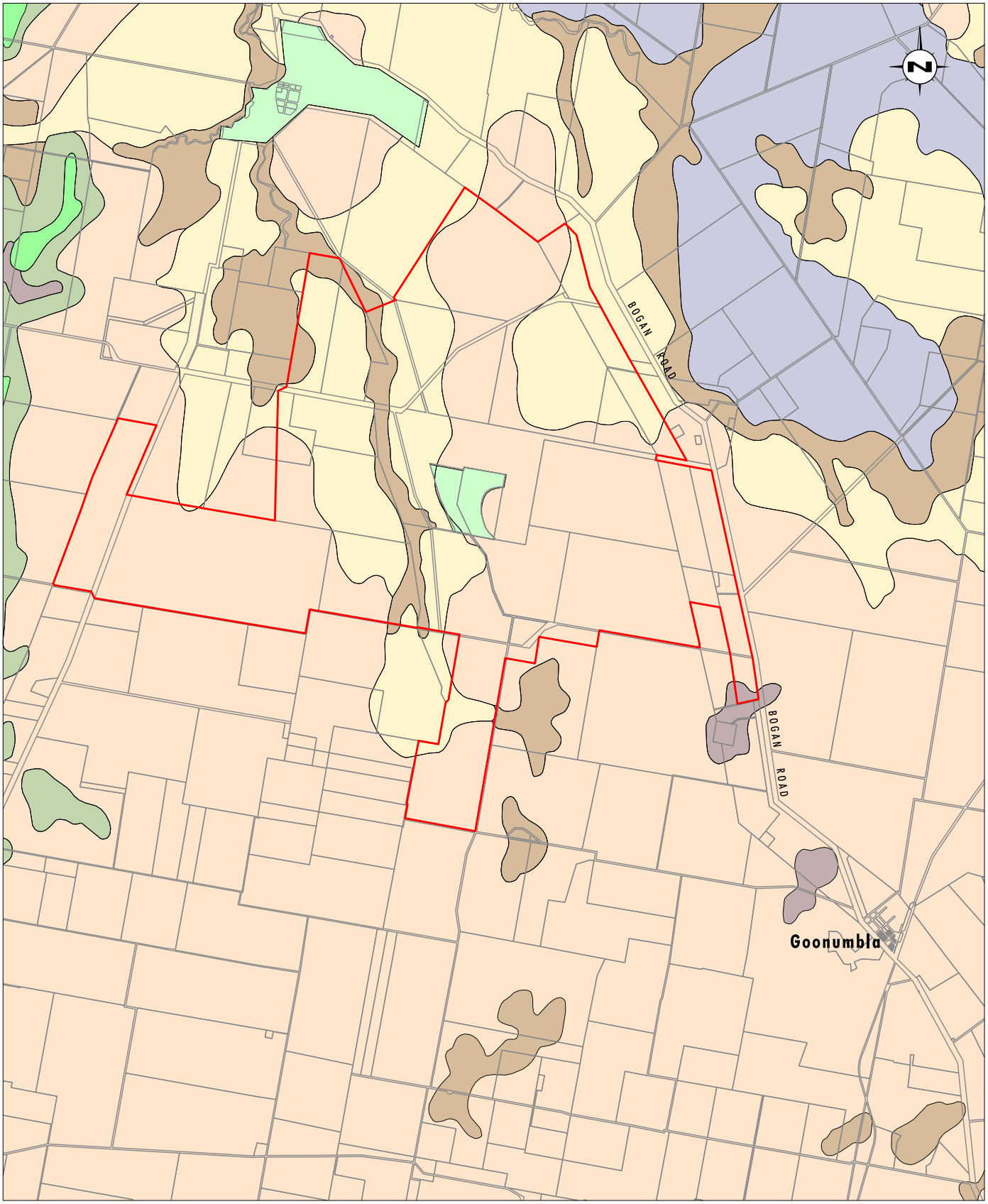
Table 5.1 - Rural Land Capability Classes

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.
	II	Usually gently sloping land suitable for a wide variety of agricultural uses.
	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 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 agriculture or pastoral uses	VIII	Cliffs, lakes or swamps and other lands unsuitable for agricultural or pastoral use.

The classes identify limitations on the type and intensity of use as a result of interactions between physical attributes (soil type, slope, and climate) and the effects of specific land uses. The classification does not necessarily reflect existing land uses, rather, it indicates the potential of the land for different agricultural purposes.

The land capability within the Project area as classified by the system according to Emery (undated), is presented in **Figure 5.2**. The Project area consists predominantly of Class III and Class II land. Class III land is suitable for cropping on a rotational basis but is subject to soil erosion difficulties. Class II land within the Project area is concentrated at the floodplains associated with Bogan River and associated tributaries, and is suitable for a wide variety of agricultural land uses.

Class IV land is also present within the Project area and is associated with the instream environment of Bogan River. Class IV land is not suitable for cultivation on a regular basis but can be utilised for grazing.



Source: NPM (2011), Office of Environment and Heritage

0 1 2.5 5km
1:100 000

Legend

- Northparkes Project Area

Land Classification

- 1 - Capable of Regular Cultivation
- 2 - Capable of Regular Cultivation
- 3 - Capable of Regular Cultivation
- 4 - Capable of Grazing with occasional Cultivation
- 5 - Capable of Grazing with occasional Cultivation
- 6 - Capable of Grazing with occasional Cultivation
- 7 - Other

Special Land Use

- State Forest or National Park

FIGURE 5.2

Land Capability

5.1.1.4 Agricultural Suitability

The agricultural suitability of land is based on the presence of physical and/or chemical limitations (Riddler 1990). Factors considered include climatic and topographic factors, physical and chemical characteristics of the soil, ability to control erosion, drainage and flooding potential. All of these factors combine to determine the productive potential of the land and its capability to produce crops, pastures and livestock.

Agricultural suitability of land in NSW has been mapped at a scale of 1:50,000 by the former NSW Department of Agriculture and published by the former Department of Environment and Planning (1981). The five classes of agricultural suitability are:

- Class 1 – suitable for intense cultivation;
- Class 2 – suitable for cultivation;
- Class 3 – suitable for grazing and pasture improvement;
- Class 4 – marginally suitable for grazing; and
- Class 5 – unsuitable for agriculture.

Previous assessment of the NPM site (Corkery 2006) has identified Class 3 and Class 4 lands occurring across the NPM site. The Class 4 land is associated with topographical elevations within the NPM site and generally aligns with areas of SMU1. Class 3 lands cover the remainder of the NPM site and are generally consistent with the areas mapped as SMU2.

5.1.2 Agricultural Impact Assessment

As outlined in **Section 4.1**, the predominant land use within the Project area is for agricultural purposes including cropping and grazing. The existing land resources within the Project area and surrounds support the agricultural land use within the area. To consider the potential impacts of the Project on agriculture within the Project area and surrounding region, an Agricultural Impact Assessment will be undertaken as part of the EA.

It is understood that DP&I are currently developing guidelines for the preparation of Agricultural Impact Assessments for mining projects. In the absence of these guidelines, it is expected that the Agricultural Impact Assessment will include:

- site specific mapping and assessment of soils, land capability and agricultural suitability including ground truthing of existing mapping undertaken as part of previous assessments;
- identification of the impact of the Project on soils, land capability and agricultural suitability within the Project area;
- identification of any conflict in land use and recommendations to prevent, minimise or manage an land use conflicts; and
- an assessment of potential impacts to the key agricultural industries within and surrounding the Project area including potential economic considerations (refer to **Section 5.14**).

5.1.3 Rehabilitation Strategy

NPM operations undertake a holistic approach to rehabilitation and mine closure planning from a conceptual Project planning phase through to the preparation of detailed rehabilitation and mine closure plans. Detailed rehabilitation design is undertaken as part of the preparation of a MOP for an operation and approved by DTIRIS. The MOP approval also provides for the monitoring of performance against rehabilitation objectives over the life of an operation. The existing mining operations within the NPM site are being progressively rehabilitated in accordance with the approved MOP for the existing operations, and relevant management plans.

A conceptual rehabilitation strategy for the Project is currently being developed as part of further detailed Project planning and design process. The rehabilitation strategy for the Project will seek to provide for progressive rehabilitation of disturbed areas as soon as practicable over the life of the Project. Conceptual final land use, land form and mine closure criteria will also be identified for the Project.

The development of the rehabilitation strategy will continue as part of the detailed Project design phase and will consider a range of factors including, but not limited to, the following:

- characteristics of the Project area including the opportunities and constraints associated with existing land resources in relation to soils, land capability and agricultural suitability;
- key environmental features of the Project area, in particular, the ecological features and key water resources;
- the strategic land use objectives for the Project area and surrounds;
- maximisation of the integration of rehabilitation and final land use for the Project area with the land use of the surrounding area; and
- operational opportunities and constraints for the Project including emplacement requirements and operational areas.

As outlined above, the rehabilitation strategy, including development of final land use, final land form and mine closure objectives, will be developed as part of the detailed design process for the Project. The development of the rehabilitation strategy will seek to build upon existing strategies and include consultation with key internal and external stakeholders, including relevant government agencies, throughout the preparation of the EA. A description of the proposed rehabilitation strategy for the Project will be included as part of the EA.

5.2 Ecology

Ecology is recognised as a key issue for the Project. Two ecological assessments have been completed within the last six years as part of environmental assessments prepared for the NPM site. The previous ecological assessments incorporate some of the area located within the Project area and as a result provide an indication of the ecological values within and surrounding the Project area.

NPM currently operate in accordance with a Flora and Fauna Management Plan prepared in accordance with PA 06_0026.

5.2.1 Existing Ecological Values

5.2.1.1 Regional Setting

The Project area is located within the South Western Slopes Bioregion on the western slopes and plains of the Great Dividing Range. The area surrounding the existing mine site is dominated by cleared agricultural land with patches of native remnant vegetation in some areas.

The current land use within the NPM site includes active mining, conservation zones (biodiversity offset areas), remnant vegetation (including Limestone State Forest) and agriculture (cropping and grazing). The native vegetation within the NPM site has been subject to clearing for a variety of purposes including agriculture, forestry and mining.

5.2.2 Flora Species

Previous ecological assessments within the Project area identified over 115 flora species occurring within the NPM site.

5.2.2.1 Potential Threatened Species

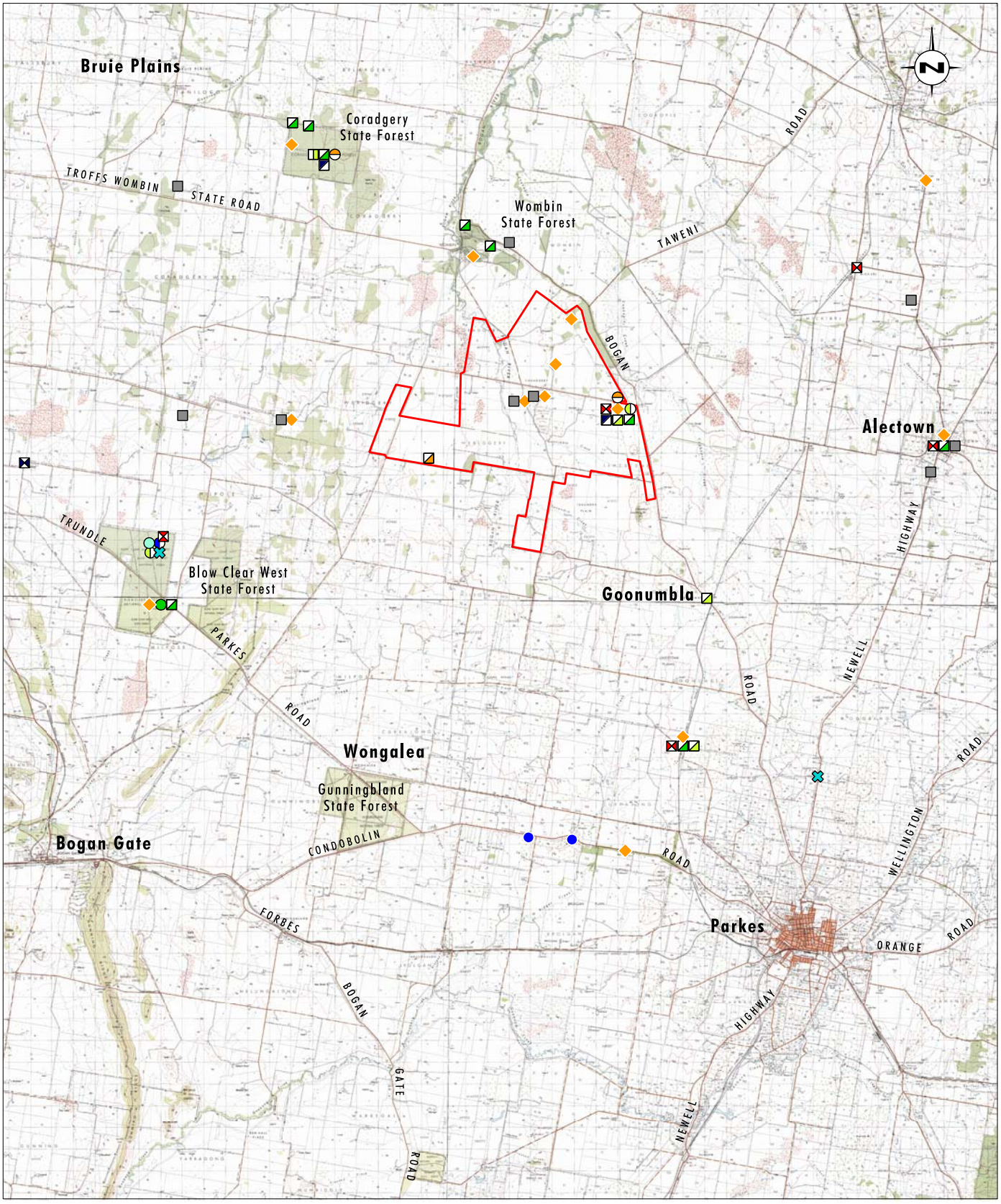
Table 5.2 below lists threatened flora species which have the potential to occur within the vicinity of the Project area, based on records from the OEH, Atlas of NSW Wildlife (refer to **Figure 5.3**), and the DSEWPC Protected Matters Search Tool (searched May 2011). Species may be added or removed from this list following field surveys and future updated database searches.

Table 5.2 – Threatened Flora Species with the Potential to Occur within the Vicinity of Project area

Species	Status
A spear grass *Austrostipa metatoris*	V (TSC) V (EPBC)
A spear grass *Austrostipa wakoolica*	E (TSC) E (EPBC)
Pine donkey orchid *Diuris tricolor*	V (TSC)
Spike-rush *Eleocharis obicis*	V (TSC) V (EPBC)
Winged pepper-cress *Lepidium monoplocoides*	E (TSC) E (EPBC)
Slender darling pea *Swainsona murrayana*	V (TSC) V (EPBC)
Tylophora linearis	V (TSC) E (EPBC)

V = Vulnerable
E = Endangered
TSC Act = *Threatened Species Conservation Act* 1995
EPBC Act = *Environment Protection and Biodiversity Conservation Act* 1999

Two species have been recorded within proximity to the Project area, these are the pine donkey orchid (*Diuris tricolor*) and *Austrostipa wakoolica*.



Source: NPM (2011), Department of Lands (2006)

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1:250 000

Legend

- Northparkes Project Area
- Barking Owl
- Black-chinned Honeyeater (eastern subspecies)
- Brown Treecreeper (eastern subspecies)
- Diamond Firetail
- Grey-crowned Babbler (eastern subspecies)
- Hooded Robin (south-eastern form)
- Koala
- Little Eagle
- Little Pied Bat
- Speckled Warbler
- Spotted-tailed Quoll
- Spotted Harrier
- Superb Parrot
- Varied Sittella
- Yellow-bellied Sheathtail-bat
- *Austrostipa wakoolica*
- *Diuris tricolor*

FIGURE 5.3

NSW Wildlife Atlas listed Threatened Species within vicinity of Project Area

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5.2.2.2 Potential Threatened Ecological Communities

The Project area contains a variety of vegetation communities which are consistent with the sub-humid climate conditions of the South Western Slopes Bioregion with hot summers and winter dominant rainfall. The vegetation communities recorded by previous ecological assessments include:

- *Eucalyptus moluccana (*Grey Box) Open Woodlands;
- *Callitris glaucophylla* (White Cypress Pine) – *Eucalyptus populena (*Poplar Box) open woodland to savanna grassland;
- *Eucalyptus populena* (Bimble Box) woodland;
- *Eucalyptus albens* (White Box) – *Callitirs glaucophylla (*White Cypress Pine) Woodland;
- *Eucalyptus melliodora* (Yellow Box) woodland (Box Gum Woodland);
- *Eucalyptus microcarpa* (Grey Box) woodland;

Geolyse and BTEQ (2006) identified some of the areas of the above vegetation communities as meeting the classification of the EPBC Act listed White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland Critically Endangered Ecological Community (White Box-Yellow Box and Derived Grassland CEEC). The ecological assessment prepared by GHD (2009) re-classified areas of the vegetation communities mapped by Geolyse and BTEQ (2006) as being the White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Grassland CEEC. However, there are areas within the above list of vegetation communities which did not meet the definition of the White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Grassland CEEC.

Since the completion of the most recent ecological assessment, a vegetation community known as Grey Box (*Eucalyptus microcarpa*) Grassy Woodlands and Derived Native Grasslands of South-eastern Australia has been listed as an Endangered Ecological Community (EEC) under the EPBC Act. There is potential for this community to occur within the Project area. Further assessment is required to determine whether the Grey Box woodland within the Project area meets the definition of the Grey Box (*Eucalyptus microcarpa*) Grassy Woodlands and Derived Native Grasslands of South-eastern Australia EEC.

The EPBC Act listed White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Grassland CEEC is also listed under the TSC Act as an EEC known as, White Box Yellow Box Blakely's Red Gum Woodland (Box-Gum Woodland).

The EPBC Act listed Grey Box (*Eucalyptus microcarpa*) Grassy Woodlands and Derived Native Grasslands of South-eastern Australia EEC is also listed as an EEC on the TSC Act, listed as 'Inland Grey Box Woodland in the Riverina, NSW South Western Slopes, Cobar Peneplain, Nandewar and Brigalow Belt South Bioregions'.

Further detailed mapping and assessment of vegetation communities will be completed as part of the ecological assessment.

5.2.2.3 Potential Endangered Flora Populations

No endangered flora populations were identified with the potential to occur in the Project area

5.2.3 Fauna Species and Fauna Habitat

The previous ecological assessments conducted in the NPM site have identified the presence of 80 vertebrate fauna, comprising 47 bird species, 13 mammal species, 11 microchiropteran bat species, three amphibian species and 6 reptile species.

5.2.3.1 Threatened Fauna Species

Figure 5.3 shows the threatened fauna species within the vicinity of the Project area based on OEH Atlas of NSW Wildlife records.

The ecological assessment prepared by Geolyse and BTEQ in 2006 recorded one threatened fauna species, the Yellow-bellied Sheathtail bat (*Saccolaimous flauiventris*). Two additional threatened species, the Grey-crowned Babbler (*Pomatostomus temporalis*) and the Superb Parrot (*Polytelis swainsonii*) were recorded within the Project area.

The ecological assessment prepared by GHD in 2009 recorded one threatened fauna species, the Grey-crowned Babbler (*Pomatostomus temporalis*). A Squirrel Glider (*Petarus norfolcensis*) may have been observed during a spotlight survey, however the observation could not be confirmed.

The Superb Parrot (*Polytelis swainsonii*) was observed by GHD utilising woodland within the Limestone State Forest and nearby areas of the existing mine site. Groups of up to fifteen Superb Parrots have also been observed flying over the existing mine site from the Limestone State Forest.

Table 5.3 below lists the threatened fauna species which have the potential to occur within the vicinity of the Project area, based on records from the OEH, Atlas of NSW Wildlife (refer to **Figure 5.3**), and the DSEWPC Protected Matters Search Tool (searched May 2011). This list is inclusive of 2 species of fish, 15 birds and 2 mammals. Seventeen of these species are listed as vulnerable under the TSC Act, two are listed as endangered under the TSC Act, one is listed as critically endangered under the TSC Act, five are listed as vulnerable under the EPBC Act and four are listed as endangered under the EPBC Act.

Species may be added or removed from this list following field surveys and future updated database searches.

Table 5.3 – Threatened Fauna Species with the Potential to Occur within the Vicinity of the Project Area

Species	Status
FISH	
Murray cod *Maccullochella peelii peelii*	V (EPBC)
Macquarie perch *Macquaria australasica*	E (EPBC)
BIRDS	
Malleefowl *Leipoa ocellata*	E (TSC) V (EPBC)
Regent honeyeater *Anthochaera phrygia*	CE (TSC) E (EPBC)
Spotted harrier *Circus assimilis*	V (TSC)

Table 5.3 – Threatened Fauna Species with the Potential to Occur within the Vicinity of the Project Area (cont)

Species	Status
Brown treecreeper *Climacteris picumnus*	V (TSC)
Varied sittella *Daphoenositta chrysoptera*	V (TSC)
Little eagle *Hieraaetus morphnoides*	V (TSC)
Swift parrot *Lathamus discolor*	E (TSC) E (EPBC)
Hooded robin *Melanodryas cucullata*	V (TSC)
Black-chinned honeyeater (eastern subspecies) *Melithreptus gularis gularis*	V (TSC)
Superb parrot *Polytelis swainsonii*	V (TSC) V (EPBC)
Grey-crowned babbler *Pomatostomus temporalis temporalis*	V (TSC)
Speckled warbler *Pyrrholaemus saggitatus*	V (TSC)
Australian painted snipe *Rostratula australis*	E (TSC) V (EPBC)
Diamond firetail *Stagonopleura guttata*	V (TSC)
Barking owl *Ninox connivens*	V (TSC)
MAMMALS	
Koala *Phascolarctos cinereus*	V (TSC)
Spotted-tailed quoll *Dasyurus maculatus*	V (TSC) E (EPBC)
Brush-tailed phascogale *Phascogale tapoatafa*	V (TSC)
Yellow-bellied sheath-tailed bat *Saccolaimus flaviventris*	V (TSC)
Little pied bat *Chalinolobus picatus*	V (TSC)
Greater long-eared bat *Nyctophilus timoriensis* (South-eastern form)	V (TSC) V (EPBC)

V = Vulnerable

E = Endangered

TSC Act = *Threatened Species Conservation Act* 1995

EPBC Act = *Environment Protection and Biodiversity Conservation Act* 1999

Nine of the above species (koala, superb parrot, grey crowned babbler, little eagle, hooded robin, diamond firetail, speckled warbler, brown treecreeper and spotted harrier) have been recorded previously within the Project area. Six additional species (black-chinned

honeyeater, barking owl, little pied bat, spotted-tailed quoll, varied sittella and yellow-bellied sheathtail-bat) have been recorded within proximity to the Project area.

Table 5.4 lists ten EPBC-listed migratory species which have the potential to occur within the Project area, based on known and predicted records Project area from the DSEWPC Protected Matters Search Tool and preliminary professional opinion.

Species may be added or removed from this list following field surveys and future updated database searches.

Table 5.4 – EPBC Listed Migratory Species with the Potential to Occur within Vicinity of the Project Area

Species	Status
Fork-tailed swift *Apus pacificus*	MIG
Great egret *Ardea alba*	MIG
Cattle egret *Ardea ibis*	MIG
White-bellied sea-eagle *Haliaeetus leucogaster*	MIG
White-throated needletail *Hirundapus caudacutus*	MIG
Rainbow bee-eater *Merops ornatus*	MIG
Regent honeyeater *Anthochaera phrygia*	MIG
Lathams snipe *Gallinago hardwickii*	MIG
Painted snipe *Rostratula benghalensis s. lat.*	MIG
Malleefowl *Leipoa ocellata*	MIG

MIG – listed migratory species

5.2.3.2 Potential Endangered Fauna Populations

No endangered fauna populations were identified with the potential to occur in the Project area.

5.2.4 Aquatic Ecology

The Project area is located within the Lower Lachlan Catchment Management Area and is bisected by the Bogan River and tributaries which have the potential to provide habitat for threatened fauna species. The Bogan River and tributaries within the Project area are ephemeral and only flow after heavy rainfall events. Regardless, further aquatic investigations will be undertaken as part of the EA.

5.2.5 Proposed Assessment and Management Methodology

The Project has the potential to impact on ecological values and as a result, a comprehensive ecological assessment will be prepared for the Project. The Ecological Assessment Report included in the EA will document the methods and results of all field surveys completed for the Project as well as previous ecological surveys within the NPM site. The methodology for the proposed field surveys are outlined below.

Flora Survey

Flora surveys will involve a number of standard techniques, aimed at ground truthing and refining existing vegetation community mapping, mapping new areas of vegetation, developing a detailed flora list and completing targeted threatened flora searches in suitable habitat.

All vascular flora species, both native and introduced, identified during surveys will be recorded. A specimen of all threatened species recorded will be sent to the Royal Botanic Gardens Sydney for additional verification.

The flora survey component of the EA field survey would cover both the vegetation mapping and threatened flora components of the Project. The flora survey will be completed during the late spring/early summer period as well as the late summer/early autumn period.

Fauna Survey

Fauna surveys will comprise a variety of techniques aimed at surveying for all faunal groups. These techniques may include, but not necessarily be limited to: Elliott and cage trapping, pitfall traps, harp traps, hair tubes, Anabat echolocation surveys, diurnal and nocturnal call playback surveys, nocturnal spotlighting surveys, diurnal bird, amphibian and reptile surveys, signs of presence searches and incidental observations. Detailed habitat assessment will also be completed to document the different types and quality of fauna habitat present.

Fauna surveys would be required to be completed in late spring/early summer, as well as late summer/early autumn. In addition, targeted surveys will be completed in winter, focusing on migratory bird species such as the regent honeyeater (*Anthochaera phrygia*).

Aquatic Survey

Aquatic surveys will be completed, where necessary, within major creek and tributaries containing sufficient flow to support aquatic species. Sampling of macro-invertebrates and freshwater fish will be undertaken in suitable aquatic habitats within Project area to gain an understanding of the condition of aquatic habitats, presence of significant values of the aquatic environment, and to establish baseline data for potential future monitoring. If sufficient water is not present to complete such surveys, the aquatic assessment will be limited to a detailed assessment of the aquatic habitats using standard, quantifiable and repeatable methods.

Groundwater dependent ecosystems (GDEs) are ecosystems which have their species composition and their natural ecological processes determined by groundwater (DLWC 2002).

Potentially occurring GDEs will be assessed in accordance with the State Groundwater Dependent Ecosystem Policy Guidelines (DLWC 2002). Potential GDEs will be identified using mapped groundwater resources compared to mapped biological features.

Ecological Assessment Report

The Ecological Assessment Report will provide detailed documentation of the field surveys completed, methodology and a detailed assessment of the impacts associated with the Project, including an assessment of significance of identified impacts on the ecological values of the Project area, including listed TECs, populations and species.

The Ecological Assessment Report will outline the key impact avoidance, minimisation, mitigation and offsetting measures (based on the inclusion of a Biodiversity Offsets Strategy) and an assessment of the significance of the Project against relevant guidelines published by DSEWPC and OEH.

5.2.6 Biodiversity Offset Assessment

Due to the ecological value of the remnant vegetation within the Project area, there is a high probability that biodiversity offsetting will be required for the Project. A Biodiversity Offset Strategy will need to be determined through detailed ecological values assessment to be undertaken as part of the Ecological Assessment. This will commence with the first detailed ecological surveys, and will need to be developed throughout the impact assessment phase for the Project.

The development of a Biodiversity Offset Strategy will need to be undertaken in consultation with OEH, DPI and where relevant DSEWPC, throughout the preparation of the EA.

5.3 Aboriginal Cultural Heritage

The term Aboriginal cultural heritage refers to both archaeological sites and to sites/places of cultural value to the present-day Aboriginal community. Archaeological sites contain material evidence of Aboriginal occupation such as stone artefacts, scarred or carved trees or grinding grooves, all of which are collectively known as Aboriginal objects. Places of cultural significance can only be identified by Aboriginal people, and encompass places with traditional, historic, religious or spiritual meanings that may or may not be associated with archaeological sites (NPWS 1997:3).

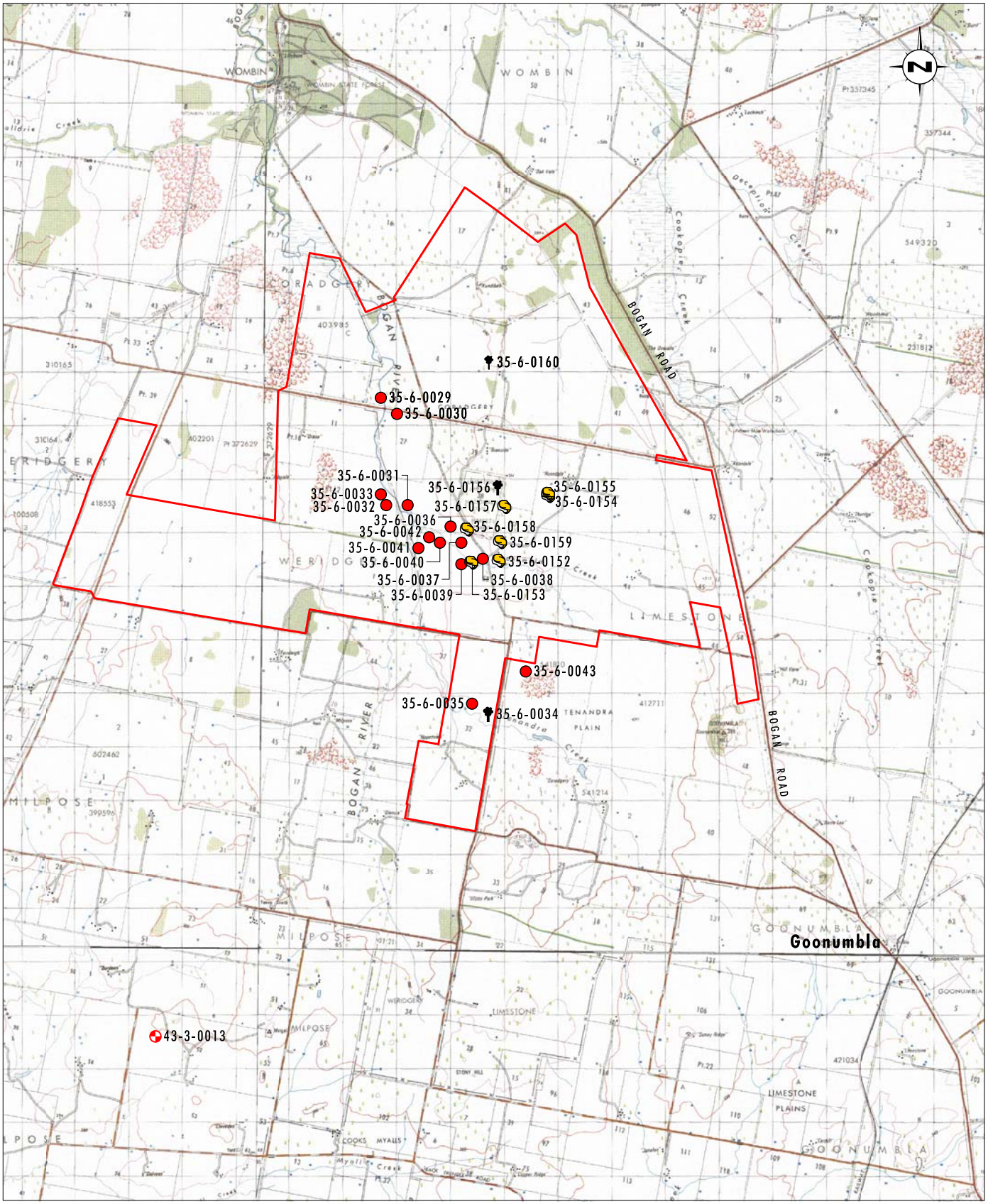
Consultation with Aboriginal parties is a primary component of the Aboriginal cultural heritage assessment process. NPM is located within the country of the Wiradjuri people. In recognition of this, NPM has entered into a memorandum of understanding with the Peak Hill Local Aboriginal Land Council and the Wiradjuri Council of Elders resulting in the establishment of an Aboriginal Heritage Working Group.

In compliance with current consent requirements, NPM operates in accordance with an Aboriginal Heritage Management Plan (AHMP) developed in consultation with PHLALC, WCECHC and the Department of Environment and Climate Change (now OEH).

The following sections briefly outline the potential for interaction with Aboriginal cultural heritage as a result of the Project and provide a methodology for the assessment of Aboriginal cultural heritage within the Project area.

5.3.1 Existing Environment

The Aboriginal Heritage Information Management System (AHIMS) maintained by OEH lists 25 recorded Aboriginal archaeological sites within a search area of approximately 16 by 15 kilometres surrounding the Project area (refer to **Figure 5.4**). Of these, 24 are located within or in proximity to the Project area. These sites consist of 14 artefact scatters, three



Source: NPM (2011), LPMA (2011), AHIMS (2011)

Legend

- Northparkes Project Area
- Artefact Scatter
- Artefact
- Bora/Ceremonial
- Artefact, Scarred or Carved Tree

FIGURE 5.4

AHIMS Recorded Aboriginal Archaeological Sites within the Project Area

scarred trees associated with artefact scatters and seven sites containing artefacts (for which site type is not listed). The majority of these sites are clustered in the central portion of the Project area and are located adjacent to watercourses (the Bogan River and Goonumbla Creek). This reflects both environmental factors and the location of previous Aboriginal cultural heritage assessments conducted for NPM, as detailed below. The remaining site is located approximately 6 kilometres south-west of the Project area and is identified as a bora or ceremonial ground.

A number of Aboriginal cultural heritage assessments have been undertaken within the NPM site and its immediate surrounds (OzArch 2008a, Paton 2006, Appleton 1996, Nicholson 1990, Stone 1986). Further to the identification of a number of sites (as discussed above), Paton (2006) identified a zone of medium archaeological sensitivity bordering Goonumbla Creek within the NPM site. Test excavations were subsequently conducted in this area prior to the construction of an overland conveyor and resulted in the recovery of low numbers and densities of artefacts (OzArch 2008b).

One of the scarred trees discussed above was located in an area to be impacted by the construction of a tailings facility. In accordance with the relevant assessment (OzArch 2008a) and in consultation with the Aboriginal Heritage Working Group, the tree was recorded, cast to archival standards and relocated to the purpose-built Wiradjuri Gardens at the entrance to the NPM site facilities (refer to KAS 2009). One of the remaining scarred trees (35-6-0156) appears to have been subject to natural decay process and no longer extant (Paton 2006).

The Project has the potential to impact a number of Aboriginal archaeological sites (both previously identified and shown in **Figure 5.4** and sites not yet identified but within the Project area). Direct impacts may result from the establishment of surface infrastructure including the development of the tailings storage facility, upgraded ore processing facility, filtration plant and associated infrastructure. Indirect impacts associated with subsidence may also occur in the vicinity underground mining areas, including the proposed extraction of GRP314 zone of mineralisation. Should any Aboriginal archaeological sites be located in these areas, the objects that they contain may be subject to harm. In relation to this, the following key Aboriginal cultural heritage factors should be considered:

- the presence of previously recorded extant Aboriginal archaeological sites and areas of archaeological sensitivity;

- the potential presence of additional sites or areas of archaeological sensitivity that may be recorded during the proposed detailed survey of the Project area (refer to **Section 5.3.3**);

- the potential presence of additional areas of Aboriginal cultural value that may be identified by Aboriginal parties as part of the Aboriginal cultural heritage assessment (refer to **Section 1.1.3.1**); and

- outcomes of previous archaeological studies and consultation with the Aboriginal Heritage Working Group in relation to management and mitigation commitments for the currently approved mining operations within the Project area.

The detailed Aboriginal cultural heritage assessment will be undertaken as part of the EA (refer to **Section 5.3.3**). It will provide an assessment of the impacts of the project on the Aboriginal heritage values of the Project area, as well as develop appropriate management and mitigation controls in consultation with the relevant Aboriginal parties.

5.3.2 Proposed Assessment Methodology

As a part of the Environmental Assessment an Aboriginal cultural heritage assessment will be completed in accordance with *Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales* (2010) and the relevant consultation requirements. It is noted that the code of practice discussed above specifies the requirements for an Aboriginal archaeological assessment, which will contain all relevant technical information and will exist as an appendix to the Aboriginal cultural heritage assessment. The Aboriginal cultural heritage assessment must identify the significance of any Aboriginal objects or places within the Project area, the actual or likely harm that may occur to these objects/places as a result of the project and the measures taken to protect, conserve, avoid or mitigate this harm. It must also include any submissions received from registered Aboriginal parties and the proponent's response to each submission.

The completion of the Aboriginal cultural heritage assessment will involve the following tasks.

- assisting NPM to undertake consultation with Aboriginal parties in accordance with relevant requirements, as determined by DP&I and OEH, including undertaking a number of meetings/workshops with the Aboriginal parties at key stages throughout the Aboriginal cultural heritage assessment in order to facilitate the receipt of comment from the Registered Aboriginal Parties;

- developing a detailed archaeological and Aboriginal cultural heritage survey methodology in consultation with the Aboriginal Parties and OEH and in accordance with the Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales (2010);

- undertaking a detailed archaeological survey of the Project area in compliance with the finalised survey methodology;

- undertaking geomorphic assessments of sites/areas where necessary;

- completing a draft Aboriginal archaeological assessment report that incorporates information required under the Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales (2010);

- assisting (if required/requested) the Aboriginal parties to compile a draft Aboriginal cultural heritage assessment report that incorporates relevant information and is largely developed based on the results of consultation with all Aboriginal parties undertaken prior to the completion of the draft report;

- completing OEH site recording cards for new sites or previously recorded sites identified during the survey and providing necessary information to OEH and NPM;

- finalising the draft Aboriginal archaeological assessment and assisting (if required/requested) the Aboriginal parties to finalise the Aboriginal cultural heritage assessment to incorporate comments received from all Aboriginal parties in relation to the draft report; and

- incorporation of finalised Aboriginal cultural heritage assessment and Aboriginal archaeological assessment into the Environmental Assessment.

5.3.2.1 Consultation with Aboriginal Parties

Aboriginal people are the principal determinants of the significance of their heritage (Department of Environment and Conservation [DEC] 2004:3) and this is reflected in the

Aboriginal cultural heritage assessment process. Consultation undertaken as part of this process will provide Aboriginal parties with the opportunity to be involved in all aspects of the assessment including:

- involvement in the design of the cultural heritage assessment;
- participation in the identification of Aboriginal archaeological sites;
- assessing the cultural significance of archaeological sites identified, and providing input on the cultural values of the area in general;
- identifying the impact of development on sites/areas of cultural heritage significance; and
- developing cultural heritage management recommendations based upon the cultural significance/values of sites and areas. As previously discussed, Peak Hill Local Aboriginal Land Council and the Wiradjuri Council of Elders currently have an active role in managing Aboriginal cultural heritage at NPM through their involvement in the Aboriginal Heritage Working Group. It is intended to maintain and foster this role through the Aboriginal cultural heritage assessment process. However, it is recognised that other Aboriginal parties may also wish to be consulted.

5.4 Historical Heritage

Desktop review of *Parkes Local Environmental Plan 1990*, the NSW State Heritage Inventory, NSW State Heritage Register and the Australian Heritage Database (including the Commonwealth and National Heritage Lists and the Register of National Estate) reveals twenty one listed items of heritage significance within the Parkes LGA. Two of these sites are listed on the State Heritage Register, being the Parkes Post Office and the Parkes Railway Station Group. A further eight items are listed on the Register of National Estate. The remainder are individual or group items listed on the Parkes LEP and State Heritage Inventory. None of the identified listed heritage items are located within or within close proximity to the Project area.

As a part of the European Heritage Assessment completed by Australian Archaeology (2006) to accompany the Environmental Assessment - Northparkes Mine E48 Project (Corkery 2006) three locally significant items (Blacksmith's Shed, Worker's Hut and 'Rosedale' Shearers Shed) were identified as being impacted as a result of the development of the Rosedale Tailings Facility. As outlined in **Section 2.0**, the Rosedale Tailings Facility has not been constructed to date.

The presence of previously identified locally significant heritage items onsite indicates that the disturbance of items of historical heritage or archaeological value may be an issue for the Project. As such a historical heritage assessment for the Project will be completed as a part of the Environmental Assessment in accordance with professional standards and guidelines, specifically those set out in the *NSW Heritage Manual 1996* (Heritage Office and Department of Urban Affairs and Planning 1996) including *Archaeological Assessments, Assessing Heritage Significance* and *Statements of Heritage Impact* and with consideration of the principles contained in the *Burra Charter: the Australia ICOMOS Charter for Places of Cultural Significance 1999* (Australia ICOMOS 5.4.1 Approach to Assessment 1999).

The approach to this assessment, as detailed below, includes a survey/site inspection targeting areas of potential historical archaeological/heritage significance, as identified during the Aboriginal site survey or during the preparation of the historical and archaeological context of the Project area, which may be impacted by the Project.

A stand alone report will be produced which assesses the historical archaeological and heritage significance of the Project area (in accordance with Heritage Branch, OEH criteria). The report will provide clear guidance to NPM in relation to management options and recommendations for the Project area.

The tasks undertaken during the preparation of the heritage assessment would include:

- research of Project area including (where appropriate) archival research in the State Library of NSW, State Records, Regional Libraries, a review of Parkes Shire Council records and maps and a review of any available air photographs and parish maps;

- consultation – predominantly to request research materials and information - with local historical societies, including the Parkes Historical Society;

- targeted inspection of the Project area to identify (and to prepare a preliminary record of) any potential historical heritage items (identified during the Aboriginal archaeology site survey, during the review and gap analysis stage of works, or the preparation of the historical context);

- preparation of a detailed historical and archaeological context, in which to assess the significance of any potential historical archaeological resource or heritage item present within the Project area;

- preparation of an assessment of the significance of any identified sites in the Project area, according to established significance assessment criteria outlined by the Heritage Branch, OEH's *Assessing Heritage Significance* guidelines;

- preparation of a Statement of Heritage Impact indicating the likely effect of proposed works on any potential historical archaeological resource or heritage item identified or previously known within the Project area and whether further management/investigation is warranted;

- if required, consultation with the Heritage Branch, OEH to ensure management strategies developed to mitigate potential heritage impacts within the Project area are appropriate; and

- preparation of a report in relation to the findings of the survey and assessment process that provides clear guidance on the significance of any potential historical archaeological resource or heritage item and identifies any requirements related to their management.

5.5 Water Resources

5.5.1 Surface Water and Water Supply

5.5.1.1 Existing Environment

The Project area is located the catchments of the Bogan-Macquarie and Lachlan River Systems which are major tributaries of the Murray-Darling Basin System. The southern portion of the Project area is located within the Lachlan River catchment area. There are no tributaries of the Lachlan River located within the Project area. The Bogan River catchment forms part of the Bogan/Macquarie River catchment which flows north-west towards Nyngan. The Bogan River starts in the Hervey Range near Peak Hill. The total catchment area of the Bogan River upstream of Nyngan is approximately 18,000 km^2 (Green *et.al.* 2011).

NPM is located within four sub-catchments in the headwaters of the Bogan River, with one tributary, Goonumbla Creek and the Bogan River traversing the Project area (refer to **Figure 5.5**). The surface water resources within the Project area and surrounding vicinity are shown on **Figure 5.5**. The sub-catchments within the existing mine site and mining leases are detailed below in **Table 5.5**.

Table 5.5 – Proportion of the Existing Mine Site Draining to Each Catchment

Catchment	ML1247 (ML1641)		ML1367		Existing Mine Site	
	Area (ha)	Area (%)	Area (ha)	Area (%)	Area (ha)	Area (%)
Goonumbla Creek	498	31	423	51	921	37
Tenandra Creek	86	5	0	0	86	4
Cookapie Creek	471	29	403	49	874	36
Bogan River (Direct)	575	35	0	0	575	23
Total	1630	100	826	100	2456	100

Source: Corkery (2006)

The surface water resources within and surrounding the Project, including Goonumbla Creek, Tenandra Creek and Bogan River, are generally ephemeral and only carry surface water after very heavy rainfall events.

Extensive drainage interception works have been constructed to ensure that all potentially 'dirty' and 'mine' surface water runoff from disturbed areas is collected and prevented from flowing into natural watercourses (GHD 2009). Further details of the NPM water management system is provided below.

5.5.1.2 NPM Water Management System

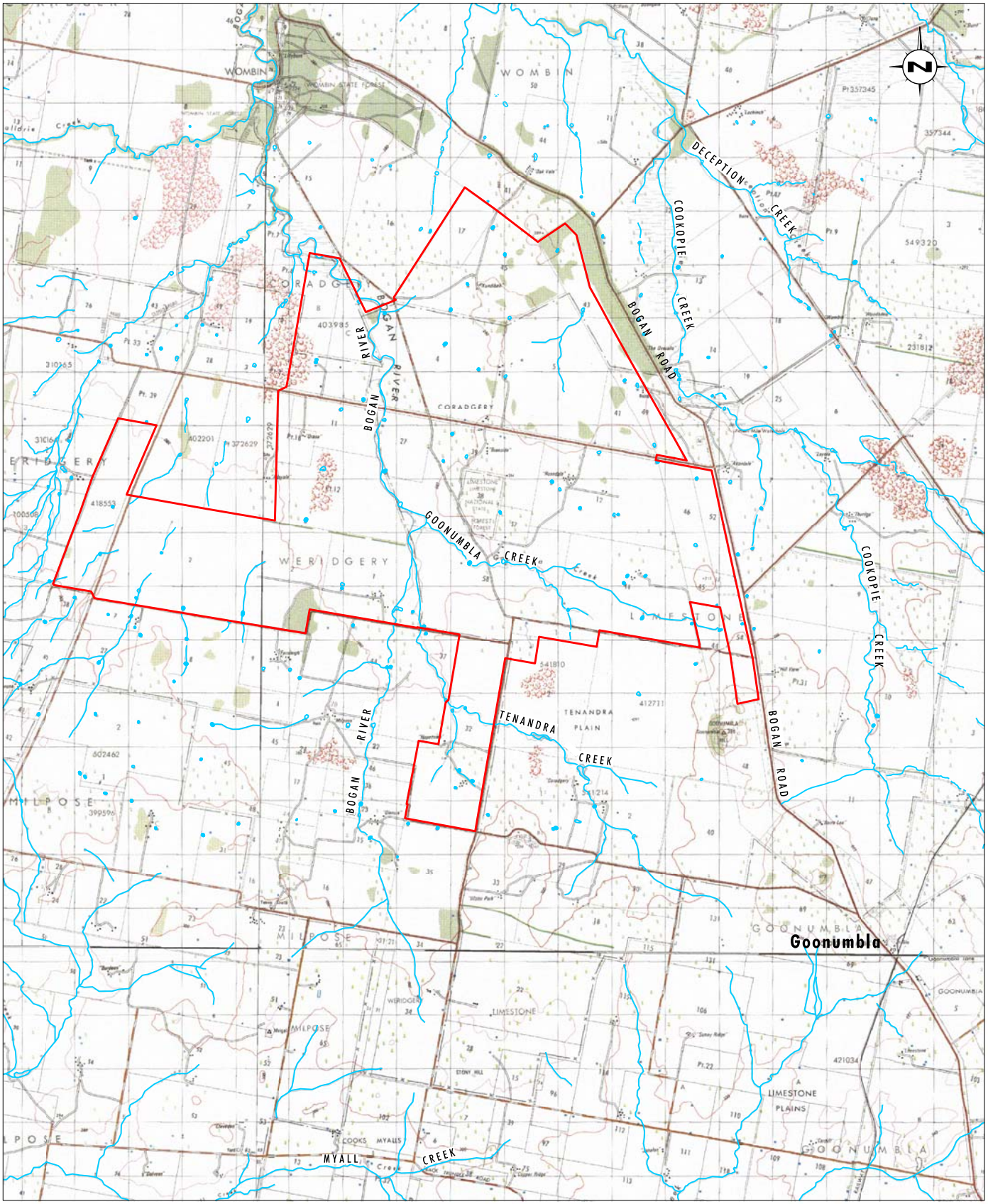
NPM operates an extensive water management system in accordance with an Operational Water Management Plan. The overall strategic approach to water management is captured within three focus areas, supply, storage and conservation. The key functions of water management controls at NPM are to:

- ensure the long term reliable water supply to the operation;
- maximise water efficiency to reduce reliance on fresh water usage; and
- to protect clean water systems.

Water Supply

The existing NPM operations require a net input of water each year. The water balance for the operation is reviewed on a weekly and monthly basis to ensure maximum efficiency. Ninety per cent of NPM's existing annual water usage is used for ore processing. Water therefore represents an important operational consideration. Water supply and conservation is of particular importance within Central NSW.

The Project will require a substantial increase in water supply for the proposed maximum ore production level of up to 30 Mtpa. As part of the Project, NPM are developing a



Source: NPM (2011), LPMA (2011)

0 1 2.5 5km
1:100 000

Legend

- Northparkes Project Area
- Drainage Line

FIGURE 5.5

Surface Water Resources

comprehensive water supply strategy, in order to effectively secure water resources for the Project. The water supply strategy will include:

- detailed investigation of relevant technologies and processing design to maximise water efficiency, retention and reuse as part of ongoing mining operations;
- securing existing water systems and allocations; and
- investigations into further allocations and supply through existing water supply systems – established under relevant legislation.

The water supply strategy will be further developed as part of the detailed project design process and outlined further in the EA.

Water Quality

NPM undertakes surface water monitoring program which involves the monitoring of water quality of various surface water courses and water bodies (process dams, farm dams, sediment ponds, retention ponds) onsite as well as upstream and downstream of the existing mine site. In 2010, NPM monitored surface water at 59 locations. The majority of the sample sites are monitored on a quarterly basis for electrical conductivity, pH, Total Suspended Solids and copper concentrations. Anions, cations and trace metals are monitored annually. Water courses are monitored annually or during rainfall events that result in flow and farms dams are monitored every six months.

5.5.1.3 Assessment Approach

The Project has a potential impact on surface water including flow regimes, surface water quality and harvestable water of nearby creeks. The Project will also require an increase in water supply to allow for the expansion in operations. A detailed water resources assessment will be undertaken as part of the EA for the Project. The water resources assessment will include:

- a site water balance that will:
  - take into account available water sources (i.e. likely catchment yields, groundwater make, tailings and other potential off-site supplies);
  - take into account water demand for the Project including production, dust suppression requirements and water sharing arrangements;
  - be based on daily time step models developed to undertake a detailed assessment of the Project water balance;
  - enable demand and supply peaks and storage requirements to be explored under a range of rainfall/evaporation, groundwater make, water supply authority and production conditions;
  - allow a detailed risk analysis of operational water supply to be completed using available long term rainfall and evaporation data and groundwater modelling predictions; and
  - identify any additional water management infrastructure needs over the life of the Project;
- documenting the existing characteristics of the catchments within the Project area including:
  - drainage system including stream ordering;

- channel depth, bed-slope and stability;
- nature of the stream bed (e.g. alluvial bed, pool and riffle sequences, etc.);
- extent of riparian vegetation;
- existing land use impacts and water users (including a review of the NOW water licence database); and
- interactions with the existing mine water management system.

Based on this information and with consideration of the conceptual mine plans, including major infrastructure and likely subsidence, other detailed surface water assessment will include:

- likely impacts and stream remediation requirements;
- potential for surface water capture and/or diversions;
- potential for increased surface ponding;
- potential impacts on the local flooding regime; and
- potential for changes to surface water quality and potential erosion and sediment control measures required.

In addition to those aspects of the operation's water cycle listed above, the water component of the EA will address:

- water legislation, comprising both the Water Act and Water Management Act, and including the preparation of any Part 2 and Part 5 Permit(s) (Water Act) required; and
- water policies, water sharing plans and the Murray Darling Basin – Basin Plan which is in preparation.

5.5.2 Groundwater

5.5.2.1 Existing Environment

Two regional aquifers are known to occur within and surrounding the NPM site, including:

- a shallow (<40 metres) alluvial-colluvial-weathered rock aquifer displaying low and very low hydraulic conductivities; and
- a deeper hard rock strata comprising a combination of well jointed strata amongst a sequence of aquicludes (impermeable rocks) and aquitards (poorly jointed rocks).

The E48 Project Environmental Assessment (Corkery 2006) identified that seepage through bedrock structures is minimal, with typically less than 0.22 ML/day of groundwater inflow into the existing E26 block cave.

Groundwater supplies within the NPM site are generally of poor quality. The existing NPM operations utilise insignificant volumes of groundwater which has seeped into the underground or open cut mines. Generally, the total available groundwater supply rate is estimated at approximately 63 ML per year. The groundwater flow within the NPM site reflects the site topography and is drawn towards the existing open cut pits and underground mines.

NPM has a number of existing licences relating to groundwater monitoring as well as extraction bore licences for four bores. In 2010, NPM monitored groundwater at 37 locations across the existing mine site. In addition, NPM hold all relevant licences for groundwater interception associated with existing mining areas.

The E48 Project Environmental Assessment (Corkery 2006) did not identify any groundwater dependent ecosystems within the NPM site. As detailed in **Section 5.2**, as part of the ecology assessment further assessment of potential impacts to GDEs within the Project area will be undertaken as part of EA.

5.5.2.2 Assessment Approach

The Project has the potential to impact on groundwater resources by means of groundwater drawdown as a result of subsidence as well as potential seepage from the proposed tailings area. As the Project has the potential to impact on groundwater resources, a groundwater assessment will be prepared as part of the EA.

As part of previous environmental assessment processes for existing approved NPM operations, a detailed groundwater impact assessment, including modelling to predict potential impacts on existing groundwater resources, has been undertaken. The detailed groundwater impact assessment will seek to build upon previous assessments, specifically consider the potential impacts associated with the proposed increased depth of mining, and the additional mining area. The groundwater related impacts arising from the Project will be assessed via the development of a computer model which simulates the groundwater systems and interactions of the mining process. The aspects that the groundwater assessment will consider are outlined below:

- identification and characterisation of groundwater aquifers and any alluvial deposits associated with drainage lines;
- extent of depressurisation induced by block cave mining, including cumulative depressurisation from the existing operations;
- potential losses associated with surface water systems during base flow and flood flow conditions;
- potential loss of water supply to regional users and the zone of influence;
- long term water quality issues;
- identification of any impacts on groundwater dependent ecosystems – usually related to the loss of pressure in shallow groundwater systems;
- predict mine water inflows and identify management strategies relating to the management of the groundwater resource, management of groundwater inflows into underground workings and the impact groundwater may have on the operations water balance; and
- post mining groundwater impacts including recovery of groundwater resources.

5.6 Subsidence

The existing mining operations include two underground block cave mines, E26 and E48 which have caused subsidence within the existing mine site. The subsidence that has occurred within the NPM site has resulted in direct surface impacts. These areas of

affectation have been identified through previous assessments, and are actively managed by NPM as part of current operations.

As part of the Project, the proposed depth extensions to the existing and approved underground block cave mines have the potential to result in further areas of surface subsidence affectation within the NPM site. The Project also includes a new underground block cave mines at E22 and GRP314, which will generate new areas of subsidence. For the purposes of the EA, the assessments will assume that surface subsidence will occur as a result of the development of the underground block cave mines at E22 and GRP314.

A subsidence impact assessment will be undertaken for the Project and will consider the existing and predicted subsidence impacts associated with the proposed extension to underground block cave mining within the NPM site. The subsidence impact assessment will address the following:

- previous subsidence experienced at the site;
- methodology for modelling predictions;
- detailed outline of the predicted subsidence levels within each block cave;
- the consequences of subsidence impacts; and
- management and mitigation of subsidence impacts.

The EA will consider the effect of subsidence impacts on all environmental aspects including but not limited to groundwater, surface water, flora and fauna, Aboriginal heritage, agricultural activities, visual amenity and rehabilitation and mine closure.

5.7 Noise

NPM undertakes quarterly noise monitoring survey's onsite in accordance with PA06_0026 and the sites associated noise monitoring program. Review of quarterly noise reporting for 2009 and 2010 indicates noise criteria has been meet during all monitoring periods. The key noise receivers and noise monitoring sites are shown on **Figure 2.3**. Meteorological conditions are a relevant factor in the propagation of environmental noise between industrial sources and noise receivers. **Figure 5.6** provides annualised and seasonal wind roses collected from the meteorological station located at the NPM site for 2010. As shown on **Figure 5.6**, a general northerly to southerly trend in wind direction is the prevailing annual variation in wind direction occurring within the vicinity of the Project area.

The key potential noise impact from the Project will be the construction and operation of a new ore processing plant and the construction and operation of the upgraded railing siding and filtration facility. Additionally construction of the TSF has the potential to generate a construction noise impact to closest residences.

A detailed noise impact assessment (NIA) will be undertaken in accordance with the requirements of OEH *EPA Industrial Noise Policy* 2000 (INP) to better understand noise impacts from the Project. This impact assessment will include an assessment of the potential noise impacts associated with the Project in the context of existing noise environment of receiver areas.

The approach to be taken to the NIA includes:

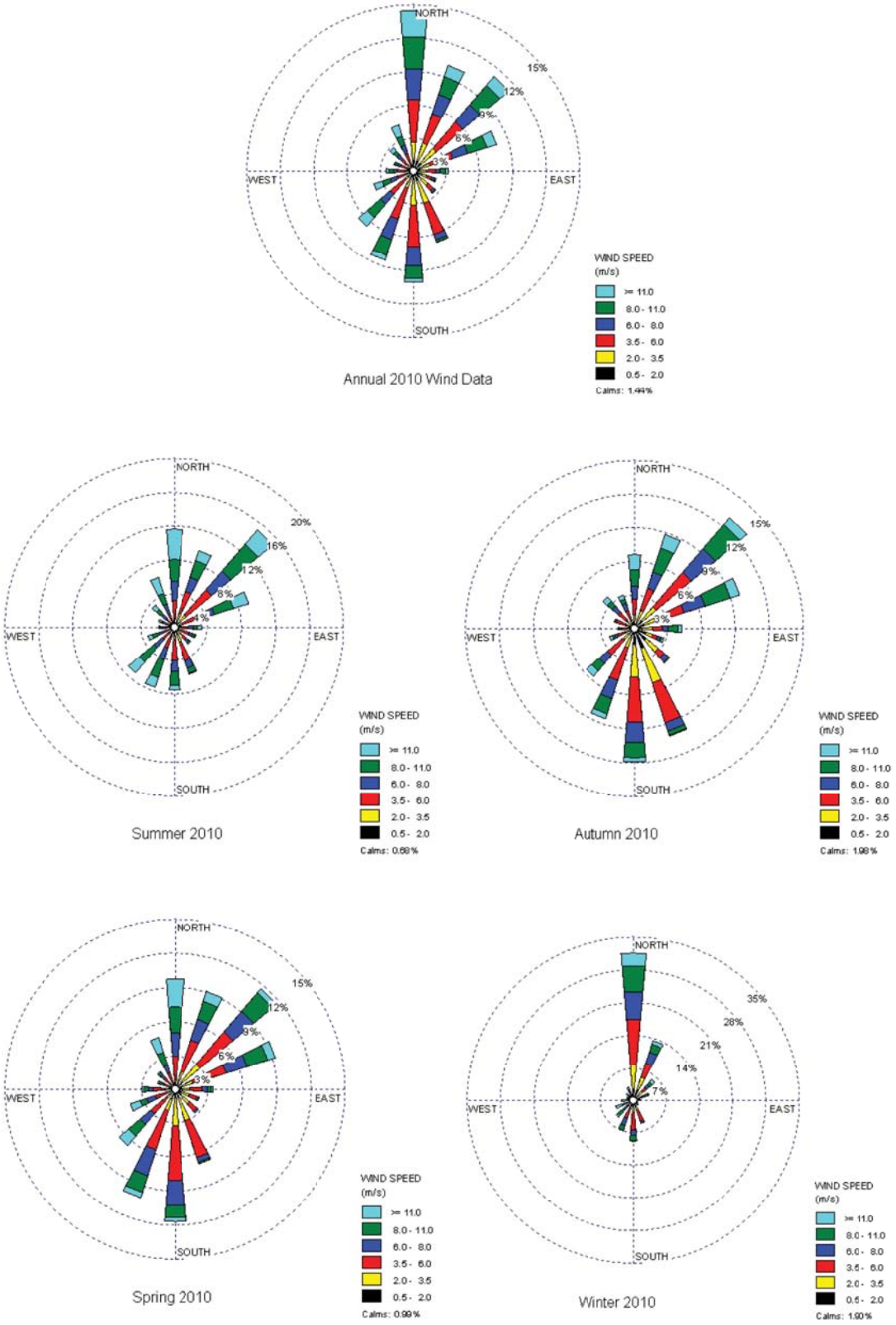


FIGURE 5.6

2010 Wind Roses for NPM Site

Source: NPM (2011)

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- measuring and determining existing background and ambient noise levels in the area surrounding the Project and use this data to confirm the project-specific noise criteria for the Project;
- confirming the road traffic and railway traffic noise level criteria based on the monitoring of the existing noise levels;
- the preparation of a detailed computer generated noise model of the proposed facility that can be used to predict the noise emissions from the facility for calm, prevailing and adverse weather conditions;
- investigating, where required, the implementation of feasible noise reduction, management or mitigation measures such that the Project achieves the project-specific noise criteria;
- an assessment of the cumulative noise impacts from the facility and other relevant nearby activities;
- an assessment of the noise impacts from the additional traffic movement generated by the Project;
- an assessment of the construction noise impact of the Project in accordance with relevant assessment procedures;
- an assessment of the railway noise impact in accordance with relevant assessment procedures based on the traffic movements associated with the Project;
- preparation of a Noise Impact Assessment report for inclusion in the EA.

Given the potential for a significant contribution to noise levels from the Project, feasible noise mitigation measures are being considered as part of Project design. Noise mitigation measures include noise attenuation of equipment and operational staging to enable operations to continue during noise enhancing conditions. Further details of the specific noise management and mitigation measures will be described and evaluated through the detailed noise impact assessment as part of the EA

5.8 Air Quality

The existing air quality in the area immediately surrounding the Project is influenced by a number of factors, including prevailing meteorological conditions (refer to **Figure 5.6**), topography, agriculture and mining activities. NPM monitors dust around its existing operations and at various neighbouring residences in accordance with its Environmental Dust Monitoring Plan.

An Air Quality Assessment will be undertaken in accordance the procedures outlined in the '*Approved Methods for the Modelling and Assessment of Air Pollutants in NSW*' (DEC, 2005). The assessment will include the development of an air quality dispersion model for the Project and surrounding areas through the use of a recognised modeling system endorsed by OEH.

The dispersion model will predict ground-level dust concentrations and deposition levels resulting from potential dust generating activities associated with the Project. Dispersion modelling will consider local meteorology, terrain information and uses dust emission estimates to predict air quality impacts associated with the Project. The calculated emissions will take account of proposed air pollution controls and mitigation strategies including passive

controls such as those built into the mine plan (for example TSF size, dimension and alignment,) and active controls such as the intensity of watering and extent of rehabilitation.

The air quality assessment undertaken as part of the EA will include the following components:

- development of an emissions inventory to provide predictions of the maximum 24 hour average PM_{10} concentrations and annual average concentrations for TSP and PM_{10} and deposited dust, associated with the Project;
- consideration of other relevant air quality parameters such as $PM_{2.5}$, NO_x and SO_x;
- detailed assessment of existing air quality in the Project area through a review of air quality monitoring data for dust deposition and concentrations of PM_{10} and TSP;
- assessment of the potential for the predicted levels to cause an exceedance of the relevant assessment criteria, using a judgement as to the likely background levels based on analysis of existing monitoring data and estimation of the potential impacts of other land uses; and
- the assessment of impacts on nearest residences in accordance with the current OEH requirements using a dispersion model and relevant meteorological data to predict dust deposition rates and concentrations of PM_{10} (24 hour and annual average) and TSP (annual average). The predicted values would be compared with OEH Guidelines (DEC 2005).

The air quality impact assessment will describe the proposed mitigation and management measures to minimise the generation of dust and emissions, and propose a monitoring program to both determine the effectiveness of mitigation and to verify predictions over the life of the Project.

5.9 Greenhouse and Energy

Greenhouse gas emissions from mining operations are an issue of concern for the wider community. Mining of copper and gold results in the emission of greenhouse gases principally through the combustion of diesel fuel used in diesel powered equipment and indirectly through the significant increase in demand for electricity. As part of the Project, a substantial increase in electricity will be required to power mining equipment and the operation of the proposed 30 Mtpa ore processing plant.

As part of the EA process a detailed greenhouse gas assessment will be completed, including the calculation of predicted emissions and identification of appropriate mitigation measures to minimise greenhouse gas emissions from the operation. This assessment will be completed in accordance with DP&I requirements, including the requirement to consider the impacts associated with Scope 3 emissions associated with the Project.

The proposed greenhouse gas assessment will include:

- estimating scope 1, 2 and 3 emissions associated with the construction of the Project, including energy and materials required to construct infrastructure and transport construction materials;
- estimating scope 1 and 2 life of mine (LOM) emissions generated by mining operations. Emission sources include energy use and waste management;

- estimating scope 3 LOM emissions associated with the operation of the Project, including energy used transporting products and energy used by contractors;
- estimating scope 1, 2 and 3 emissions associated with the decommissioning and closure of the NPM, including energy used to re-shape and rehabilitate the final landform;
- estimating the impact of the Project's emissions on atmospheric concentrations of greenhouse gases;
- evaluating the impact of the Project's emissions on local, state, national and international greenhouse gas emission targets;
- evaluating whether the Project aligns with the principles of Ecological Sustainable Development (ESD) in the context of GHG and energy management; and
- identifying management and mitigation options to reduce the impact of the Project.

5.10 Traffic and Transport

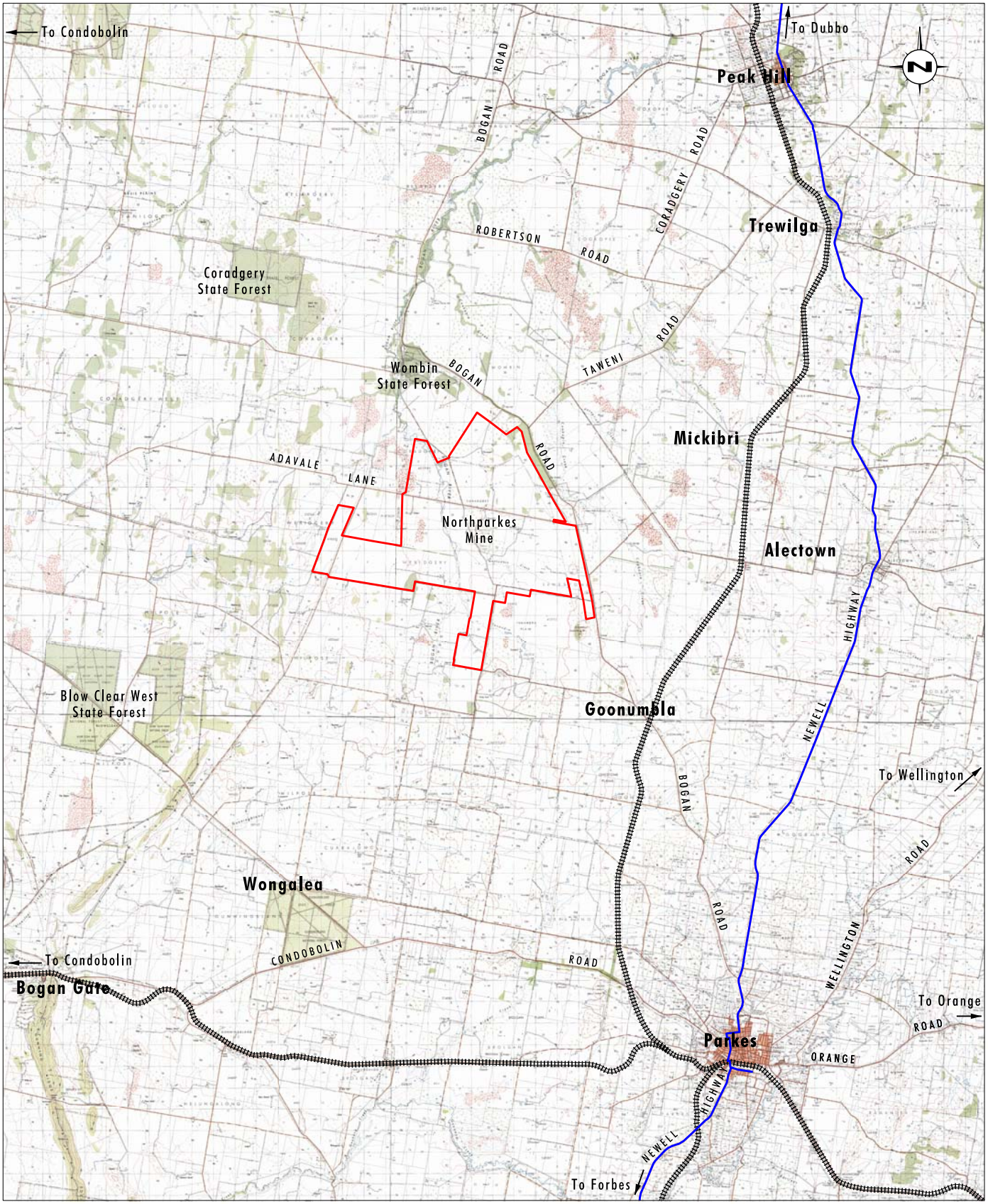
The main road and rail infrastructure surrounding the Project area is shown on **Figure 5.7**, and consists of the Newell Highway (SH17), Bogan Road (SR76) and a number of ancillary connections including Coradgery Road (SR136), Robertson Road (SR130) and Taweni Road (SR82A). The majority of mine related traffic access the NPM site via Bogan Road (SR76) and a two kilometre section of the Newell Highway (SH17) to the north of Parkes.

Mine related traffic associated with existing NPM operations consists of light vehicle movements associated with employees and mine related contractors, heavy vehicles transporting concentrate to the rail siding, and heavy vehicles to deliver mining equipment and supplies, including mining machinery, fuel and processing plant chemicals for both construction and ongoing mining operations. Due to the scale of the Project, there will be an increase in traffic movements accessing the site during both the construction and operational phases of the Project.

Currently NPM has approval under PA06_0026 and subsequent Modification 1 to transport copper concentrate from an 8.5 Matpa operation from NPM south to the Goonumbla rail siding through the use of heavy vehicles. Review of previous environmental assessments completed for the E48 Project and Modification 1 indicates that at current operating levels the roads surrounding the site have sufficient capacity to accommodate existing approved operations.

The Project will include the construction of a pipeline to provide for the transport of concentrate in slurry form to the upgraded rail siding at Goonambla. The development of the concentrate transport pipeline will reduce heavy vehicle movements between NPM and Goonumbla due to removing the requirement for ore to be transported via Bogan Road by heavy vehicles.

The NPM site is situated approximately 12 kilometres to the north-west of the existing Goonumbla Rail siding. The Goonumbla Rail siding is located on the line connecting Cootamundra (also located on the Main South line which connects Sydney to Melbourne), Parkes and Dubbo. Parkes is also located on the Broken Hill line which is the major east-west rail line. Existing rail infrastructure allows NPM to utilise existing rail networks for transport of concentrate to Port Kembla. The proposed increase in production will place an increased demand on the rail network.



Source: NPM (2011), Department of Lands (2006)

Legend

- Northparkes Project Area
- Highway
- Railway

FIGURE 5.7

Existing Road Network

Due to the proposed change in the traffic characteristics associated with the Project, as a part of the environmental assessment a traffic and transport assessment will be undertaken to assess the potential impacts on both rail and road networks. The traffic and transport assessment will include the following:

- an assessment of the existing road and rail networks and existing traffic volumes;
- an assessment of the adequacy of intersections and the general traffic routes to accommodate the proposed increase in vehicle numbers; and
- documenting potential road and rail transport issues for both the construction and operational phases of the project including:
  - level of service on the road and rail networks;
  - physical condition of the roads and rail related to the project including capacity of the networks;
  - road and rail safety issues; and
  - impacts of the project on the road and rail network.

5.11 Visual Impact

The environment surrounding the Project is characterised by a generally flat topography (refer to **Section 5.1.1.1**) utilised principally by private land owners for agriculture (refer to **Section 4.1**). Viewing locations within the vicinity of the Project include private residences, roads and public spaces (refer to **Figure 4.1**).

The Project has the potential to alter the existing visual characteristics of the Project area through the development of surface mining infrastructure, including an additional TSF, ore processing and filtration facilities located outside the NPM site. Accordingly, a detailed visual assessment will be undertaken as a part of the EA to assess the following:

- identification of sensitive receivers including private residences and public locations including public roads;
- an assessment and description of the visual resource and identification of the landscape components contributing to the visual character of the region and local area surrounding the Project area;
- comprehensive site analysis to determine the landscape units and visual catchments of the area, including topography and drainage, water bodies, vegetation, aspect, land use patterns, heritage items and existing structures;
- identification of key features of the Project which may create visual impacts and the duration of the activities or features that may cause impact. This will be achieved through use of digital terrain modelling and radial analysis to determine potential viewing locations;
- evaluation of views, existing and proposed, from selected specified viewpoints surrounding the Project, including but not limited to the Bogan Road, private residences and other prominent viewing locations;
- assessment of the potential changes to the landscape and associated visual impacts; and

- recommended measures to minimise and mitigate potential visual impacts of the Project, including the preparation of a rehabilitation plan and screen planting plan where required.

5.12 Utilities, Infrastructure and Waste Management

Electricity is supplied to the site by Energy Australia through transmission lines from an offsite substation. Preliminary investigations have identified that transmission lines need to be upgraded in order to provide the increased electricity demand of the Project. Further to upgrades of existing transmission lines a new onsite substation will be built to accommodate predicted energy demand.

NPM currently utilises a Parkes Shire Council/ NPM jointly funded water supply infrastructure network to link the Forbes bore field to Parkes and NPM. It is expected that an upgrade to the existing water supply infrastructure will be required as a result of the Project.

A number of utility systems are already in place at the existing mine site, these systems include sewage, waste water, fire protection, fuel storage and communications. These systems are likely to be replaced, upgraded or expanded as a result of the Project.

All general wastes from NPM are managed through a site wide non mineral waste management plan. The principal non-mineral wastes generated by NPM include:

- scrap steel;
- general domestic-type wastes from on-site buildings and product packaging;
- oils and grease; and
- sewage.

The site wide non mineral wastes management plan includes recycling programs for paper, cardboard, lead batteries, aluminium cans, printer cartridges, grease, oil and scrap steel. Waste oil and grease is contained in bunded areas of existing workshop, prior to being collected by a licensed waste contractor for treatment and recycling. Effluent from two onsite treatment plants is disposed of into the process water system. An approved contractor disposes of sewage sludge from the two stage septic systems.

5.13 Hazard and Risk

A Preliminary Hazard Analysis (PHA) will be undertaken to confirm whether or not the Project is a potentially hazardous or offensive industry in accordance with *State Environmental Planning Policy No. 33 – Hazardous and Offensive Development* (SEPP 33).

The PHA will include:

- a Level 1 Risk Assessment for the Project; and
- review of the SEPP 33 screening of input/output materials to be stored, processed and handled by the Project.

The PHA will be prepared in accordance with the *SEPP 33 – Hazardous and Offensive Development* (NSW Government, 1997), *HIPAP No. 6 – Guidelines for Hazard Analysis* (DoP 2011a, DoP 2011b) and *Multi-level Risk Assessment* (DUAP, 1999). The PHA will identify and assess all hazards that have the potential for off-site impact to determine the consequence to people, property and the environment and their potential to occur.

Should the PHA identify that the Project is considered to be a potentially hazardous or offensive development further detailed assessment would be undertaken as part of the EA.

5.14 Socio-Economic Impacts

The Project area is located within the Parkes Shire Council LGA which includes five major towns including Parkes, Peak Hill, Trundle and Bogan Gate. Parkes is the largest town and centre for services and accounts for approximately 76 per cent of the LGA's population.

The largest employment sector within the Parkes area is agriculture which accounted for approximately 23 per cent of the LGA employment in 2006. There is also above average employment in labour intensive occupations, including the importance of agriculture in the employment profile of this area. The region also has above average employment in the transport sector, indicating Parkes role as an inland transport hub.

NPM currently employs the majority of the existing workforce from the surrounding area (refer to **Table 5.6**), which indicates that the majority of the workforce are residents of the LGA and surrounding areas, and reliant on the available services. **Table 5.6** also highlights the existing NPM operations are a key employer within the LGA with the benefits from this linking through to the surrounding areas.

Table 5.6 - Location of NPM Existing Employees

Locality	Percentage of Employees (%)
Parkes	74.4
Forbes	8.3
Other	4.9
Peak Hill	3.0
Trundle	3.0
Bogan Gate	1.9
Goonumbla	0.3
Dubbo	0.8
Tichbourne	1.1
Alectown	0.4
Bedgerebong	0.4
Orange	1.5
Total	100

Parkes has a range of services and infrastructure such as:

- health care services (Parkes Hospital and Community Health Centre);
- aged care facilities;
- child care facilities;
- emergency services, including local fire brigade;
- educational services including primary and secondary schools; and
- Parkes Shire Council services including water supply, waste management, road network and community services.

NPM is an active participant in the local community through a range of direct and indirect mechanisms. Direct mechanisms include sponsorship of community events and services, and direct financial contributions for the provision of services within the Parkes LGA including child care facilities and a neighbourhood centre. In 2010, NPM provided direct sponsorship of community events and services to a total of $520,000. In addition, NPM also provides direct funding for the maintenance of Bogan Road, which is predominately utilised by NPM employees to access the site.

Given the scale of the project, there are a range of potential socio-economic impacts which will need to be assessed. Socio-economic assessment is concerned with assessing and predicting the likely consequences of a Project in both social and economic terms. While economic assessment emphasises the monetary effects of a proposal, social impact assessment is concerned with assessing benefits and costs in non-monetary terms.

A detailed social impact assessment will be undertaken to identify the predicted impacts of the project on the community. The social impact assessment will specifically assess matters such as employment, education, health services, housing and accommodation. The assessment will consider both the construction and operational phases of the Project. Where adverse impacts are identified, mitigation measures will be developed in consultation with DP&I.

In addition there is likely to be community interest in the Project, and NPM will actively engage with all relevant stakeholders, as outlined in **Section 3.2**. The social impact assessment process will be closely integrated with the community consultation process undertaken as part of the Project.

An economic impact assessment will be prepared to support the Project by a specialist economist. The economic impact assessment prepared in support of the Project will be prepared in accordance with Planning NSW (2002) draft *Guidelines for Economic Effects and Evaluation in EIA*. The assessment will consider:

- the economic efficiency of the project (i.e. consideration of economic costs and benefits); and

- the regional and State economic impacts of the project (i.e. the economic stimulus that the project would provide to the region and State economy).

The outcomes of the economic impact assessment will be a key consideration in the justification of the Project to relevant government agencies and the broader community through the EA, and also form part of the assessment of relevant Ecologically Sustainable Development (ESD) considerations for the Project.

6.0 Project Schedule

This report has been prepared to accompany a request to DP&I to issue the DGRs for the Project, following on from the lodgement of the project application in March 2011.

Based on current Project timing, NPM intends to lodge the draft Environmental Assessment for the Project with DP&I for Adequacy Review in mid 2012.

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APPENDIX 1

Preliminary Environmental Risk Analysis

Appendix 1

Northparkes Step Change Project

Preliminary Environmental Risk Analysis

Activity	Aspect	Potential Impact	Status and Proposed Control	Risk Assessment			Further Assessment Requirements	Key Issue
				C	L	R		
CONSTRUCTION PHASE								
Construction of mine infrastructure (including TSF, ore processing plant, pipeline and filtration plant).	European Heritage	Disturbance of sites of European heritage significance.	A review of the historical context of the Project area indicates that it has the potential to contain items of local historical heritage significance only. No state listed heritage items were identified within the Project area.	2	D	L	An assessment of the potential impacts of the project on European heritage will be undertaken.	No
	Ecology	Loss of native flora and fauna.	A number of surface facilities will be constructed outside existing mine areas. A full assessment of the potential impacts of the project on ecological values will be completed.	2	B	H	An assessment of the potential impacts of the project on ecological values will be undertaken.	Yes
	Cultural Heritage	Disturbance of Aboriginal places or objects.	A number of surface facilities will be constructed outside existing mine areas. A full Aboriginal Archaeology Assessment is being completed for the Project.	3	B	H	An assessment of the potential impacts of the project on Aboriginal Archaeology of the site will be undertaken. The assessment will be completed in consultation with the local Aboriginal community.	Yes
	Erosion and sediment runoff	Sedimentation of local waterways.	Appropriate erosion and sediment controls will be designed and constructed for all construction areas in accordance with *Soils & Construction* (Landcom, 2004).	2	D	L	Due to effective mitigation of this potential impact further assessment is not required.	No

Activity	Aspect	Potential Impact	Status and Proposed Control	Risk Assessment			Further Assessment Requirements	Key Issue
				C	L	R		
Construction of mine infrastructure (including TSF, ore processing plant, pipeline and filtration plant) (cont)	Clean Water Management	Contamination of clean water.	Diversion drains will be constructed to divert clean waters away from major construction areas. Dirty water will be segregated from clean water. The drains will be designed and constructed in accordance with *Soils & Construction* (Landcom, 2004).	2	D	L	Due to effective mitigation of this potential impact further assessment is not required.	No
	Surface water	Reduction in surface water catchments	Construction of mine infrastructure will reduce natural surface water catchment area	2	A	H	Surface water impact assessment to be completed for Project as a part of EA.	Yes
	Groundwater	Degradation of natural groundwater flow and quality.	Ground disturbance associated with construction activities has the potential to impact groundwater aquifers.	2	D	L	No further assessment required	No
	Dust Generation	Degradation of air quality.	The construction program including the development of new tailings facilities which has the potential to generate construction phase air quality impacts. A full Air Quality Assessment is being completed for the Project, which will take into consideration Air Quality impacts emanating from the Projects Construction phase.	3	C	H	An assessment of the potential impacts of the project on air quality is currently being carried out.	Yes
	Visual Amenity	Aesthetics of exposed earthworks and construction works.	The development of a tailings storage facility will be considered as a part of the operational phase of the project. Construction works, including the development of surface infrastructure will be relatively short in duration and will be included as a part of a visual impact assessment to consider the visual impacts associated with project construction.	2	C	M	No further assessment is required.	No

Activity	Aspect	Potential Impact	Status and Proposed Control	Risk Assessment			Further Assessment Requirements	Key Issue
				C	L	R		
Construction of mine infrastructure (including TSF, ore processing plant, pipeline and filtration plant) (cont)	Land capability and agricultural suitability Soils	Loss/deterioration of land capability and agricultural suitability. Loss of productive topsoil.	The proposed project will impact upon land not previously subject to impacts from the mining industry. An agricultural impact assessment is being prepared for the project to assess the impact of infrastructure development on land located outside the existing mining lease.	3	B	H	An agricultural impact assessment is being prepared for the project to assess the impact of infrastructure development on land located outside the existing mining lease.	Yes
	Traffic	Supply of materials for construction project resulting in increased traffic.	Construction activities will result in increased traffic movements during the construction phase of the Project. This has the potential to impact upon surrounding roads. A traffic impact assessment is being prepared for the project which will include consideration of traffic impacts.	3	B	H	An assessment of traffic generation due to the proposal and the likely impacts of this traffic on the existing traffic network will be undertaken.	Yes
	Noise Generation	Degradation of noise amenity.	The construction of proposed infrastructure (ore processing and filtration plant) has the potential to generate significant noise impacts. A noise impact assessment is being prepared for the project to assess the operational noise impact of onsite infrastructure.	3	C	H	A noise impact assessment is being prepared for the project to assess the operational noise impact of onsite infrastructure.	Yes
	Surface Water Flows	Alteration of flow/flood in surrounding drainage lines.	The Project has the potential to have an impact on the water flow and flooding of existing water catchments including Goonumbla Creek, Tenandra Creek, Cookapie Creek and the Bogan River.	3	C	H	An assessment of the potential impact of the project surface water flows will be undertaken.	Yes

OPERATION OF SURFACE FACILITIES & SERVICES (processing plant, tailings storage facility, office, workshop, roads etc)								
Operation of surface facilities and infrastructure	Erosion and sediment runoff	Sedimentation of local waterways.	Appropriate erosion and sediment controls will be designed and constructed for all surface facility areas in accordance with *Soils & Construction* (Landcom, 2004).	3	D	M	Due to effective mitigation of this potential impact further assessment is not required.	No
	Clean Water Management	Contamination of clean water.	Diversion drains will be constructed to divert clean waters away from surface facility areas. Dirty water will be separated from clean water. The drains will be designed and constructed in accordance with *Soils & Construction* (Landcom, 2004).	3	D	M	Due to effective mitigation of this potential impact further assessment is not required.	No
	Dust Generation	Degradation of air quality.	The operation of proposed infrastructure including the ore processing and filtration plant and the on-going operation of tailings storage facility has the potential to impact air quality. An air quality impact assessment is being prepared for the project, which will assess potential dust impacts.	3	D	M	An air quality impact assessment is being prepared for the project, which will assess potential dust impacts.	Yes
	Noise Generation	Degradation of noise amenity.	The operation of proposed infrastructure (ore processing and filtration plant) has the potential to generate significant noise impacts.	4	D	H	A noise impact assessment is being prepared for the project to assess the operational noise impact of onsite infrastructure.	Yes
	Visual Amenity	Aesthetics of mine surface facilities.	The development of significant surface infrastructure, including a tailings storage facility, ore processing and filtration plant have the potential to have a visual impact upon residential receivers and public places, the impact of which has the potential to be increased by the relatively flat topography surrounding the Project Area. A Visual Impact Assessment will be prepared for project to assess the ongoing operational impact of built infrastructure on visual amenities	3	B	H	A Visual Impact Assessment will be prepared for project to assess the ongoing operational impact of built infrastructure on visual amenities	Yes

Operation of surface facilities and infrastructure (cont)	Energy Use	Emission of greenhouse gas emissions.	The operation of surface facilities will require use of electricity, diesel and petrol. The greenhouse gas emissions resulting from this energy consumption will be assessed.	2	C	M	An assessment of energy use and greenhouse gas emissions will be undertaken.	Yes
	Traffic	Increased traffic.	Ongoing mining operations will result in increased traffic movements. This has the potential to impact the surrounding road network. A traffic impact assessment is being prepared for the project which will consider all operational traffic impacts.	3	B	H	An assessment of traffic generation due to the proposal and the likely impacts of this traffic on the existing traffic network will be undertaken.	Yes
	Mine Closure	Inadequate mine closure leaving post mining liability.	A conceptual closure plan will be developed to demonstrate that the proposed operations can be effectively closed at the end of mine life.	2	C	M	A conceptual closure and rehabilitation plan will be discussed in the Environmental Assessment.	No
UNDERGROUND MINING OPERATIONS								
Underground Mining Operations	European Heritage	Disturbance of sites of European heritage significance.	A review of the historical context of the Project area indicates that it has the potential to contain items of local historical heritage significance only. No state listed heritage items were identified within the Project area.	2	E	L	An assessment of the potential impacts of the project on European heritage will be undertaken.	No
	Ecology	Loss of native flora and fauna.	Underground mining operations may have indirect impacts on native flora and fauna as a result of subsidence. A full assessment of the potential impacts of the project on ecological values will be completed.	3	C	H	An assessment of the potential impacts of the project on ecological values will be undertaken.	Yes
	Cultural Heritage	Disturbance of Aboriginal places or objects as a result of subsidence.	Underground mining operations may have indirect impacts on aboriginal archaeological values as a result of subsidence. A full assessment of the potential impacts of the project on ecological values will be completed.	3	C	H	An assessment of the potential impacts of the project on aboriginal archaeological values of the project area will be undertaken in consultation with the local Aboriginal community.	Yes

Underground Mining Operations (cont)	Groundwater	Degradation of natural groundwater flow and quality (including depressurisation).	Underground mining operations may impact groundwater resources through a potential intersection of aquifer systems, with the potential to impact local and regional groundwater aquifers.	2	D	L	A groundwater impact assessment will be undertaken.	No
	Land use and agricultural productivity	Impact on land use, land capability and agricultural suitability.	The ore bodies to be extracted as a part of underground mining are with the exception of GRP314 are depth extensions to existing mining operations. An agricultural impact assessment will assess the potential impacts of underground activities on land use and agricultural productivity.	1	D	L	Assessment of land use and agricultural impacts associated with the project will be undertaken.	No
	Energy Use	Emission of greenhouse gas emissions.	Underground block cave mining requires the use of electricity, diesel, explosives and petrol. The greenhouse gas emissions resulting from this energy consumption need to be assessed. Fugitive emissions of greenhouse gases will additionally be assessed.	2	C	M	An assessment of energy use and greenhouse gas emissions will be undertaken.	Yes
	Mine Closure	Inadequate mine closure leaving post mining liability.	A conceptual closure plan will be developed to demonstrate that the proposed operations can be effectively closed at the end of mine life.	2	C	M	A conceptual closure and rehabilitation plan will be discussed in the Environmental Assessment.	No
ANCILLARY ACTIVITIES AND ISSUES								
Waste Management	Waste disposal (including sewage)	Pollution and/or contamination due to incorrect disposal. Inefficient use of resources.	All wastes generated as part of this project will be managed by a non mineral site wide waste management plan and in accordance with the NPM EMS.	1	D	L	Due to effective mitigation of this potential impact, no further assessment is required.	No
	Waste oil and grease storage	Soil and/or water contamination from spills or leaks.	All fuels, oils, grease etc will be collected and handled using systems designed and operated in accordance with relevant legislation and Australian Standards.	1	D	L	Due to effective mitigation of this potential impact, no further assessment is required.	No

Water Extraction Management	Extraction of additional water from surrounding aquifers	Potential drawdown of aquifers from increased extraction	Sustainable extraction practises applied including balanced drawdown, monitoring of aquifer levels at extraction points and working collaboratively with other water users.	4	C	C	A water assessment will be prepared to consider the potential impacts of additional water extraction on surrounding aquifers	Yes
Materials supply and storage	Oil, fuel and grease supply and storage	Soil and/or water contamination from spills or leaks.	All fuels, oils, grease etc will be handled using systems designed and operated in accordance with relevant legislation and Australian Standards.	1	D	L	Due to effective mitigation of this potential impact, no further assessment is required. A PHA will be completed as a part of the EA.	No
	Dangerous goods supply and storage	Soil and/or water contamination from spills or leaks. Explosion hazard	All dangerous will be handled using systems designed and operated in accordance with relevant legislation and Australian standards.	1	D	L	Due to effective mitigation of this potential impact, no further assessment is required. A PHA will be completed as a part of the EA.	No
Workforce and Amenities	Transport and access of employees to site	Increase in traffic.	The project will employ approximately 930 people plus contractors when operational. An assessment of traffic impacts will be required.	3	C	H	An assessment of traffic impacts will be undertaken.	Yes
	Increased local population	Impact on services/local infrastructure.	The project will employ approximately 930 full time equivalents plus construction workers. Impacts associated with demand on local infrastructure require further assessment.	3	C	H	A detailed social impact assessment for the project will be completed.	Yes
Socio economic	Economic benefits	Economic impacts on local area, region and state.	The project will employ approximately 930 full time equivalents plus construction workers. Positive impacts to occur through increased employment, direct and indirect expenditure.	3	C	H	An economic impacts assessment for the Project will be completed.	Yes

Likelihood	Consequence				
	1 - Minor	2 - Medium	3 - Serious	4 - Major	5 - Catastrophic
A - Almost Certain	Moderate	High	Critical	Critical	Critical
B - Likely	Moderate	High	High	Critical	Critical
C - Possible	Low	Moderate	High	Critical	Critical
D - Unlikely	Low	Low	Moderate	High*	Critical
E - Rare	Low	Low	Moderate	High*	High*

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