Section 2
Description of the Project

This section outlines the objectives of Namoi Mining Pty Ltd (NMPL) proposal for the development and operation of the proposed Sunnyside Coal Mine. The coal resource is described and the mining operation and sequence, together with processing activities, are detailed. This section also describes NMPL's proposal with respect to hours of operation, infrastructure and services, safety, waste management, coal transportation and progressive rehabilitation. The section concludes with a review of the feasible development alternatives considered during the planning phase for this Project.

The Project is described in sufficient detail to provide the reader with an overall understanding of the nature and extent of activities proposed, how the various activities would be undertaken and to enable an assessment of the potential impacts on the surrounding environment.

Details of the safeguards and mitigation measures that NMPL would implement to protect and manage surface water, groundwater, soil, noise, air quality, Aboriginal heritage, flora, fauna, traffic, visual and socio-economic components are set out in Section 4 Part B of this document.

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2.1 INTRODUCTION

2.1.1 Objectives

The objectives of Namoi Mining Pty Ltd (NMPL) for the development and operation of the proposed Sunnyside Coal Mine are to:

(i) develop and operate a safe mine producing a medium ash thermal coal;

(ii) commence coal production by late 2008 to achieve an initial combined production from the Whitehaven Coal Limited (WCL)-related mines in the Gunnedah/Boggabri/Narrabri area of approximately 3.2Mtpa. This production would consist of 1.5Mtpa from Tarrawonga, 0.7Mtpa from Whitehaven and up to 1.0Mtpa from Sunnyside Coal Mines. Beyond 2008, the combined production for WCL mines is targeted to be 4.5Mtpa. This increased production would consist of 2.0Mtpa from Tarrawonga Coal Mine, 1.5Mtpa from Belmont Coal Mine (not yet approved), and up to 1.0Mtpa from Sunnyside Coal Mine;

(iii) develop and operate the mine in a manner that complies with all statutory requirements;

(iv) undertake all activities in an environmentally responsible manner, employing a level of control and integrating safeguards that would ensure compliance with appropriate criteria/goals or reasonable community expectations at all times;

(v) establish and/or maintain international markets for coal produced;

(vi) provide a further boost to the local economy of Gunnedah and surrounding districts through employment opportunities and the supply of services required for the operation of the coal mine;

(vii) create a final landform amenable to a combination of agricultural and native vegetation conservation activities with a particular emphasis on protecting and encouraging the existing Koala population in the area; and

(viii) achieve the above objectives in a cost-effective manner and thereby ensure the ongoing viability of the proposed mine.

2.1.2 Project Site Layout

Figure 2.1 presents the proposed Project Site layout and identifies the following components.

- The open cut area, out-of-pit overburden emplacement and soil stockpile areas.
- Site facilities area, including the mine office, workshop and fuel storage.
- Coal processing area including stockpiling, crushing, screening, truck loading arrangements and weighbridge.
- Two amenity bunds, one 15m high and the other 5m high.
- An auger mining area.
- Mine entrance and internal roads.
- Water management structures including dams, sediment basins and drains.

Plate 2.1 presents an oblique aerial photograph of the Project Site and surrounds.

\\SERVER\RWC\675\67501\CAD\675Base_Plate 2.1.DWG

Plate 2.1
OBLIQUE AERIAL PHOTOGRAPH OF THE PROJECT SITE AND SURROUNDS

The Project Site boundary in **Figure 2.1** has been off-set for clarity and masks essential detail about the Project Site layout along the boundary between the "Sunnyside" and "Lilydale" properties. The inset on **Figure 2.1** shows that detail. The Project Site is located along the boundary fence. Immediately inside the fence, a 20m wide waterway would convey runoff water from above the open cut pit to the northern sector of the property. An access vehicular track would be located adjacent to the waterway. At the completion of mining, a 40m wide corridor of Koala habitat would be established adjacent to the remaining track and waterway. The corridor would be located on rehabilitated land at this location.

In order to assist with the description of proposed activities, the area covering the open cut mine, out-of-pit overburden emplacement, soil stockpiling, coal stockpiling and loading and the mine office and site facilities area is referred to as the "mine area". The Project Site contains other areas where drainage and surface water management features would be installed and areas that would remain undisturbed and/or replanted with trees to enhance local Koala habitat.

The details of Project layout are more fully described in sections 2.3, 2.4 and 2.5.

2.1.3 Proposed Coal Transport Route

The Project also includes the transportation of <50mm crushed coal from the Project Site to the Whitehaven Coal Handling and Preparation Plant (CHPP) and Rail Loading Facility.

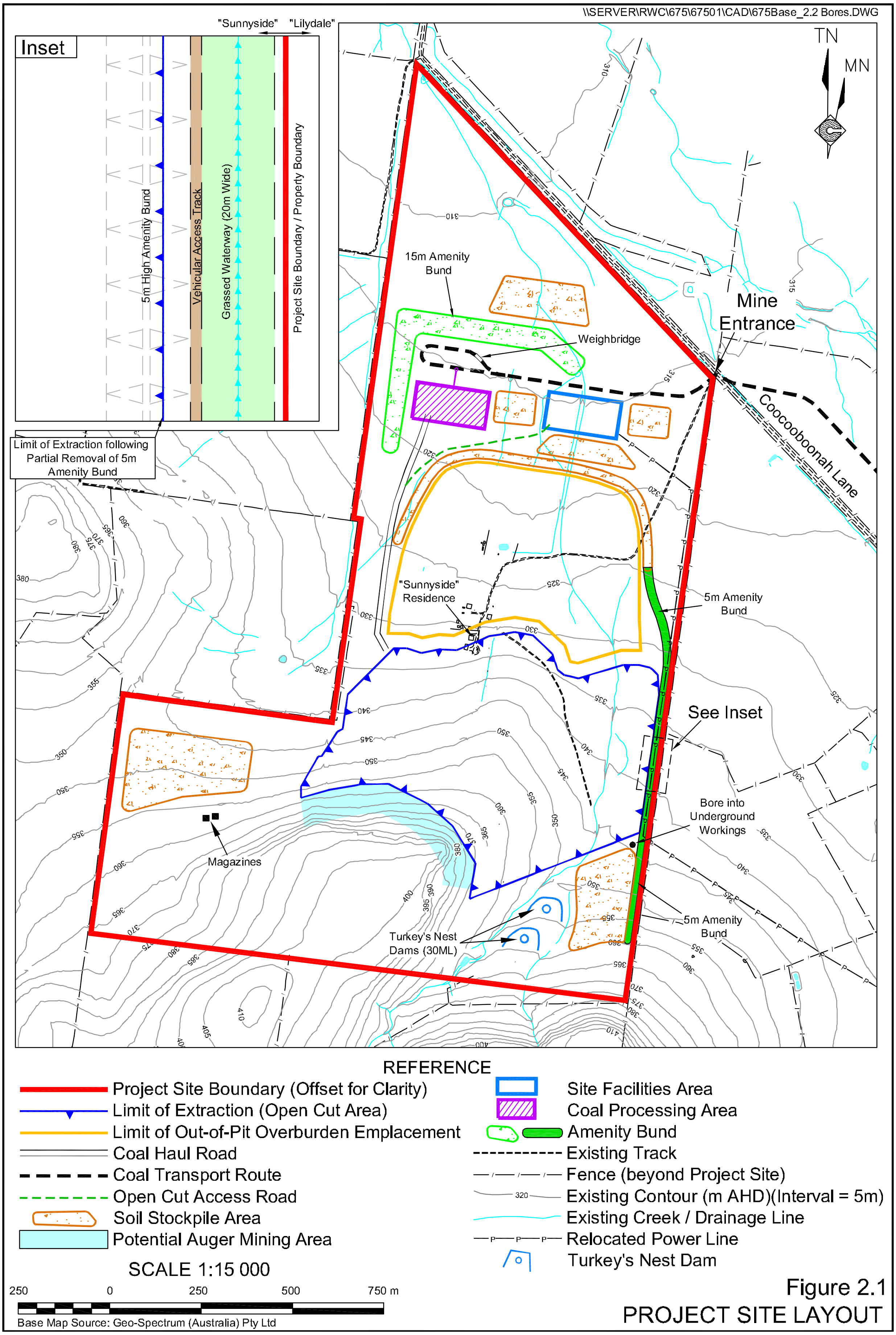

Figure 2.1
PROJECT SITE LAYOUT

Figure Prepared by R.W. Corkery & Co. Pty Ltd

The proposed coal transport route would incorporate existing public roads and a new section of public road constructed parallel to and northeast of Coocooboonah Lane. This section of road would be constructed in order to minimise potential impacts on the local Koala population.

Sections 2.6.4 and 2.6.5 provide greater detail on the location, orientation and construction of the proposed coal transport route external to the Project Site.

2.1.4 Project Outline

The Project, if approved, would involve the following activities.

- Construction of the mine entrance and internal access roads from Coocooboonah Lane.
- Coal mining by open cut mining methods over an area of approximately 43ha referred to as the open cut area. The open cut area has been defined by drilling and a review of economic, geological and environmental considerations as described in Sections 2.2 and 2.3.1.
- Programmed placement of overburden materials from the open cut area with a combination of out-of-pit and in-pit emplacements.
- On-site crushing and temporary stockpiling of the mined coal within a defined coal processing area north of the open cut area. It is proposed to construct a 10m to 15m high amenity bund along the northern and western boundaries of the coal processing area.
- Construction / establishment of a coal transport route between the Project Site and the Whitehaven Rail Loading Facility. This would involve modifications to four existing intersections on public roads and construction of a temporary re-aligned section of the coal transport route immediately northeast of the existing Coocooboonah Lane.
- Transportation of coal from the Project Site to the Whitehaven Rail Loading Facility for despatch to export markets via rail to Port Newcastle. It is not intended to wash Sunnyside coal given the intended market of the ROM product.
- Management of surface water and sediment and soil erosion control.
- Installation of a range of services, structures and relocated and transportable buildings.
- Progressive shaping and rehabilitation of the mine area and other disturbed areas. Emphasis would be placed on revegetation to enhance/restore Koala habitat.

In addition to the above activities, the proposed mine would be operated with comprehensive systems to manage and monitor groundwater, surface water, noise, blasting, air quality, visibility, Aboriginal heritage, flora, fauna, traffic, visual and socio-economic aspects.

An overview of the principal activities to be undertaken throughout the mine life is outlined as follows.

Out-of-Pit Overburden Placement

The out-of-pit overburden emplacement would be located downslope and immediately to the north of the open cut area and contain approximately 4.9Mm^3 of overburden. The placement of overburden beyond the open cut area is required to enable the initial stages of the open cut mining operations to be established. In the first year of mining, approximately 3.92Mm^3 of overburden would be placed in the out-of-pit emplacement. This would be followed by approximately 0.98Mm^3 in the second year.

In-Pit Overburden Placement

Once there is adequate void capacity in the open cut area, overburden would be progressively relocated within the open cut area by cross pit haulage. This would result in creation of a permanent out-of-pit emplacement, a re-contoured area across the open cut area and a final void which represents the general shape of the pit at the completion of mining. It is proposed to shape the final void at the completion of mining, leaving a depression in the natural surface. A maximum slope of 10^0 is planned for the out-of-pit overburden emplacement and the mining area depression after rehabilitation.

Subject to satisfactory geotechnical and geological conditions, NMPL intends to undertake highwall auger mining during the first 3 years of the mine life from the southern highwall.

ROM Coal

Rear haul trucks would transport run-of-mine coal from the open cut area via the access ramp and short haul road to the proposed raw coal stockpile for separate stockpiling according to quality. Coal would then be blended, if required, and fed into the crushing facility with a front-end loader.

Stockpiling and Despatch

Crushed coal at <50mm would then be selectively stockpiled for further blending, if necessary, before being loaded by either front-end loader or overhead bin into road haulage trucks for transport to the Whitehaven Rail Loading Facility.

Coal Transport Route

The road for the coal transport route would enter the Project Site from the Coocooboonah Lane at the northeastern corner of the “Sunnyside” property. This road would provide access to the site facilities and the coal processing areas. It would also enable trucks to enter and leave the property in order to transfer coal to the Whitehaven Rail Loading Facility.

Topsoil Management

A temporary windrow of topsoil would be constructed to define the northern limit of the out-of-pit overburden emplacement. The soil would be sourced directly from within the proposed emplacement area prior to commencement of overburden stripping operations. The soil stockpiles would be segregated into topsoil and subsoil components. After final slope reclamation of the emplacement, the soil would be sequentially placed over the surface to promote quality rehabilitation and revegetation.

Water Management

The open cut area would be located downslope from the elevated southern section of the Project Site. Runoff from the catchment above the open cut area would be directed around the open cut area in a series of diversion drains, sedimentation dams and waterways. Some of the diverted water would be used to augment the on-site water supply.

Site Facilities Area The site facilities area would accommodate transportable offices, bath-house, crib room, fuel and lubricants storage facility, stores and first aid buildings, enclosed workshop facility, equipment laydown and park up area and a light vehicle car park for the projected workforce of up to 31 employees. The existing "Sunnyside" residence would be re-located to provide office facilities.

Power Supply Power to the site office would be provided by relocating the existing rural power supply now servicing the "Sunnyside" residence. A diesel-powered generator would provide additional power for the workshop located near the mine office. Power for mining and coal processing activities would be provided by another larger on-site diesel-powered generator.

Water Supply Potable water and water for ablutions would be provided from off site. The predicted groundwater inflow to the pit is expected to provide a significant proportion of the mine operating water supply. This will need to be augmented by surface runoff water collected in dams and/or water from an existing 31.2ML resource in the Gunnedah N^o 5 Entry underground workings. Pit inflows would be stored in two 30ML turkey's nest dams prior to use around the site. Should any excess pit inflow water be generated that cannot be stored in the two turkey's nest dams, the diluted pit water would be discharged underground via a bore to the old Gunnedah N^o 5 Entry workings immediately to the south of the proposed open cut area. Salinity levels in the water placed underground would be managed by dilution with surface runoff water and would be confirmed by monitoring prior to placement underground. Should pit inflows not reach the predicted levels, the mine water requirements can be supplied from the surface water dams. In that case, dust suppression water would be provided and stored on site in appropriately located dams. Initially, this water would be pumped from a purpose-drilled borehole accessing water from the Gunnedah Coal Mine N^o 5 Entry underground workings. This bore would also enable pit groundwater inflows to be discharged to the underground workings. There would be a number of sedimentation and clean water dams which would constitute part of the surface water control system. Water would be obtained from these dams when available to replace or augment groundwater inflows into the pit. When this surface water is not available, water from the bore would augment the surface supply.

2.1.5 Required Approvals

The following approvals are required for the proposed Sunnyside Coal Mine to proceed.

(i) **Project Approval – Minister for Planning.** Project approval is required in accordance with Part 3A of the *Environmental Planning and Assessment Act 1979* for all activities associated with the development and operation of the mine.

(ii) **Environment Protection Licence – Department of Environment and Climate Change.** An environment protection licence is required under Section 47 of the *Protection of the Environment Operations Act 1997* to develop and operate the mine.

(iii) **Roads and Traffic Authority.** An approval under Section 75 of the *Roads Act 1993* would be required from the RTA. The Oxley Highway is a classified State road. Roadwork must not be undertaken on a classified State road that involves the deviation or alteration of the road, or the construction of a bridge, tunnel or level crossing unless the plans and specifications of the proposed work have been approved by the RTA.

(iv) **Road Construction Permit – Gunnedah Shire Council.** In addition to RTA approval, the approval of Gunnedah Shire Council is required under Section 138 of the *Roads Act 1993* in order to carry out road modifications along Coocooboonah Lane and around the mine entrance and the construction of public road intersections between the Project Site and the Whitehaven Rail Loading Facility.

(v) **Water Licence - Department of Water and Energy.** A licence is required under Section 116 of the *Water Act 1912* to permit the incidental "extraction" of groundwater during mining activities. As part of the Project, NMPL also intends to have the potential and be licenced to pump groundwater from bores drilled to recover water from the Gunnedah Coal Mine N° 5 Entry underground workings. This would be important in the early stages of the Project until surface water becomes the major component of the mine's operational water supply. NMPL also proposes to have the potential and be licensed to pump diluted pit inflows into these workings over the life of the mine. NMPL would obtain all necessary water licences including where proposed works intercept the groundwater table.

(vi) **WorkCover.** A licence from WorkCover NSW is required for an on-site explosives magazine that would be used to store some detonators and boosters generally on an overnight basis, as required.

As the coal is owned by the Crown, NMPL requires a mining lease issued by the Department of Primary Industries - Mineral Resources (DPI-MR), under Section 51 of the *Mining Act 1992* to recover coal. NMPL intends to apply for a mining lease, the boundaries of which would generally be coincident with the boundary of the Project Site. Project approval from the Minister for Planning is a pre-requisite for the granting of a mining lease.

In order to permit commencement of the approved open cut mining activities, further approvals would be required. These approvals would be sought in accordance with the provisions of the *Coal Mine Health and Safety Act 2002* regarding the commencement of operations, and the *Mining Act 1992* in relation to the preparation of a Mining Operations Plan (MOP).

NMPL would have any buildings constructed or relocated on the Project Site certified by Gunnedah Shire Council. Following receipt of project approval, NMPL would also seek approval from Gunnedah Shire Council for the installation of a septic system (envirocycle irrigation type) on the Project Site.

2.1.6 Project Timetable

The following list provides an indicative Project timetable that NMPL envisages could be followed from the submission of the *Environmental Assessment* for public exhibition in March 2008.

- March 2008 – *Environmental Assessment* made publicly available and Department of Planning receives submissions from the community and government agencies.
- May 2008 – NMPL provides responses to the Department of Planning to specific issues raised in submissions.
- June 2008 – Minister issues project approval (allow one month for any objectors to challenge the approval).
- July2008 – Mining Lease granted and submission of Mining Operations Plan / other plans specified in project approval.
- August2008 – Commence site establishment involving pre-stripping, on-site road construction, occupy the relocated "Sunnyside" residence for offices, and position service buildings.
- November 2008 – Mining commences.
- December2008 – Removal of first coal and transportation to the Whitehaven Rail Loading Facility. Followed by 5 years of mining coal at up to 1Mtpa.

All rehabilitation and site decommissioning would be undertaken within 12 months of the end of mining (approximately December 2014). This would include removal and rehabilitation of most site roads and the Coocooboonah Lane re-alignment and re-instating Coocooboonah Lane.

2.2 GEOLOGY AND MINE PLANNING CONSIDERATIONS

2.2.1 Regional Geology

The regional geology is shown in **Figure 2.2**.

Regionally, the Sunnyside Project Site lies in the Mullaley sub-basin of the central Gunnedah Coalfield, with the proposed extraction of the Hoskissons Seam from the Late Permian Hoskissons Coal Member of the Black Jack Formation.

Two major coal seams occur beneath the Project Site, namely the Hoskissons Seam and the underlying Upper and Lower Melville Seam, which sub-crop to the east of the Project Site.

The Lower Melville Seam subcrops beneath Quaternary alluvium in the Coocooboonah Creek valley floor, whilst the Hoskissons Seam sub-crops under primarily transported colluvial cover on the eastern flanks of Coocooboonah Creek.

The strata have an average dip of 2° to 3° to the southwest. The depth of weathering extends approximately 30m below surface, with the depth to the top of the Hoskissons Seam extending up to approximately 65m below surface in the open cut pit area.

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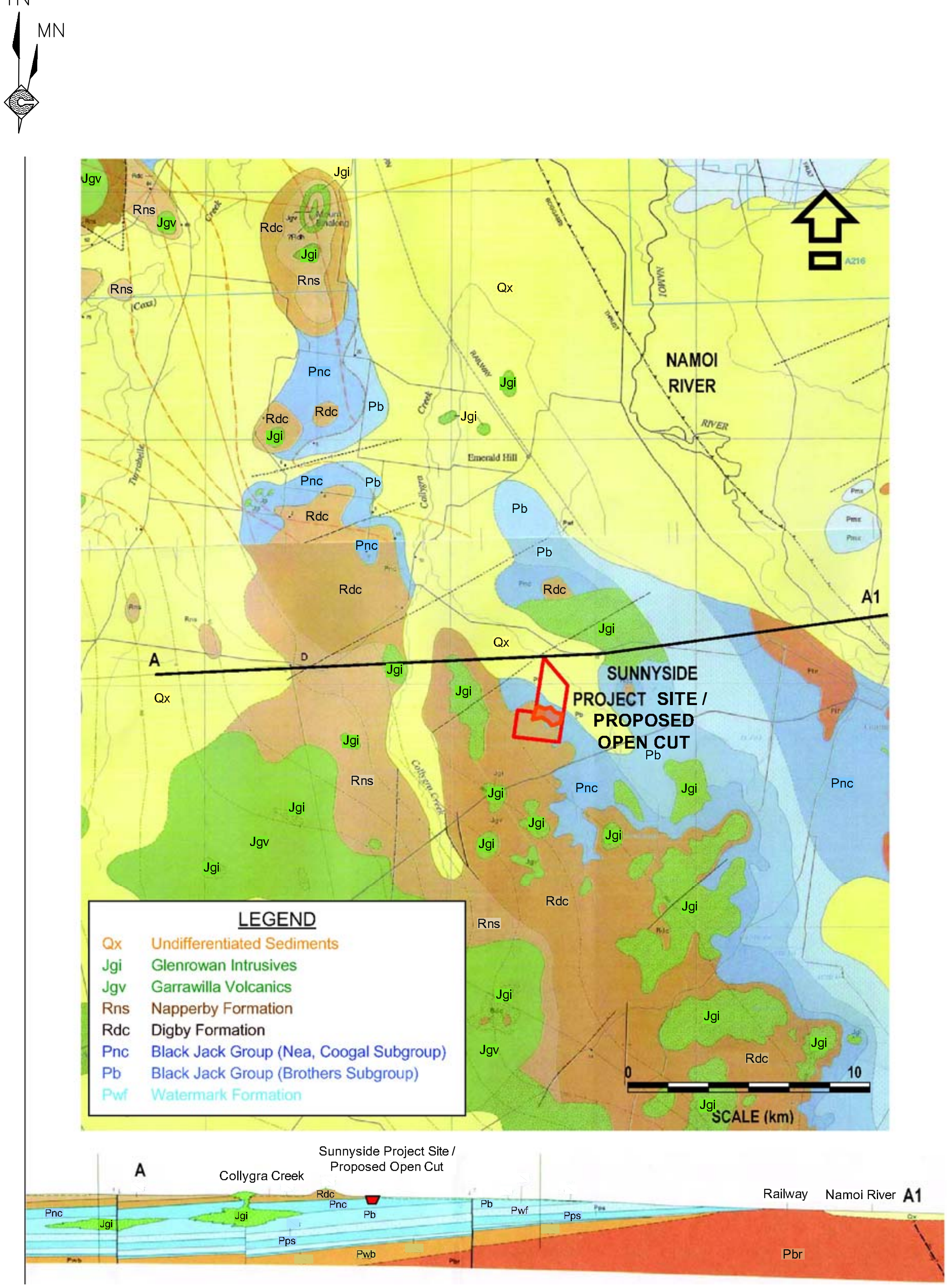

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Source: GeoTerra (2008) - Drawing 3

Figure 2.2
REGIONAL GEOLOGY

2.2.2 Exploration

2.2.2.1 Introduction

Exploration Licence (EL) 5183 was granted to NMPL on 23 December 1996 covering an area of approximately 2 500ha, approximately 15km west of Gunnedah. The southern boundary of EL 5183 adjoins the northern boundary of Consolidated Coal Lease 701, the Gunnedah Colliery Holding **(Figure 1.4)**.

2.2.2.2 Previous Exploration

The area covered by EL 5183 was previously held by the former owners of the Gunnedah Colliery as an Authorisation (A139) under the *Coal Mining Act 1973*. That owner undertook borehole exploration in the area from 1979 onwards.

Four cored drill holes, drilled in the southern portion of EL 5183 in 1979 – 80, led to the discovery of shallow coal reserves over an area that is now the Sunnyside Open Cut Resource Area. Elsewhere on the EL an initial broad pattern of 17 part-cored and 17 rotary open holes were drilled to better delineate the local structure and the sub-crop trends of the Hoskissons Coal and Melville Seams.

During late 1996 and into 1997, 50 infill rotary and partly cored holes were commissioned by NMPL, covering the complete north-south sub-crop extent of the Hoskissons Coal Seam within EL 5183, including the Sunnyside Open Cut Resource Area.

2.2.2.3 Recent Exploration

NMPL instigated a drilling program in September, 2005 consisting of 48 rotary and five partly cored holes drilled in the Sunnyside Open Cut Resource Area, totalling 1700m. Five of these open holes were used for coal quality analyses. Drilling confirmed the economic open cut potential with approximately 7Mt (in-situ) identified. Drilling identified extensive intrusive silling into the roof and floor zones of the Hoskissons Coal Seam on the western and northwestern sides of the open cut target area and also defined the seam subcrops to the north and east. Shallow old underground mine workings exist immediately to the southwest within the former Gunnedah Coal Mine N^{o} 5 Entry area.

In August 2006, further drilling consisting of 14 rotary open holes was undertaken to identify the sub-crop trend of the underlying Melville Seam to the north and east. Additional drilling was also undertaken to better define the western and southwestern open cut limit.

During May 2007, 16 open holes were drilled to test structure and the limit of oxidation (LOX). In July and October 2007, eight open holes were drilled to test the No 5 underground workings for water holding capacity. In October 2007 three 4 inch partly cored holes were drilled for marketability and coal quality studies. The last phase of drilling (February 2008) comprised four open holes to test the extent of intrusions in the pit area.

Figure 2.3 shows the location of the various exploration boreholes in the vicinity of the Project Site.

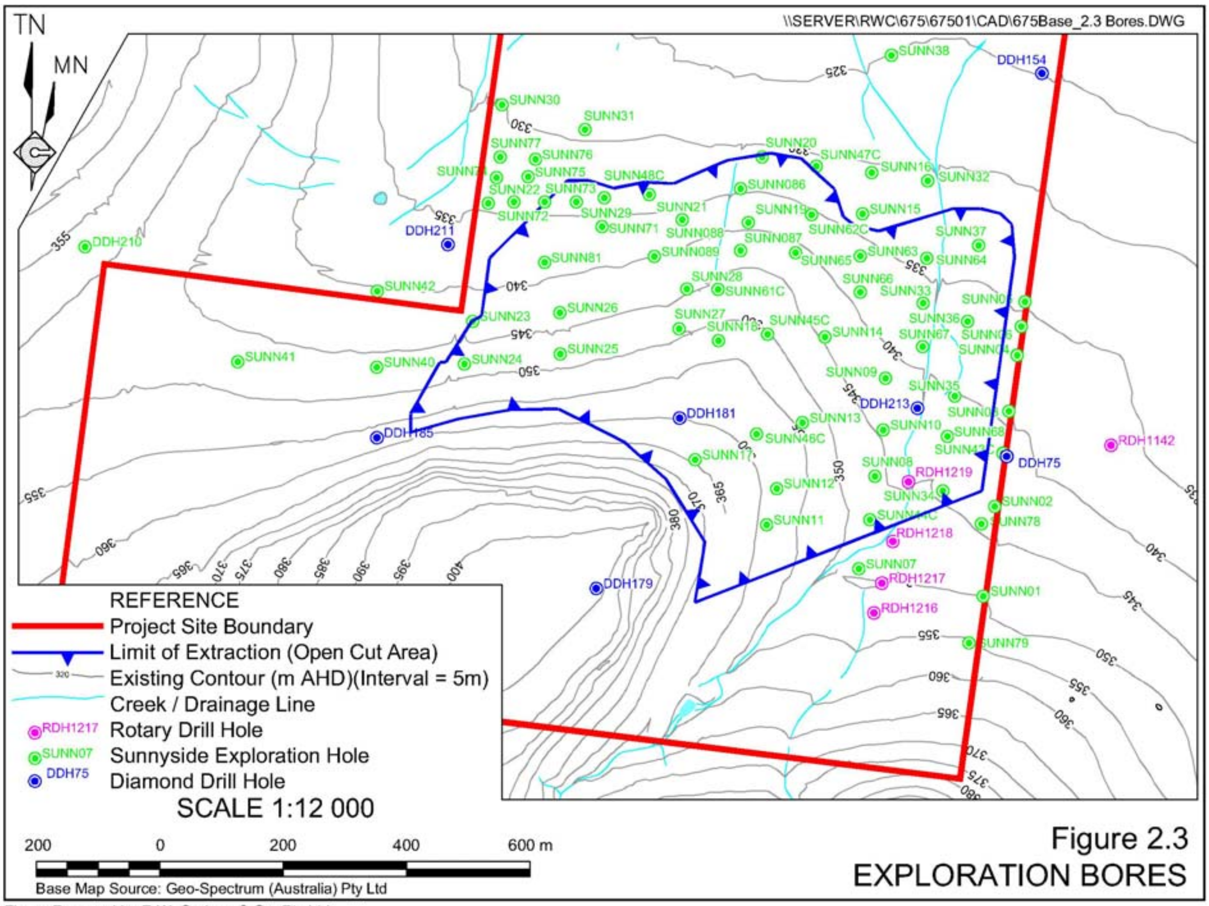

Figure 2.3
EXPLORATION BORES

Figure Prepared by R.W. Corkery & Co. Pty Ltd

A geological database was developed that incorporated all known relevant drilling in the area since the 1970s. This database formed the basis of geological modelling and minable reserve assessment undertaken by JB Mining Services and subsequently the detailed mine planning and open cut mine design undertaken by MMG Mining Pty Limited.

2.2.2.4 Project Site Geology

Figure 2.4 shows a series of cross sections through the Project Site indicating the location of the Hoskissons Coal Seam in relation to the ground surface, base of weathering and major geological structures.

2.2.2.5 Local Structures and Igneous Activity

The coal resource on the “Sunnyside” property is separated from the Gunnedah Coal Mine N^{o} 5 Entry underground workings by a zone of faulting and intrusive volcanic activity.

Aeromagnetic surveys undertaken by the Department of Mineral Resources during the 1990s, and more recently by SRK Consultants for NMPL, show a number of northeast-trending lineaments across the northern half of EL 5183. Drilling during 1997 delineated up to four northeast-trending faults across the northern half of the EL. A similar northeast-trending fault / dyke structure occurs in the vicinity of the northern boundary to the Project Site.

Previous drilling indicated a major igneous body overlying the Hoskissons Coal Seam near the subcrop to the north and northwest of the Project Site within the central EL area. This was confirmed during both the 1997 and 2005 drilling programs. Beneath this igneous body, the coal is invariably destroyed by heating or at least badly heat affected.

Numerous thinner intrusions, which are probably dykes with perhaps some minor sills within the Hoskissons Coal Seam itself, were intersected. These are more concentrated to the north. The coal within the proposed open cut area is comparatively free of igneous sills except for the southeastern and northwestern fringe areas where heat-affected coal occurs.

2.2.2.6 Hoskissons Coal Seam

The Hoskissons Coal Seam generally ranges from 6m to 9m thick and consists of five plies or layers identified as Plies A to E (**Figure 2.5**).

- Ply AB comprises the lower ash basal part of the seam, up to the first stone band. Ply AB is generally 4.5m to 6.3m thick. It thins to the north of the Project Site and is less than 1.6m thick in the northern section of EL 5183.
- Ply C separates Ply DE and AB and is a distinct marker band comprised of grey to carbonaceous mudstone ranging in thickness between 0.12m and 0.25m.
- Ply DE comprises inter-banded coal and minor grey to carbonaceous mudstone with a thickness of between 1.7m and 2.9m. The coal plies within this zone have inherent ash content in the range of 16% to 20% on an air-dried basis, which is typically higher than the inherent ash in Ply AB.

The roof above the Hoskissons Coal Seam is a carbonaceous mudstone with occasional sandstone bands. The floor is either a siltstone or silty mudstone.

2.2.2.7 Coal Quality

Within the Project Site, the top of the Seam Ply DE has a raw ash content of 25% to 35% ash. It represents a relatively high ash coal for thermal markets or for blending purposes. It is proposed to selectively mine Ply C and incorporate that material in the overburden emplacements. At the base of the seam, Zone AB would be mined selectively. Raw ash values range from 6% to 10% and exhibit premium thermal coal and semi-soft coking coal characteristics.

For the full seam, raw ash values range from 20% to 33%. By selectively removing Ply C, it is expected that the resultant Ply DE + AB run-of-mine ash content would be between 15% and 19%.

Table 2.1 lists a typical product quality for coal produced from the Sunnyside Project Site.

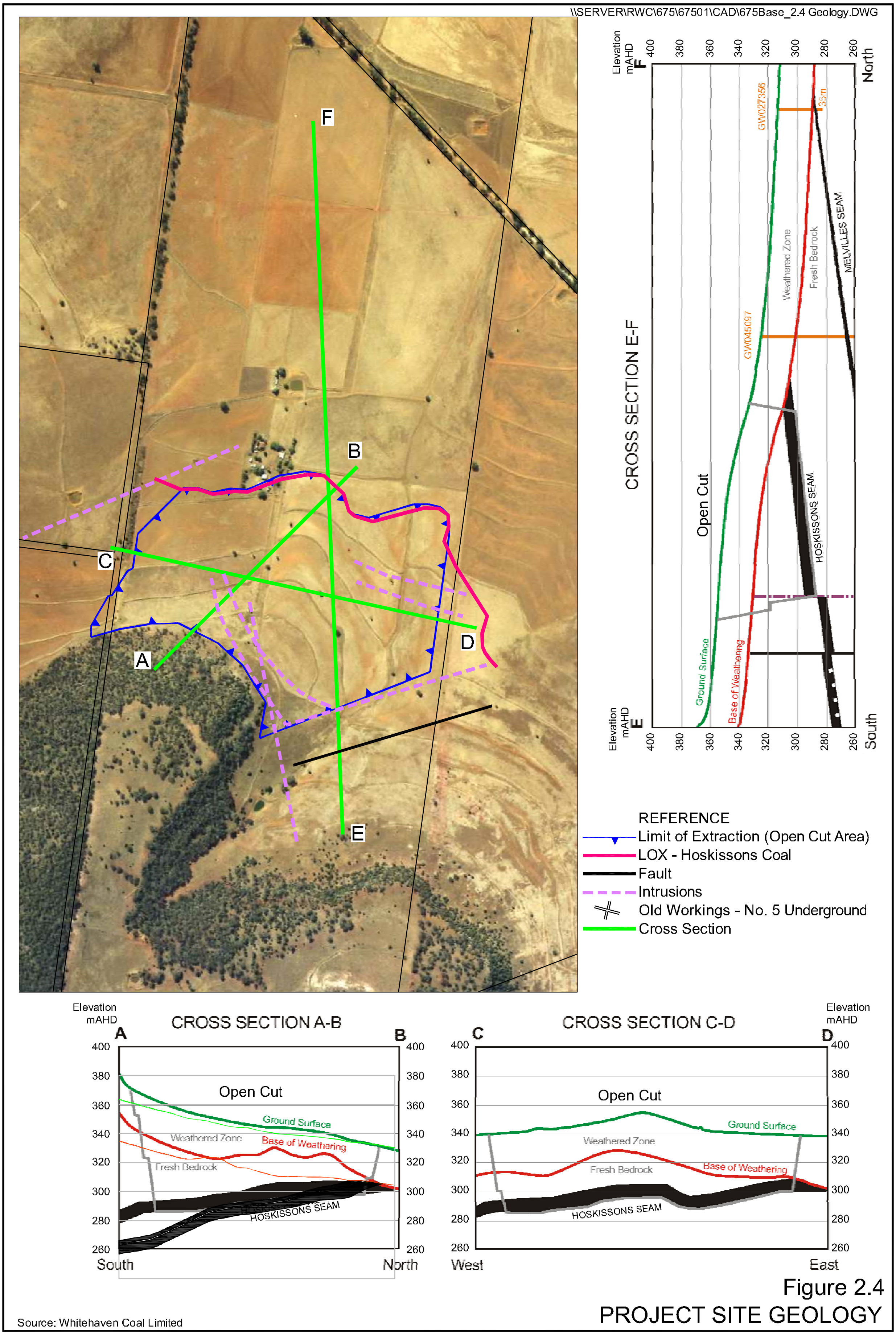

Figure 2.4
PROJECT SITE GEOLOGY

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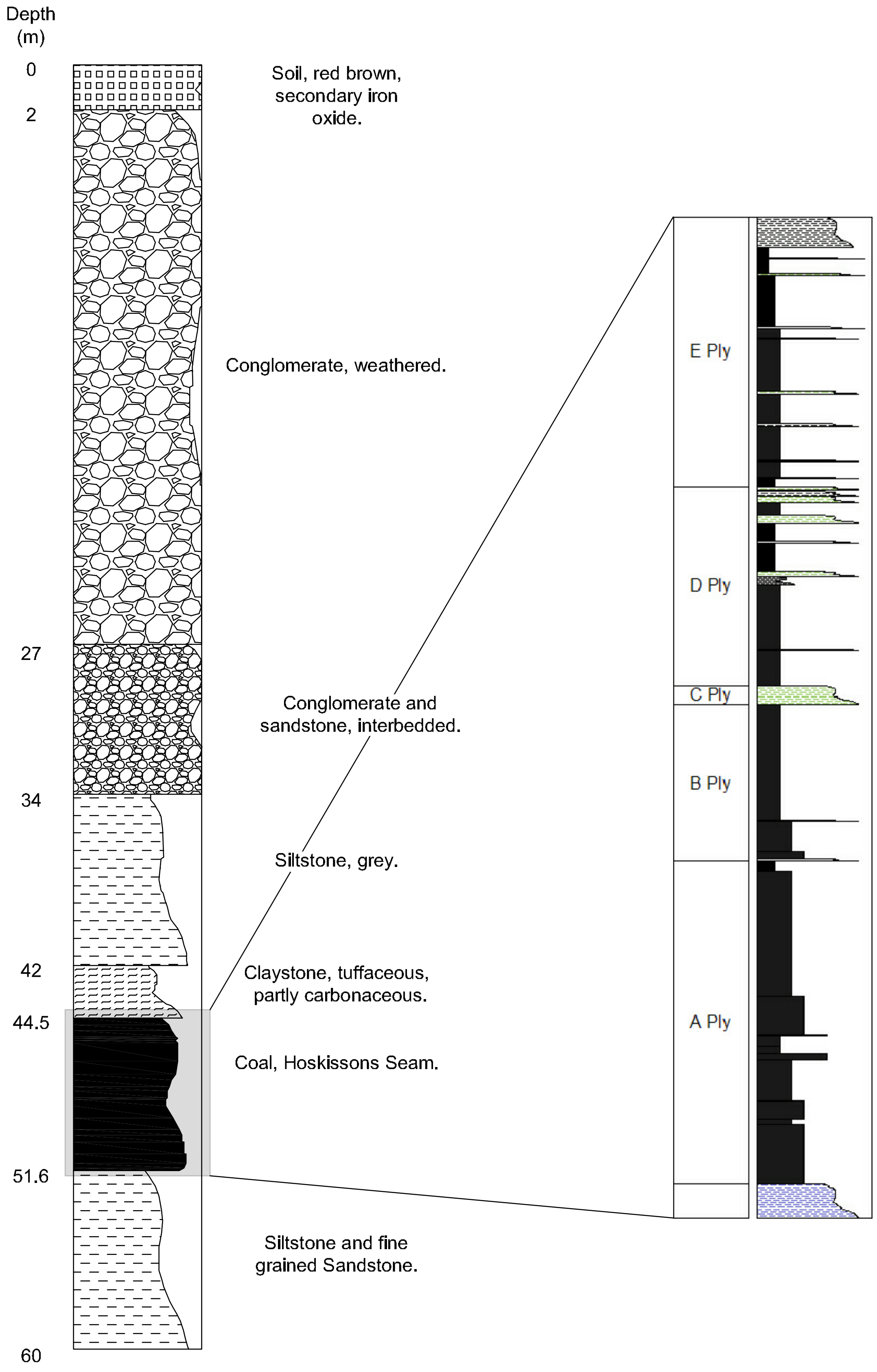


Source: Belford Dome Resource Assessment

Figure 2.5
TYPICAL STRATIGRAPHIC SECTION

Figure Prepared by R.W. Corkery & Co. Pty Ltd

Table 2.1
Typical Coal Product Quality – Sunnyside Coal Mine

Quality Parameter	**Value**
Moisture (ad)	2.5%
Moisture (ar)	9.0%
Ash (ad)	22.0%
Volatile Matter (ad)	26.7%
Fixed Carbon	48.5%
Total Sulphur (ad)	0.40%
Calorific Value	5840 kcal/kg
Calorific Value	24.45 GJ/t
HGI (Hardgrove Grindability Index)	45-48
Phosphorus (ad)	0.002-0.004%
ad = air dried / ar = as received	
Source: NMPL	

2.2.2.8 Coal Resources

JB Mining Services has developed a geological model of the proposed Sunnyside Coal Mine which defines approximately 5.9Mt of mineable coal within the proposed open cut area within the AB and DE plies.

In consideration of the current thermal coal market, it is proposed to produce a "bypass" unwashed product in the range of 15% to 19% ash content. To achieve this, selective mining in three or more passes with disposal of Ply C is proposed.

The open cut area is located in the far south of EL 5183 and continues into CCL 701. The southern boundary of the open cut area is defined by a dyke/fault that also determined the northern extremity of the Gunnedah Coal Mine N° 5 Entry underground workings when that mine was operational. The open cut area is bounded to the north by a fault or a dyke/fault structure. A number of other north-northwest trending structures are present to the south and southwest of the Project Site and indicate that localised geological complexity can be expected even within the open cut area.

In the order of 130 000t of coal may be accessed by auger mining from the southern highwall within the open cut area (see **Figure 2.1**).

2.2.2.9 Spontaneous Combustion Potential

The Hoskissons Coal Seam has been mined for the past 120 years with a number of reported outbreaks of spontaneous combustion. In order to determine the susceptibility of Sunnyside coal to spontaneous combustion, three representative core samples were supplied for testing at the University of Queensland's Spontaneous Combustion Laboratory.

Previous spontaneous combustion studies using an adiabatic oven have measured the self-heating rate index (R_{70}) of Australian and Gunnedah coals. These previous studies enabled comparisons to derive a relative indication of the propensity of the coal to combust spontaneously. The R_{70} values of the Sunnyside samples range from 2.10 to 3.82° C/h for an ash content range of 8.2 to 33.9% on a dry basis. The coal reactivity to oxygen and the intrinsic spontaneous combustion propensity is classified as high (Class IV).

Figure 2.6 displays the relationship between R_{70} and ash content showing Sunnyside samples versus other Sydney Basin coals. (Beamish, 2007).

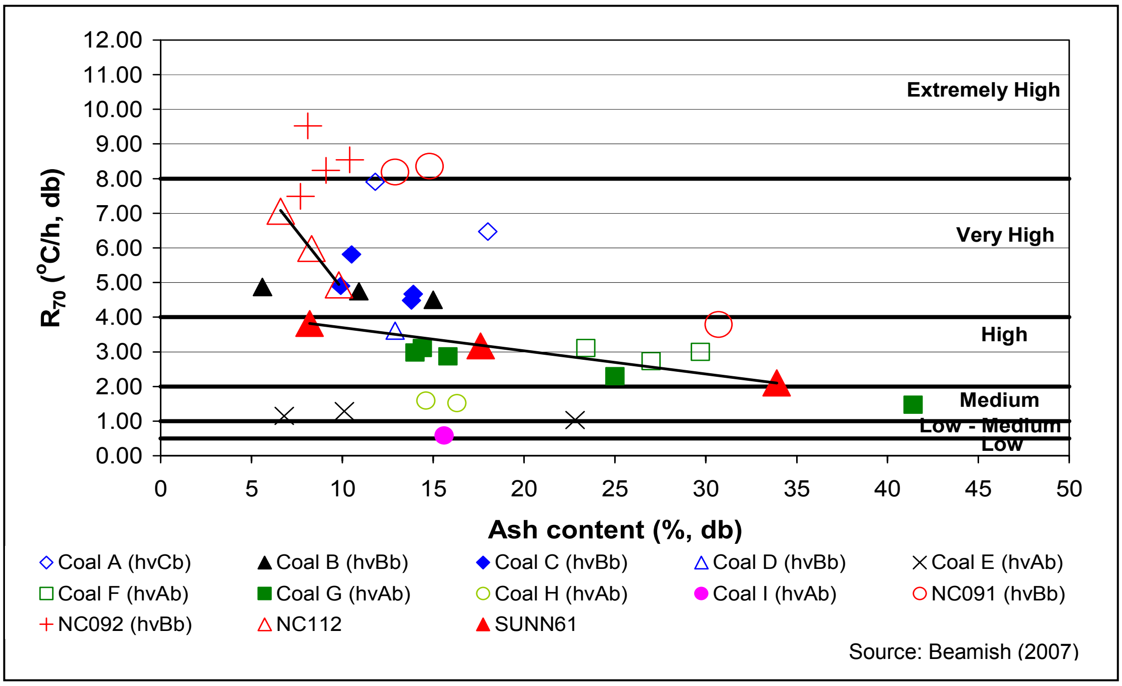


Figure 2.6
SPONTANEOUS COMBUSTION TEST GRAPH

These results indicate that there is potential for Sunnyside coal to spontaneously combust. In order to manage this potential, NMPL would implement strategies on site incorporating the following elements.

- Minimising the length of time coal is held in stockpiles.
- Monitoring coal stockpiles for signs of spontaneous combustion.
- Immediately reporting incidents.
- Extinguishment by excavation, spreading and saturation with water.

The potential for washery reject spontaneous combustion events is not relevant to this Project because it is not intended to wash the coal produced from the Sunnyside Coal Mine or backload any reject for emplacement within the Sunnyside Coal Mine.

2.3 MINE PLANNING AND OPERATIONS

2.3.1 Mine Planning Considerations

2.3.1.1 Economic Mine Planning Considerations

The viability of mining Hoskissons Coal Seam on the "Sunnyside" property is determined by two main economic factors.

(i) **The Overburden to Coal Stripping Ratio**

The average overburden to coal stripping ratio of 5:1 (bank cubic metres of overburden : tonne of coal) over the life of the proposed mine represents a conservative limit at which, given the fluctuating coal prices, the proposed coal mine would remain economically viable. This ratio is in the low to mid range when compared to other open cut coal mines in New South Wales. The ratio rises rapidly as the Sunnyside open cut area approaches the escarpment south of the pit. This rapid increase in the overburden to coal stripping ratio acts as a significant economic barrier to further open cut mining of the reserve at Sunnyside and clearly defines the extent of open cut operations in that direction. Small auger mining activity is proposed from the southern highwall into these high ratio coal reserves.

(ii) **Ash Content**

The Hoskissons Coal Seam to be mined within the "Sunnyside" property has a high ash ply (Ply C) that would be selectively mined and placed in the overburden emplacement. This would enable a medium ash thermal coal product to be produced without the need to wash the coal. This significantly simplifies and improves the economic basis for the Sunnyside Coal Mine Project.

2.3.1.2 Geological Mine Planning Considerations

The Hoskissons Coal Seam sub-crops on the northeastern side of the open cut area. The seam dips to the southwest, away from the sub-crop and beneath the rising topography associated with remnant sandstone hills on the "Sunnyside" property. This stratigraphy determines the overburden to coal stripping ratios.

The northwestern and southeastern extremities of the open cut area are determined by igneous geological elements that adversely affect coal quality and render it unsuitable for mining.

There are no economic reserves of Melville Seam coal within the open cut area.

2.3.1.3 Environmental Mine Planning Considerations

Although the limits of the proposed open cut area have been set with predominantly economic and geological considerations in mind, the following environmental considerations have influenced the overall mine planning process.

(i) **Agricultural land**

The final landform has been designed to allow for the re-establishment of an area of Class III capability land similar to that of the pre-mining areas. The out of pit overburden emplacement area and the depression left after the final void is re-shaped would have low agricultural potential. Final slopes of the in-pit and out-of-pit emplacement would typically be 10^0 or less, which would allow the areas to be used for grazing and occasional cropping purposes.

(ii) **Ecological**

Parts of the Project Site have been identified as supporting the White Box Yellow Box Blakely's Red Gum Woodlands endangered ecological community but it is not affected in any significant manner by the proposed development. A remnant of the Native Vegetation on Cracking Clay Soils of the Liverpool Plains endangered ecological community occurs towards the Oxley Highway end of Coocooboonah Lane. A small section of this community would be temporarily affected by the proposed re-alignment of Coocooboonah Lane.

A Koala population has been identified surrounding proposed areas of disturbance within the Sunnyside Project Site. A Koala Management Plan has been developed for the Project, a copy of which is included in this *Environmental Assessment* as Part 3B of the *Specialist Consultant Studies Compendium.* The various components of this plan would be implemented throughout the life of the mine. Mining and related activities would not directly affect any Koala habitat. The decision to re-align Coocooboonah Lane was made by NMPL to avoid clearing roadside Koala habitat. Revegetation would be directed at restoring and enhancing Koala habitat.

2.3.2 Vegetation Clearing

Clearing of the vegetation within the mine area would be undertaken using a progressive campaign basis with the extent of clearing undertaken in each campaign being just sufficient for the subsequent year of mine development.

There are very few trees to be cleared within the areas to be disturbed. The bulk of the vegetation is pasture and crop stubble which would be retained in the topsoil as it is collected during soil stripping activities. When appropriate, and where weeds are sufficiently dense in areas to be cleared, weed spraying would be conducted prior to soil stripping activities.

In order to prevent erosion and sedimentation, the following activities, where warranted, would be undertaken prior to any major vegetation clearing and surface disturbance.

- Construction of a temporary diversion bank on the upslope boundary of the area to be cleared. The diversion bank would divert clean water from the upslope areas into natural drainage lines or to designated storage dams within the Project Site.
- Construction of one or more catch drains or banks on the downslope boundary of the area to be cleared. Runoff collected by the catch drains or banks would be directed to sediment basins and/or storage dams from which it would be drawn for dust suppression purposes.

The size and location of these structures would vary depending on the surface area and location of disturbance but would be based on the structure designs and construction notes identified in the Landcom publication, “Soils and Construction Volume 1” 4th Edition March 2004. Further details of the planned surface water management structures are presented in Section 4B.4.

2.3.3 Soil Removal and Management

2.3.3.1 Introduction

The soil materials within the proposed areas of disturbance were assessed by Geoff Cunningham Natural Resource Consultants (GCNRC) to determine:

- their suitability for use as a final cover material on the post-mining landforms; and
- the requirement for specific stripping and stockpiling or erosion control measures.

The assessment was based on field and laboratory examinations of key physical and chemical attributes and is described in greater detail in Section 4B.10.

2.3.3.2 Soil Categories and Stripping

GCNRC identified three soil mapping units classified as SMU 1, SMU 2 and SMU 3. The first two soil mapping units describe soils that occur within the mine area and the third is the soil associated with the endangered ecological community located at the Oxley Highway end of Coocooboonah Lane.

Topsoil material from SMU 1 and SMU 2 would be stripped to a depth of 15cm and placed in a defined stockpile area. There would be no need to provide separate stockpiles for the two soil mapping units as they can be stockpiled together without adversely affecting rehabilitation suitability. The subsoil material from SMU 1 and SMU 2 would be stripped to a depth of 65cm below surface level and also placed together in the soil stockpile areas. Topsoil and subsoil stockpiles would be kept separate. In the event mottled or weathered rock is encountered during stripping, no further material would be removed.

The soils have a generally moderate to high structure grade and can be stripped and respread using scrapers without major impacts on soil structure. None of the soil material tested showed any saline tendencies. All soils would be subject to structural degradation if worked when too moist. Hence, soil stripping would preferentially occur when moisture levels are suitable.

Table 2.2 provides a summary of the soil stripping suitability and procedures relevant for consideration as part of the description of the Project.

2.3.3.3 Soil Stockpiling

Open Cut Area and Overburden Emplacements

Wherever practicable, stripped topsoil and subsoil would be directly replaced on completed sections of the final landform. This is expected to become common practice during and beyond Year 2 of the mining operation.

When stockpiling is necessary, topsoil and subsoil would be stockpiled separately within topsoil stockpile areas (**Figure 2.1**) not exceeding 2m and 3m in height respectively. In the event it is necessary to construct subsoil stockpiles greater than 3m high, they would be provided with a cover of topsoil and seeded with a non-persistent cover crop.

Individual subsoil and topsoil stockpiles would be constructed using scrapers or bulldozers, with the dimensions of each stockpile reflecting the method of construction, the area available and avoidance of natural or created drainage lines. All stockpiles would be sown with stabilising species as soon as possible after placement and watered, if necessary, to encourage vegetative cover. When stockpile construction is conducted in stages, the stockpiles would be progressively rehabilitated. During stockpile establishment, the surfaces would be left with a rough surface to assist in runoff control, seed retention and germination.

Table 2.2
Soil Stripping Suitability and Procedures

Layer (Thickness)	Material	Stripping Suitability	Soil Stripping Procedures
SMU 1			
1 (0cm – 15cm)	Variable. Fine, sandy loam, sandy clay to silty clay, medium to heavy clay	Suitable for topsoiling.	Strip to a depth of 15cm in all areas disturbed by mining associated activities. Place in stockpile or direct return to other disturbed areas as topsoil material.
2 (15cm – 65cm)	Medium to heavy clay.	Suitable for subsoiling.	Strip to full depth. Stockpile as subsoil or move directly to areas being rehabilitated and use as subsoil material.
3 (Remainder of Profile)		Suitable for covering overburden prior to placement of subsoil and topsoil materials.	
SMU 2			
1 (0cm- 15cm)	Mainly fine sandy loam, occasionally light clay, sandy clay to clay loam or silty clay.	Suitable for topsoiling.	Strip to a depth of 15cm in all areas disturbed by mining associated activities. Place in stockpile or direct return to other disturbed areas as topsoil material.
2 (15cm – 65cm)	Variable fine sandy loam, sandy clay, silty clay, light clay, light to medium clay through to heavy clay.	Suitable for subsoiling.	Strip to full depth unless mottled material or bedrock is uncovered. Stockpile as subsoil or move directly to areas being rehabilitated and use as subsoil material. However, where surface disturbance is minimal then only layer 1 of this SMU should be stripped.
3 (Remainder of Profile)		Suitable for covering overburden prior to placement of subsoil and topsoil materials.	
SMU 3			
1 (0cm – 15cm)	Heavy clay.	Suitable for topsoiling.	Strip to full depth and place in separate topsoil stockpile. Must be used to rehabilitate section of Coocooboonah Lane re-aligned transport section that supports Native Vegetation of the Cracking Clay Soils of the Liverpool Plains endangered ecological community.
2 (Below 15cm)	Heavy clay.	Suitable for stockpiling and for use a subsoil material.	Should only be removed where absolutely necessary and only to a depth of 65cm below present soil surface.
3 (Remainder of the Profile)		Not to be disturbed	Not to be disturbed.

Source: GCNRC (2007) – Section 7.2

The positioning of the topsoil and subsoil stockpiles would accommodate surface topography in order to avoid the occurrence of overland and/or concentrated surface water flows which might otherwise result in stockpile erosion. However, where natural protection from surface water flows is not readily achievable, NMPL would install upslope protection earthworks such as contour banks or straw bale protection. Where appropriate, silt-stop fencing or similar protection would be placed immediately downslope of stockpiles and retained until such time as they develop a stable cover of vegetation.

The boundaries of the proposed soil stockpile areas nominated on **Figure 2.1** are indicative and minor adjustments may occur once operations are underway.

Internal Roads

Topsoil would be stripped along the alignment of internal roads and windrowed along the downslope side of each road and positioned away from any culverts. The topsoil windrow would be typically <1m high. Subsoils would not be stripped from within the alignment of the internal roads.

Coocooboonah Lane Re-alignment

Topsoil from within the re-alignment would be stockpiled on the downslope side ready to be replaced at the completion of the use of that section of road. Limited quantities of subsoil would also be stripped from within the re-alignment to a depth consistent with the depth needed for road construction when the road is boxed out.

The topsoil from SMU 3 at the Oxley Highway end of Coocooboonah Lane would be stripped and stored adjacent to the Lane. It would be replaced at the completion of the operation of the diversion. This area contains the endangered ecological community identified as the Native Vegetation on Cracking Clay Soils of the Liverpool Plains. The rehabilitation would be undertaken in accordance with the requirements of the landowner.

Other Areas of Disturbance

Soils stripped from other areas of disturbance on the Project Site such as the coal processing area, site facilities area and the amenity bund would be placed in separate stockpiles just beyond the edge of the area stripped. Each stockpile would then be available for re-spreading over the disturbed area following decommissioning of the respective areas of activity. Topsoil and subsoil from the sites of storage dams, sediment basins or other water management structures would be pushed aside to enable their construction and, on completion of construction activities, replaced on the completed surfaces and revegetated, where necessary.

Following stockpile establishment, the operation of machinery on the topsoil and subsoil stockpiles would be avoided in order to prevent compaction and to maintain soil aggregation.

2.3.3.4 Soil Inventory and Reconciliation

In order to effectively manage the stripped topsoil and subsoil, NMPL would maintain an inventory of all soils stripped, re-spread and/or stockpiled throughout the life of the mine. This soil inventory would serve several purposes including:

- ensuring appropriate volumes of soil are stripped consistent with the soil requirements of the final landform;

- identifying the age of various stockpiles on the Project Site and therefore assist in minimising the length of time soils remain stockpiled; and
- assisting NMPL in using the most appropriate soils for the different elements of the final landform.

Regular reconciliation of soil availability and requirements would ensure sufficient topsoil and subsoil would be available especially as the mine nears completion.

2.3.4 Overburden Removal and Management

2.3.4.1 Material Characteristics

The removal of overburden would be the main earthmoving activity undertaken within the mine area. This section examines the characteristics of the overburden and describes the planned removal and emplacement of the overburden either back into the open cut area or into an out-of-pit emplacement. A brief overview of the characteristics of the overburden is presented and a comprehensive description of the overburden characteristics is included in the GeoTerra Pty Limited (GeoTerra) Groundwater Assessment included as Part 1 of the *Specialist Consultant Studies Compendium*.

Figure 2.5 shows the typical stratigraphic section through the overburden above the Hoskissons Coal Seam within the open cut area. Any sulfides that may have been present in the overburden above the fresh overburden/weathered overburden interface have been weathered out to depths of up to 36m below surface and would no longer be a potential source of acidic drainage.

Acid rock drainage laboratory analyses and batch leach tests indicated that the waste rock is not potentially acid producing. A small volume coal seam only 18cm thick located approximately 36m below the surface in the overburden demonstrates some acid producing potential. However, no acidic problems are likely given this seam represents approximately 1% of the overall overburden volume and its acid production potential would be dominated by the non-acid producing rock. This small volume of potential acid-producing material would be incorporated into either the out-of-pit or in-pit emplacement at least 2m below the final land surface to reduce the potential for oxidation.

The batch leach test indicated that the leachate from the overburden would be moderately saline and have a neutral to slightly alkaline pH.

Given the outcome of the assessment of the chemical analyses, there are no specific handling and emplacement requirements for these materials other than placing the 18cm thick seam within the overburden.

2.3.4.2 Overburden Removal

Overburden would be removed by a combination of methods. Initially, the weathered overburden would be removed by up to three scrapers. These would strip each area to an approximate depth of 10m below existing surface level. Two scrapers would then continue to remove overburden. The scrapers would operate nominally on a 5 day per week basis. This equipment would remove all material until blasting of solid overburden is required. The more solid material would then be drilled and blasted before being removed by excavators and haul trucks.

Drilling in preparation for blasting would be undertaken using a hydraulic drill. Drilling would prepare approximately 220 000bcm of overburden material for each subsequent blast. The first overburden blast is planned to occur during the 1st quarter of Year 1.

The annual explosives usage projected assuming a 0.55 powder factor and an annual target of 2.6Mbcm per year would be approximately 14 300t. This would be principally in the form of ANFO and Emulsion 256 type products. These would be delivered to site and placed in the drill holes on the day of each blast. Explosives material would not be stored on site whereas detonators and boosters may be stored overnight (see Section 2.5.8).

Table 2.3 identifies typical blast design parameters to be adopted within the open cut area to achieve compliance with relevant guidelines for airblast overpressure and ground vibration at surrounding residences.

Table 2.3
Typical Blast Design Parameters

Parameter	Unit	Detail		
		Minimum	Average	Maximum
Bench Height	m	5	15-20	Approx 45
Blast Hole diameter	mm	229	229	229
Blast Hole Inclination	Deg	75	75	75
Blast Hole Spacing	m	5.0	9.0	9.5
Burden	m	4.0	7.2	7.5
Stemming Length	m	0.5	4.5	5.5
Maximum Instantaneous Charge	kg	50	960	1952
Source: NMPL				

The explosives type would be 90% ANFO, 10% emulsion with initiation using either a nonel or electronic delay system.

NMPL currently anticipates it would be necessary to undertake blasting at intervals of approximately 3 weeks. Therefore, in each year, in the order of 16 blasts would be initiated.

Blast design, loading and firing would be undertaken by an explosives contractor or a suitably qualified and experienced blasting engineer holding a shotfirer's certificate issued by the DPI-MR. Each blast would be designed to provide an adequate level of fragmentation within acceptable environmental impact criteria.

The potential for fly rock has been considered in blast design. The DPI-MR generally recommends a safe exclusion distance of 500m for open cut coal mines. Although residences and nearby roads lie outside this 500m exclusion zone, NMPL would monitor the distance fly rock (if any) travels beyond the designed blast envelope and identify if further safeguards would be required. The closest point of the open cut area to Coocooboonah Lane is approximately 700m, a distance considered completely safe from fly rock.

The blast design parameters outlined in **Table 2.3** are based on conservative predictive formulae. Blast design is an evolving outcome-orientated process and refinements to blast designs would be implemented on the basis of monitoring results and the achievement of specific blasting objectives. As blast-related impacts are primarily related to the Maximum Instantaneous Charge (MIC) and the distance between the blast and the receiver location, subject to operational constraints, less frequent blasts yielding larger volumes could be initiated with similar impacts.

Overburden would initially be placed in the amenity bund and the out-of-pit overburden emplacement immediately north of the open cut area which would screen the coal processing area. The out-of-pit overburden emplacement would accept overburden for the first 15 months of the mine operation. Subsequent to that, overburden would be placed within the mined-out section of the open cut area.

The volume of material in the out-of-pit overburden emplacement would be approximately 4.9Mm^3 and the volume placed within the in-pit emplacement would be approximately 13.6Mm^3.

Table 2.4 presents the mining rates for overburden and coal removal and provides the detail movement of material during the mining operation. It is noted that in total, approximately 70% of the overburden would be blasted and the remainder ripped and removed by scraper.

Table 2.4
Mining Rates

Year	2008	2009	2010	2011	2012	TOTAL
Overburden Quantities x 1 000						
Overburden to Rip (m³)	1737.1	1053.7	1119.9	1213.2	434.9	5558.8
Overburden to Blast Volume (m³)	4053.3	2458.5	2613.0	2830.8	1014.9	12970.5
Total Quantities (m³)	5790.4	3512.2	3732.9	4044.0	1449.8	18529.3
Coal Quantities x 1 000						
ROM Coal Volume(m^3)	642.5	637.5	610.8	644.3	416.1	2951.2
ROM Coal (t)	996.0	988.1	946.7	998.7	644.9	4574.4
Average Stripping Ratio						
Overburden(m³): Coal (t) Ratio	5.8	3.6	3.9	4.0	2.3	4.1
Source: MMG Mining Pty Limited and NMPL						

2.3.4.3 Overburden Emplacement

Figure 2.7 provides detail of the configuration of the out-of-pit overburden emplacement following initial construction and at the completion of mining. Both the plan and sections highlight with the surplus material that would be stored above the final profile during mining. The final profile is also shown on Section BB' consistent with that planned at the completion of mine rehabilitation (see Section 2.11.3).

Minor adjustments to the profile of the out-of-pit overburden emplacement and the in-pit emplacement may arise as NMPL endeavours to maximise the amount of overburden material placed in-pit. At its highest point following final re-shaping, the out-of-pit overburden emplacement would have an elevation of 350m AHD which would place it approximately 30m above the surrounding natural ground level to the north of the emplacement. It would be approximately 20m above surrounding ground level on the southern side of the emplacement.

The final in-pit and out-of-pit overburden emplacement areas would have slopes less than 10^0.

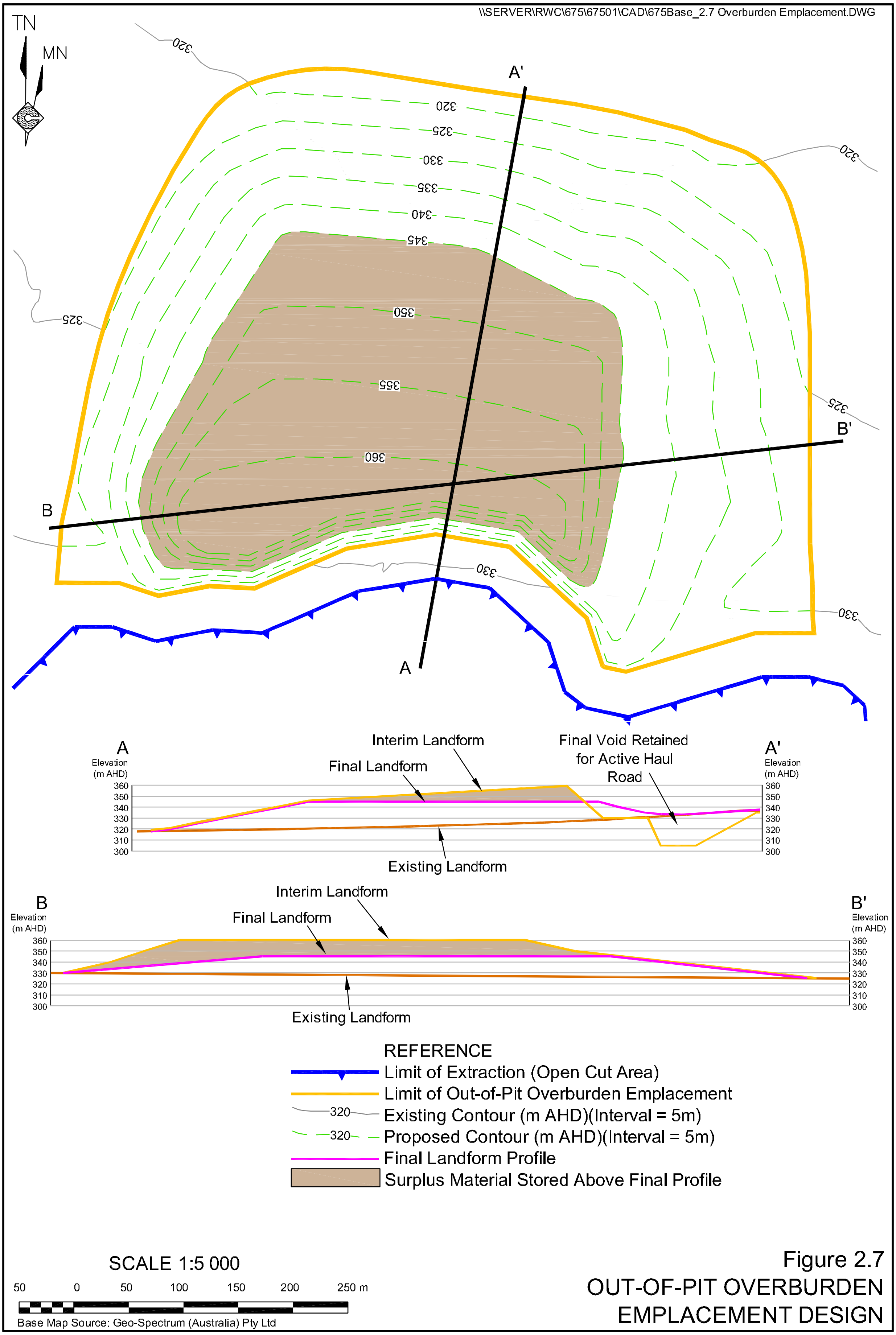


Figure 2.7
OUT-OF-PIT OVERBURDEN EMPLACEMENT DESIGN

Figure Prepared by R.W. Corkery & Co. Pty Ltd

The out-of-pit overburden emplacement would be constructed so that the initial emplacement of overburden would form an acoustic barrier around the operating area within the emplacement. Throughout the remaining placement of overburden in the out-of-pit overburden emplacement, activities would be co-ordinated to maintain a 5m high acoustic bund effect, wherever possible, by selective emplacement of the overburden, ie. until the upper 5m section of the emplacement is constructed.

2.3.5 Coal Extraction

Once the surface of the coal seam is exposed, it would be cleaned off and extracted. The upper Ply DE would be ripped, excavated and transported to the ROM coal pad within coal processing area. Ply C would be ripped and excavated and transported to either the in-pit or out-of-pit overburden emplacement. The coal in Ply AB would then be ripped, excavated and transported to the ROM coal pad.

Coal would be extracted from a series of benches formed within the coal seam. Typically, a dozer would rip the seam and establish four benches. A front-end loader would stockpile the coal in the pit to a height that would enable an excavator to load into rear haul trucks. The trucks would transport the coal out of the open cut area via the access ramp and coal haul road to the ROM coal pad. Coal may be placed in separate stockpiles on the ROM coal pad according to quality and in order to meet market specifications. The ROM coal pad would have a capacity of approximately 100 000t.

2.3.6 Highwall Auger Mining

Due to the approximate north-south alignment of mine blocks (60m width) within the open cut area, the final southern end-wall coal face would be periodically exposed to enable auger mining to be undertaken during the first 3 years of the mine’s development. Auger mining would increase coal recovery by up to 132 000t.

The proposed area designated for auger mining (**Figure 2.1**) is an 80m wide zone down dip and to the south from the proposed southern open cut face. The total end wall coal face suitable for auger mining would be approximately 650m long.

The auger mining area has been chosen as it would:

- have an uneconomic open cut stripping ratio;
- be free of faulting and igneous intrusions; and
- maintain a sufficient barrier between the Gunnedah Coal Mine N^{o} 5 Entry underground workings and the maximum auger mining extremity.

The target horizon selected for auger mining would be the basal 4.5m thick working section of the Hoskissons Coal Seam on and above the pit floor. Coal in this horizon has raw ash values in the AB ply of between 6% and 10% and exhibits premium thermal coal and semi-soft coking coal characteristics. The auger mining method would involve the establishment of a series of cylindrical tunnels of up to 1.8m in diameter, each separated by a web or septum pillar that supports the overlying strata. As a result, mining-related subsidence would be minimal and not capable of causing significant effects on the land surface or infrastructure.

Auger mining would be undertaken in two passes to maximise recovery with each pair of auger holes being stacked vertically as shown in **Figure 2.8**. The auger holes would be drilled in sets, with each set typically comprising eight or nine pairs of 1.8m diameter holes at centres of 2.0m to 2.1m. The barrier between each auger hole set would typically be approximately 4.5m. This is required to optimise roof strength and avoid roof collapse and the likelihood of overlying slope instability. A platform or bench would be required to be constructed on the pit floor to enable the two pass operation to be optimised.

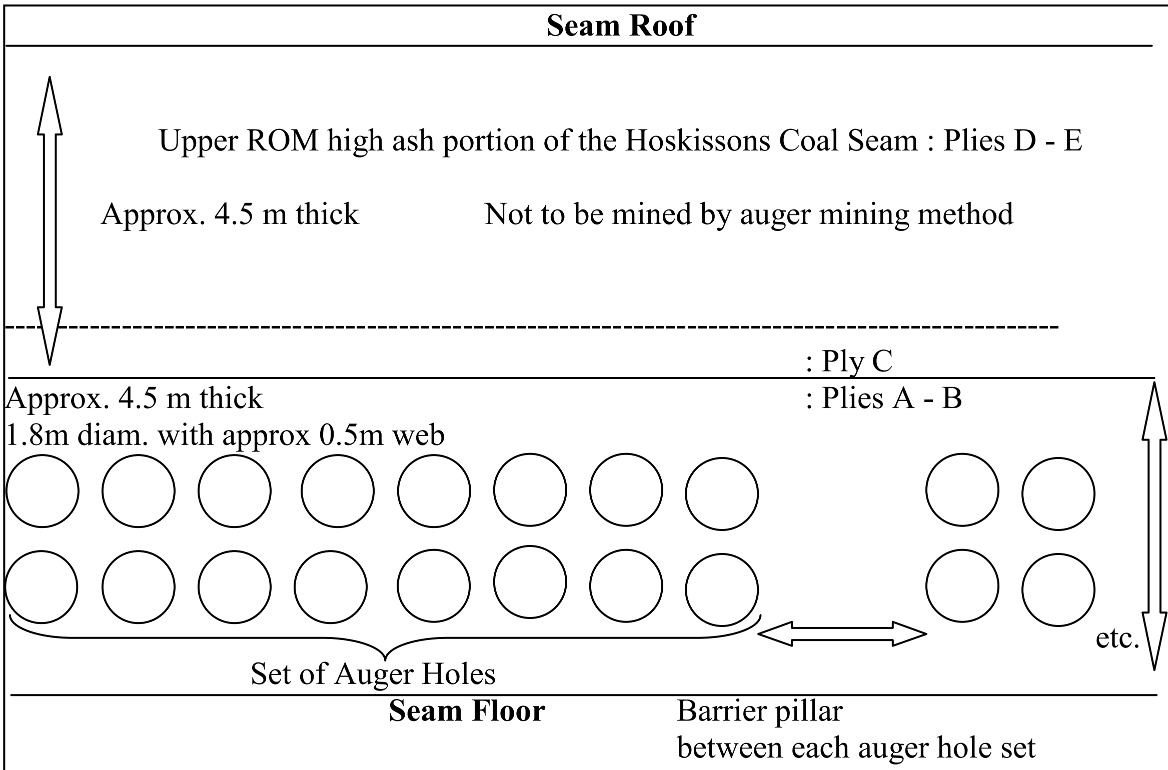
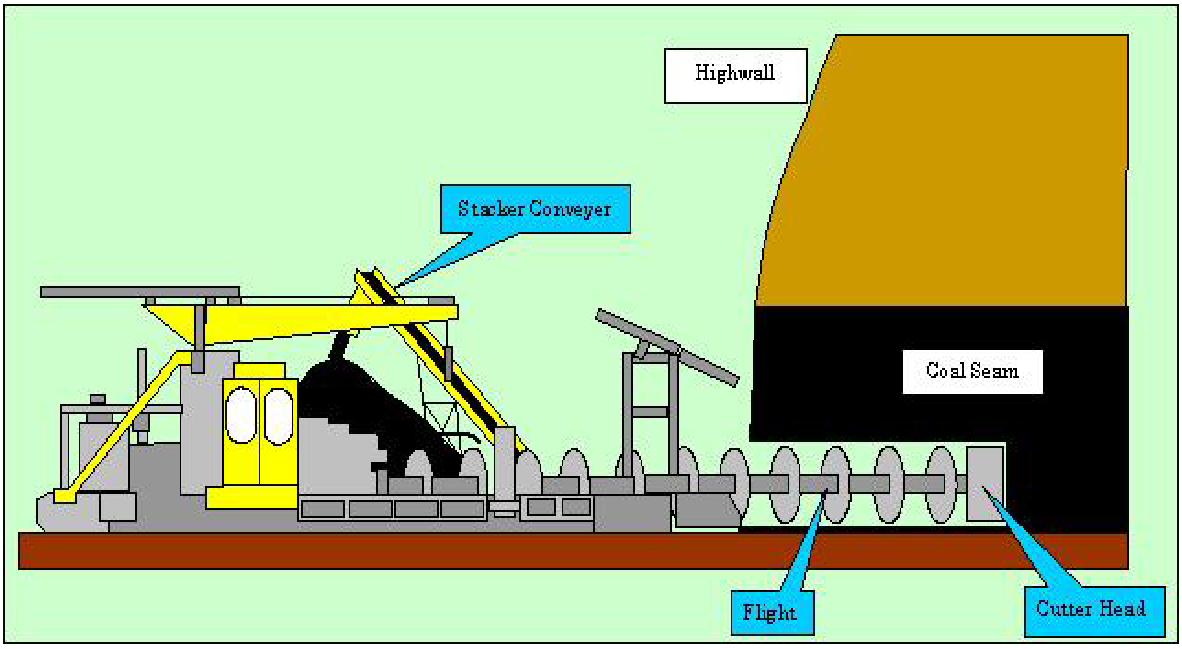


Figure 2.8
AUGER MINING – CONCEPTUAL SECTION

ROM coal recovery for the proposed two pass auger mining operation within the open cut area would be in the order of 132 000t of coal.

The auger mining equipment would comprise an auger drill, auger flights, cutting head and flight handling equipment (see **Figure 2.9**) together with a stacker conveyor to enable coal to be stockpiled or loaded directly into trucks. ROM auger coal would be hauled by truck from the mine face to the coal processing area.

Prior to commencement of auger mining, a geological and geotechnical assessment would be undertaken to confirm it is both safe and economic to proceed. A detailed web and barrier pillar spacing design would be undertaken together with a risk analysis of the overall operation. A formal application for a Highwall Mining Approval would be lodged with the DPI-MR following the risk analysis and prior to the commencement of auger mining.



Source: D. West NMPL

Figure 2.9
SCHEMATIC AUGER MINING EQUIPMENT

2.3.7 Mining Sequence

Open cut mining would proceed generally from west to east. **Figure 2.10** shows the open cut mine stages with the extraction area for each year from Year 1 to Year 5 identified. **Figure 2.11** shows the sequential mining development and overburden emplacement at the end of Years 1, 2, 3, 4 and 5.

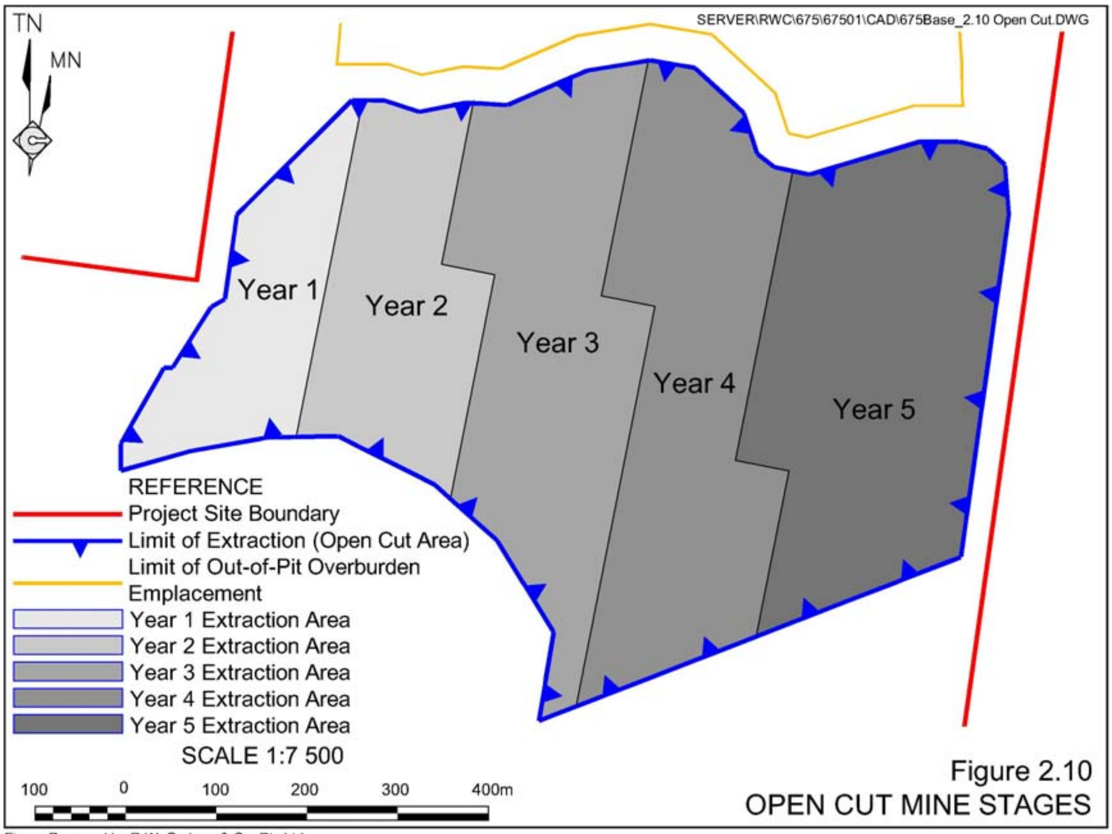


Figure 2.10
OPEN CUT MINE STAGES

Figure Prepared by R.W. Corkery & Co. Pty Ltd

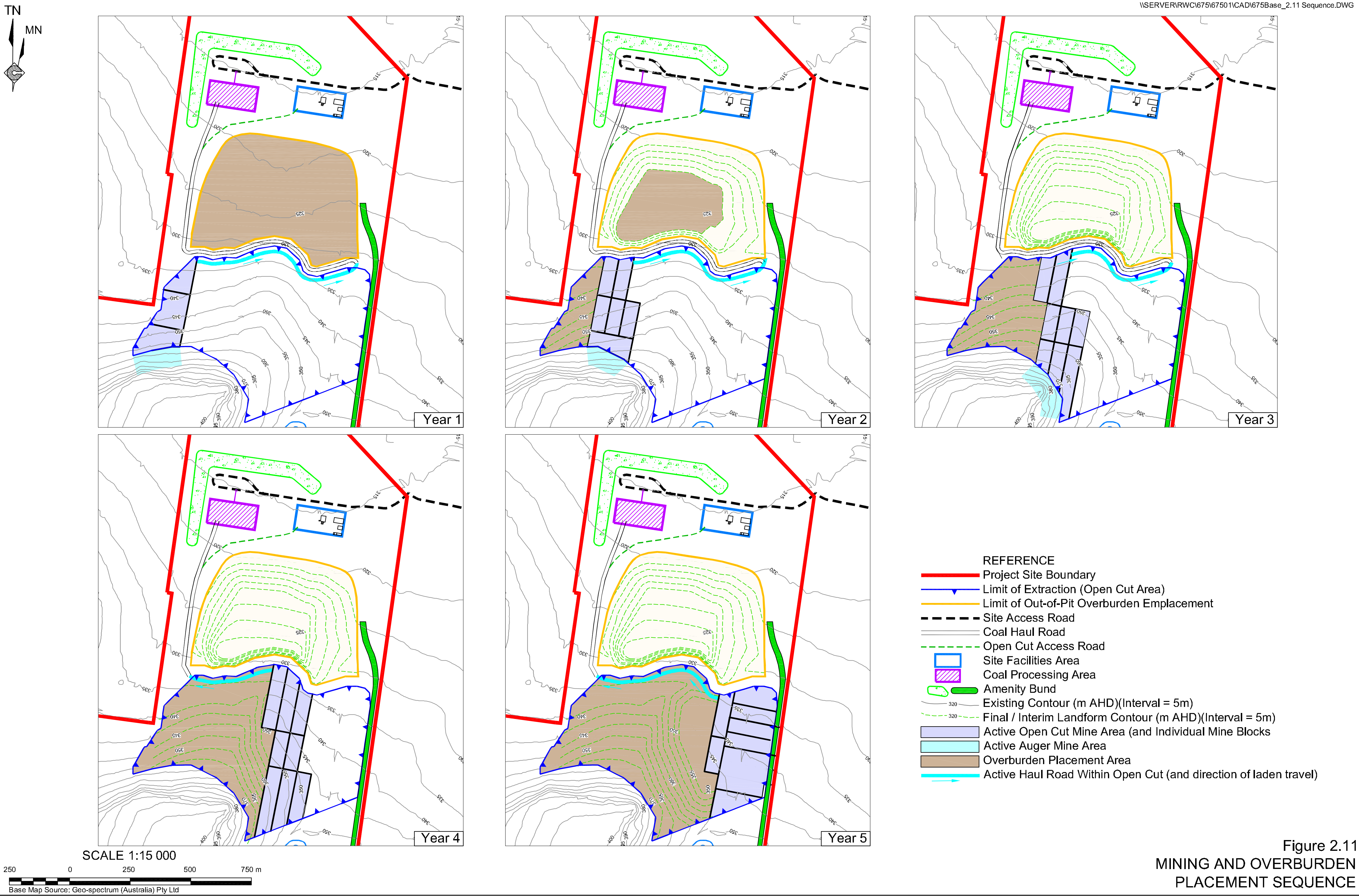


Figure 2.11
MINING AND OVERBURDEN PLACEMENT SEQUENCE

Figure Prepared by R.W. Corkery & Co. Pty Ltd

Initial access into the open cut area would be obtained via a ramp constructed on the northern side of the open cut area. This ramp would enable equipment access to the initial box cut at the western end of the open cut area. The overburden extracted during ramp and box cut establishment would be removed and placed in the amenity bund and out-of-pit overburden emplacement.

During Year 1, mining would commence initially with the overburden from the initial mine area removed and placed in the amenity bund and out-of-pit overburden emplacement. The active haul road within the open cut area would also be excavated. The coal haul road (outside the open cut area) would be aligned on the southern side of the out-of-pit overburden emplacement. Towards the end of Year 1, a 200m section of the southern open cut face would be exposed which would allow the highwall auger mining operation to commence (see Section 2.3.6).

During Year 2, mining would progress towards the east. By the completion of Year 2, the construction of the out-of-pit overburden emplacement would be completed with a proportion of the material set aside to infill the section of the final void containing the haul road / exit ramp. A further 200m section of the southern open cut face would be exposed for auger mining during Year 2. In-pit overburden emplacement would commence during Year 2 and rehabilitation would commence on the backfilled section of the initial open cut.

During Year 3, mining would continue to progress eastwards with the final 250m section of the southern open cut face exposed for auger mining.

During Year 4, mining would progress further to the east with approximately one half of the in-pit emplacement area being reshaped, re-contoured and covered with topsoil. Revegetation of this area would also be undertaken. The soil material from the remaining open cut area would be directly transferred to active rehabilitation areas. During Year 4, the orientation of the active haul road and exit ramp within the open cut area would be reversed with the road exiting the northwestern side of the open cut area and linking in with the north-south section of the out-of-pit coal haul road.

During Year 5, mining would progress to a stage where the final void is partially reshaped and the last of the open cut coal extracted. The final void would be shaped and contoured.

2.3.8 Mining Equipment

The mining equipment fleet that would be used on site is listed in **Table 2.5**.

2.4 COAL PROCESSING

The processing of ROM coal would be undertaken within the coal processing area to be located within the northwestern section of the Project Site. The processing equipment and coal stockpiles would be screened by an amenity bund, up to 15m high, which would provide both acoustic and visual screening.

Table 2.5
Mining Equipment Fleet

Item (or equivalent)	No. on site	Function	Day Shift	Afternoon Shift
Terex RH 170 Hydraulic Excavator	1	Overburden excavation. Coal excavation	Yes	Yes
Cat 988 Front-end Loader	2	Coal excavation and loading	Yes	Yes
Cat 785 Rear Dump Truck (150t capacity)	3	Overburden and coal haulage	Yes	Yes
Drilling Rig	1	Overburden drilling	Yes	No
Blasting Truck	1	Blasting campaigns	Yes	No
Cat 657 Scraper	Up to 3	Overburden removal	Yes	Yes
Cat D11R Bulldozer	1	Overburden removal and ancillaries	Yes	Yes
Cat 14H Grader	1	Ancillaries	Yes	Yes
16kL Water Truck	1	Dust suppression	Yes	Yes
Lighting Plants	3	Lighting	No	Yes

The coal processing area would cover approximately 2ha. An indicative layout and cross section is presented in **Figure 2.12**. The coal processing area would contain the following components.

- ROM coal pad.
- Coal loading hopper.
- Crushers.
- 100t product bin.
- Conveyor.
- Product coal stockpile area.
- Diesel 600kVA generator and fuel storage area.

Other associated infrastructure would consist of a hydraulic power pack for operating the truck loading device on the 100t product bin, 4 500L self-bunded fuel and storage for power generator and a site container for spare parts.

The amenity bund shown on **Figure 2.12** would be 15m high on the northern side of the coal processing area, decreasing in height to 10m on its western side. The reduced height on the western side can be achieved because the natural topography rises by 5m in that direction. The bund would have a 3:1 (V:H) batter on the outer side and 1.5:1 (V:H) batter on the inner side with a 5m wide near horizontal crest.

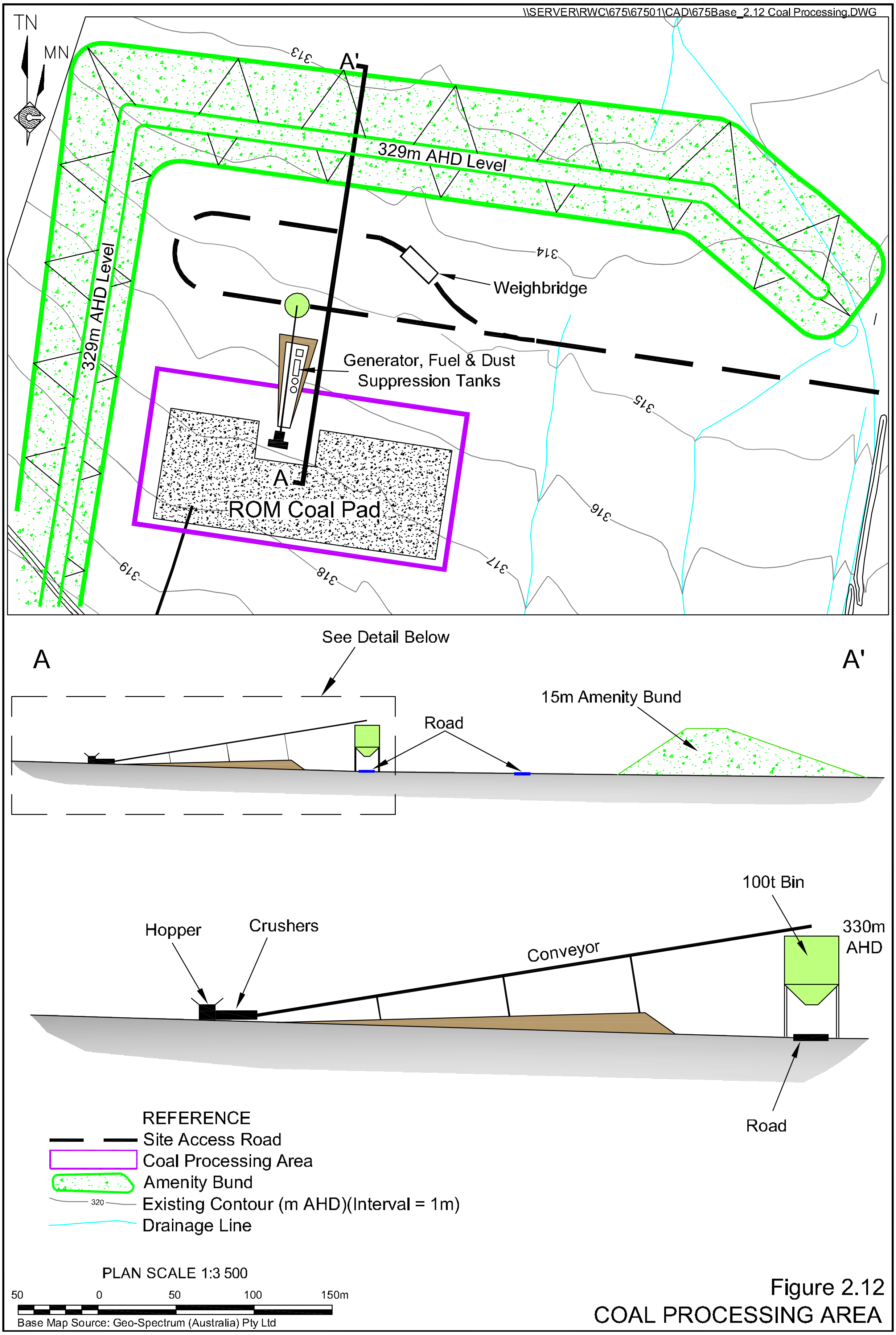


Figure 2.12
COAL PROCESSING AREA

Figure Prepared by R.W. Corkery & Co. Pty Ltd

The coal product bin would be approximately 15m high with its top positioned at approximately 330m AHD. The amenity bund would largely screen this bin from view to the west and north of the Project Site.

Coal from the ROM coal pad would be loaded by front-end loader and placed into the 20t capacity coal loading hopper. The ROM coal would pass through a primary crusher for crushing to <150mm after which it would be secondary crushed to <50mm and then pass via a conveyor under a permanent magnet to the 100t product bin prior to truck loading. The coal processing plant and conveyor superstructure would be approximately 16m high.

The use of the overhead 100t product bin would be dependent upon the economic transfer of the existing product bin from the Whitehaven Coal Mine to the Sunnyside Project Site. In the event it is not appropriate to transfer the product bin from the Whitehaven Coal Mine, NMPL would use up to two front-end loaders to load coal product trucks at ground level.

2.5 INFRASTRUCTURE AND SERVICES

2.5.1 Introduction

The principal infrastructure and services required to support the Sunnyside Coal Mine would be located principally within the site facilities area (see **Figure 2.1** and **Figure 2.13**). The roads required for the coal mine development are described in Section 2.6.

2.5.2 Buildings

Figure 2.13 presents the conceptual layout of the buildings and other facilities to be constructed or installed within the site facilities area including:

- mine office;
- toilet and ablution facilities;
- crib hut;
- hardstand and laydown area;
- bunded fuel bay;
- first aid building;
- 100kVA generator;
- maintenance workshop, wash bay; and
- light vehicle parking facilities.

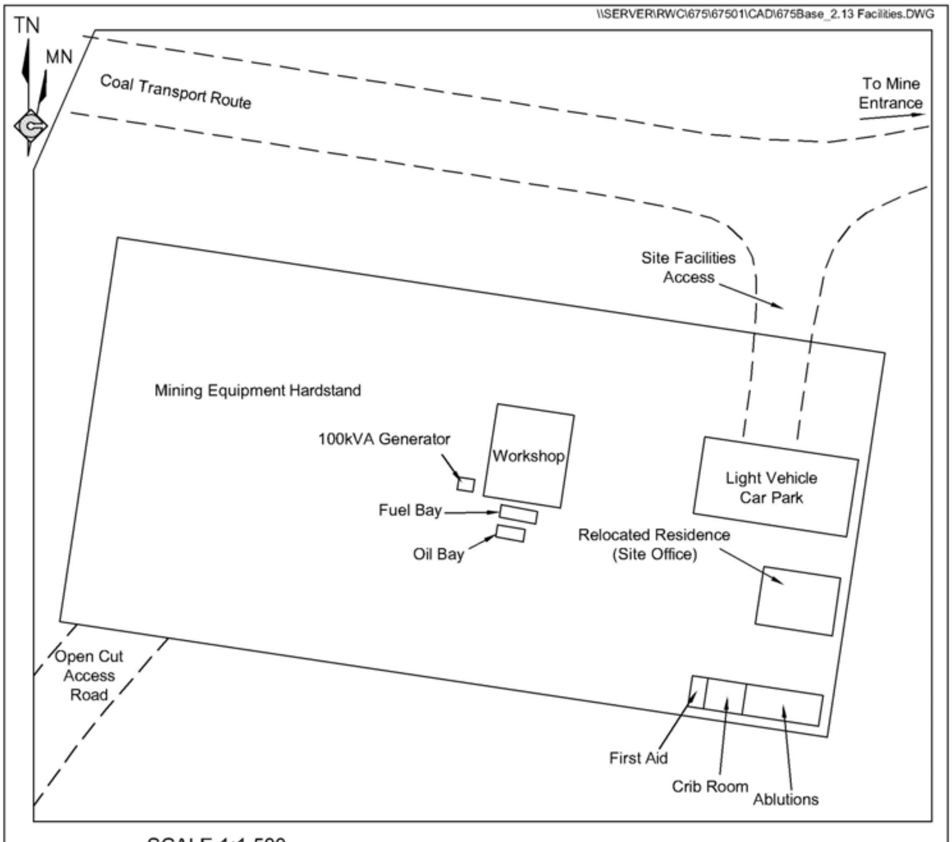


Figure 2.13
SITE FACILITIES AREA

Figure Prepared by R.W. Corkery & Co. Pty Ltd

The mine office would be the relocated "Sunnyside" residence. All other buildings with the possible exception of the maintenance workshop, would be of a demountable style.

2.5.3 Potable and Ablutions Water Requirements

Potable water, ie. water for drinking purposes, would be transported from Gunnedah to supplement rainwater collected off Project Site buildings and stored in tanks. Based on potable water requirements at similar sized mines in the Namoi Basin, it is expected that up to 100kL of potable water would be required each year. Ablutions water would also be transported from Gunnedah, when required. The requirement for this water is estimated to be up to 2ML per year.

2.5.4 Operational Water Requirements

Water initially required for operational purposes would be obtained from either surface water dams or a purpose-installed borehole accessing water within the Gunnedah Coal Mine N^o 5 Entry underground workings to the south of the Sunnyside Coal Mine (see **Figure 2.1**). The bore would be used to augment surface water dam supplies should dry conditions prevail at the commencement of the Project.

The predicted groundwater inflow to the pit is expected to provide a large component of the mine operating water supply. However, in order to meet the mine's water requirement it will need to be augmented by surface runoff water and possibly by the 31.2ML water resource currently occurring in the Gunnedah N^o 5 Entry underground workings. Pit inflows would be stored in two 30ML turkey's nest dams prior to use around the Project Site. Any excess pit inflow water unable to be stored in the turkey's nest dams would be discharged underground via a bore to the old Gunnedah N^o 5 Entry underground workings immediately to the south of the proposed open cut area. Surface runoff water would be utilised to manage salinity levels of the water in the turkey's nest dams to ensure that groundwater pollution does not occur as a result of placing the water underground.

Should pit inflows not reach the predicted levels, the mine water requirements can be supplied from the surface water dams that form part of the site surface water management system.

Operational water requirements for the Sunnyside Coal Mine would be in the order of 75MLpa to 100MLpa depending on seasonal conditions. This process water requirement would be required for:

- Dust suppression on the site roads. ....63 to 88MLpa
- Coal crushing conveyor dust suppression 2MLpa
- Stockpile dust suppression water sprays 5MLpa
- General dust suppression activities around the surface.......................... 5MLpa

2.5.5 Electricity

There is an existing rural power supply to the "Sunnyside" property. When the "Sunnyside" residence is relocated to provide the mine office, its rural power supply would be re-aligned to provide electric power for the site facilities area.

Power to operate the crushers and conveyors within the coal processing area would be generated by a diesel generator (600kVA) located adjacent to the coal handling plant (see **Figure 2.12**) and would be noise treated and self-bunded for spill containment.

An additional generator (100kVA) would provide power to the workshop and fuel depot. This generator would be located adjacent to the workshop in the site facilities area.

The pump servicing the water supply bore located above the Gunnedah Coal Mine N° 5 Entry underground workings would be diesel powered.

2.5.6 Communications

Off-site and on-site communications would be by a combination of phone/fax lines installed to service mine management and contract staff in the site facilities area, mobile communications and 2-way radio. Wireless-based Internet access would be provided.

2.5.7 Sewerage

Sewage treatment would be undertaken by an envirocycle septic system with effluent irrigation onto a designated waste water utilisation area on the "Sunnyside" property.

2.5.8 Fuel

Fuel storage and refuelling facilities for the mining equipment fleet, comprising storage for 68 000L diesel in a WorkCover-approved self-bunded fuel tank and a refuelling bay would be located within the site facilities area adjacent to the workshop (Refer **Figure 2.13**). Although the majority of mobile equipment would utilise this facility, a mobile fuel service truck would be used to service less-mobile equipment within the open cut area. There would also be up to 10 000L of oil stored in a self-bunded container.

Any other hydrocarbon tanks or drums used on site would be stored in fully bunded areas to Work Cover approved standards.

It is estimated that the various on-site components of the proposed Sunnyside Coal Mine would use approximately 3 400kL of diesel annually, comprising:

- 3 200kL for mining activities; and
- 200kL for on-site power generation.

Annual off-site project-related fuel usage would include:

- 510kL for coal transportation by road between the Project Site and the Whitehaven Rail Loading Facility, based on 0.015L per net tonne kilometre; and
- 10kL for private vehicles and deliveries.

In addition, approximately 2 100kL of diesel would be required annually to transport the coal by rail between Gunnedah and Port Newcastle, based on 1Mtpa of coal delivered.

2.5.9 Explosives

Blasting consumables would be stored in the Orica Depot near Boggabri and brought to site as required. Two small explosives magazines would be positioned southwest of the open cut area (**Figure 2.1**) to enable overnight storage of detonators and boosters on site, if required. These magazines would be located in accordance with WorkCover licence requirements.

2.6 TRANSPORTATION

2.6.1 Introduction

The bulk of transport activities associated with the Project would revolve around the road transportation of coal from the Project Site to the Whitehaven Rail Loading Facility for subsequent transportation to Newcastle and export markets. There would be a small number of additional transport movements associated with fuel deliveries, service vehicles and employees travelling to and from the Project Site. This subsection:

- describes the transport activities during the site establishment phase;
- describes the road construction activities on the Project Site and along the re-aligned section of Coocooboonah Lane; and
- outlines the proposed coal transport route and road intersection upgrading activities between the Sunnyside Coal Mine and the Whitehaven Rail Loading Facility.

2.6.2 Site Establishment

During the two month period while the mine entrance, coal transport route and internal roads are under construction, the typical types and number of vehicle movements entering and exiting the Project Site are anticipated to comprise:

- low loaders (0 to 6 per day);
- heavy vehicles (0 to 8 per day); and
- light vehicles (30 to 60 per day).

These vehicles would predominantly travel from Gunnedah via the Oxley Highway and Coocooboonah Lane.

The re-aligned section of Coocooboonah Lane and the intersection upgrades along the coal transport route would be constructed concurrently with the mine entrance and internal roads.

A Road Construction Management Plan would be prepared to ensure appropriate procedures are in place for the management of both mine-related and public traffic during road construction activities. This plan would be submitted to both Gunnedah Shire Council and the RTA in support of NMPL's Section 138 Permit Application relating to the various road construction activities.

2.6.3 Mine Entrance and Internal Roads

The layout of the internal roads on the Project Site is shown on **Figure 2.1**.

Coal Transport Route

The mine entrance would be located off Coocooboonah Lane at the northeastern corner of the Project Site generally at the location where the existing entrance gate is located for the "Sunnyside" property. The sole road from the mine entrance onto the Project Site would be the coal transport route which would provide access to the site facilities area and coal loading facility adjacent to the coal processing area. The coal transport route would loop under a truck loading bin to enable loaded trucks to travel back to the Oxley Highway and the rail loading facility near Gunnedah.

The road along the coal transport route within the Project Site would be constructed with an overall width in the order of 8.0m comprising a 7.0m wide sealed surface and 0.5m of sealed shoulder on both sides.

Construction of the mine entrance and coal transport route on the Project Site road would be part of the first activities undertaken on the Project Site following receipt of project approval and all relevant approvals, permits and licences.

Construction of the coal transport route on the Project Site would involve the removal and stockpiling of surface topsoil, the installation of any required roadside drainage controls, and the placement of suitable sub-base and base-coarse materials preferentially sourced from the early development stages of the open cut area. The section of the coal transport route on the Project Site would be sealed as part of the overall road sealing program between the Project Site and the Oxley Highway (see Section 2.6.4).

Coal Haul Road

Throughout the life of the mine, a coal haul road would be retained to provide access between the open cut area and the coal processing area. This haul road would be extended and re-aligned during the life of the mine, as required and would be watered regularly to suppress dust. The road would be up to approximately 25m wide and constructed with suitable overburden material from the open cut area. Earthen windrows up to 50% of the maximum wheel height on site would be constructed on one or both sides of the road as a safety measure.

NMPL would construct and maintain a haulage ramp to provide a coal transport route for vehicles to access and leave the open cut area. The location of the ramp would vary as mining progresses (see **Figure 2.11**). The ramps would be constructed from overburden as the open cut area develops and would be:

- a minimum of three times the width of the largest haul truck (typically 22m to 25m wide for dual access roads);
- sheeted with suitable overburden materials recovered during mining operations; and
- established with a gradient of between 10^{o} to 15^{o}.

Run-off water leaving haul roads and ramps and any sediment it contains would be directed to sumps within the open cut area or to purpose-built sediment basins adjacent to the haul road.

Open Cut Access Road

NMPL would construct and maintain a 25m wide unsealed road from the hardstand area adjacent to the workshop to the coal haul road – principally to provide access for mobile equipment operators to travel to and from the site facilities area for meal breaks and regular maintenance. This road would be constructed to a similar standard to the coal haul road.

Other Roads

The development of the Sunnyside Coal Mine would require the construction of a network of temporary unsealed haul roads to permit the transportation of topsoil, subsoil, overburden and coal. NMPL intends to minimise the number of internal haul roads constructed.

2.6.4 Coocooboonah Lane Re-alignment

It is proposed to construct a re-aligned section of Coocooboonah Lane as part of the overall coal transport route approximately 100m northeast of, and parallel to, the existing Coocooboonah Lane. The re-aligned section of the Lane would be located on the "Plain View" property for the duration of the mine life. The road would be fully removed and the agricultural paddocks re-instated at the end of the mine life. This new, albeit temporary section of the Lane would enable preservation of the important remnant roadside vegetation which contains Koala feed trees.

The new section of Coocooboonah Lane would be approximately 2 300m in length and would rejoin the existing Coocooboonah Lane approximately 450m before the Lane intersects with the Oxley Highway. Access to the "Plain View" property would be re-established from this new section of Lane. Access to the "Lilydale" property would be retained from the existing Coocooboonah Lane, however, the Lane would be sealed to approximately 50m past the current entrance to "Lilydale". A "Stop" sign would be installed where the sealed access road re-enters the Coocooboonah Lane re-alignment.

The new section of Coocooboonah Lane would be constructed with an overall width in the order of 8.0m comprising a 7.0m wide sealed surface and 0.5m sealed shoulders on both sides. The new section of Coocooboonah Lane would be constructed prior to coal being transported from the mine.

Construction of the re-aligned section of Coocooboonah Lane would involve the removal and stockpiling of surface topsoil and subsoil on the downslope side of the road, the installation of any required roadside drainage controls, and the placement of suitable sub-base and base-coarse materials preferentially sourced during the early development stages of the open cut mine.

Figure 2.14 shows a typical cross-section of the road to be constructed along the re-aligned section of Coocooboonah Lane. Its construction would involve conventional road building techniques and procedures. These would include the following.

- Topsoil would be stripped to a depth of approximately 150mm and stockpiled adjacent to the road (on the downslope side) at appropriate locations for future rehabilitation of the road. Approximately 150mm of subsoil would also be removed and similarly stockpiled.
- The cleared section (up to 15m wide) would be compacted using rollers or similar equipment.
- Suitable sub-base and base-coarse materials would be preferentially sourced from the initial excavations associated with the open cut area and placed in position and compacted.

- The constructed road surface would be at the same elevation as the surrounding surface level so as not to impede natural surface flows.
- A two coat bitumen seal would be applied along the length of the road from the mine entrance to the Oxley Highway to a width of 7.0m and a 0.5m sealed shoulder retained on both sides of the sealed surface.
- Guideposts, centre reflective markers and appropriate signage would be installed.
- The full length of the Coocooboonah Lane re-alignment would be fenced in consultation with the owner of "Plain View".
- Two flood-ways would be constructed to allow water flows from Coocooboonah Creek to travel uninhibited along their natural course. Extended shoulder aprons up to 4m in width in the flood-ways would be three coat bitumen sealed to prevent erosion.

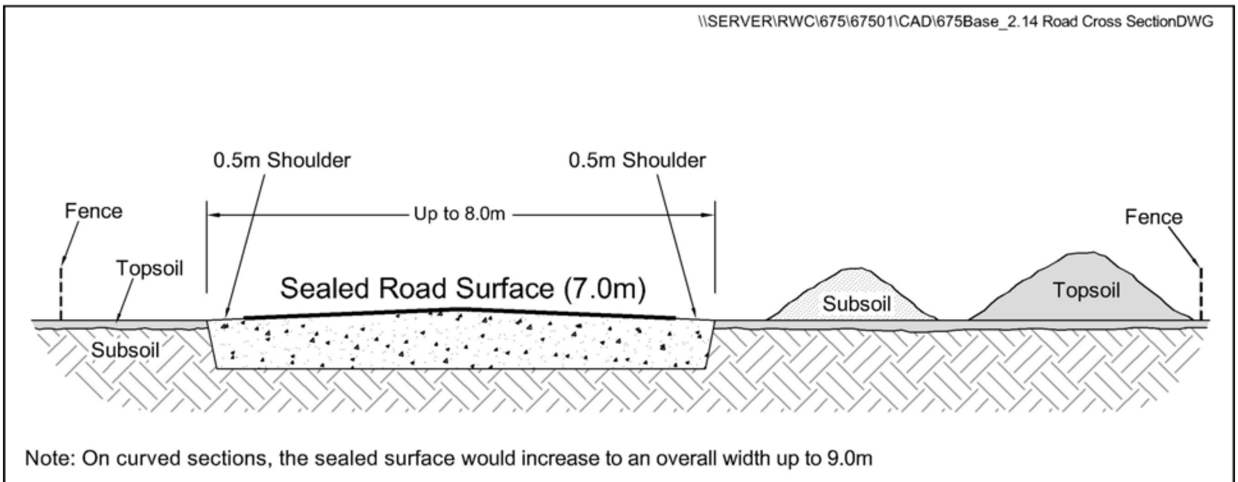


Figure 2.14
TYPICAL ROAD CROSS - SECTION

2.6.5 ROM Coal Transportation

2.6.5.1 Proposed Coal Transport Route

Figures 2.15 and **2.16** show the proposed coal transport route and the upgrades proposed for each intersection along its length. The route was identified by NMPL with the assistance of Constructive Solutions Pty Limited of Tamworth whose detailed assessment of the route is included as Part 6 in the *Specialist Consultant Studies Compendium*.

Coal trucks, of nominal 28t or 40t capacity, would be loaded adjacent to the coal processing area and depart from the Project Site at the mine entrance, cross over the existing Coocooboonah Lane via an at-grade crossing (Inset A) and proceed along the re-aligned section of Coocooboonah Lane. Mine traffic would give way to local traffic using Coocooboonah Lane. This section of the coal transport route is shown on **Figure 2.15**.

Approximately 450m before the existing intersection of Coocooboonah Lane with the Oxley Highway, the re-aligned section would rejoin the existing Coocooboonah Lane. Access to "Plain View" and "Lilydale" properties would be retained after the new alignment of Coocooboonah Lane is constructed. This arrangement is shown in Inset B on **Figure 2.15**.

Trucks would turn left out of Coocooboonah Lane and proceed along the Oxley Highway for approximately 6km before turning left into Blackjack Road. The proposed upgrade of the Coocooboonah Lane and Oxley Highway intersection is shown in Inset C on **Figure 2. 15**. The proposed upgrade of the Blackjack Road and Oxley Highway intersection is shown in Inset D on **Figure 2.16**.

The section of Blackjack Road along the coal transport route has a long history of coal haulage. During 1901, a tramway was built along the alignment which enabled coal to be transported from the Gunnedah Mine to the rail siding at the end of Blackjack Road. During the early 1970s, the current Gunnedah rail siding was constructed and it was serviced by coal trucks travelling along Blackjack Road. In recent years, coal has not been transported from the Gunnedah Mine although coal rejects from the Whitehaven CHPP have been transported along Blackjack Road to the Blackjack Open Cut for use in rehabilitation of that old mine.

At the northern end of Blackjack Road, trucks would turn right into Quia Road. Current traffic levels indicate that an improved right turn lane would suffice at this intersection. However, there are a number of developments proposed in the vicinity. Should they proceed, the resultant traffic volume increase may require a roundabout style intersection as shown in Inset E on **Figure 2.16**. The type of intersection constructed would be determined in consultation with Gunnedah Shire Council prior to installation.

Trucks would travel along Quia Road for approximately 750m before turning left and passing under a rail overpass, then immediately turn left again and proceed along Torrens Road directly to the Whitehaven Rail Loading Facility. The proposed improvements for this intersection are shown in Inset F on **Figure 2.16**.

The trucks would unload adjacent to the rail loading facility and return to the Sunnyside Coal Mine along the same route. Stockpiled Sunnyside coal would be blended and prepared for loading onto trains through the Whitehaven Rail Loading Facility.

Table 2.6 presents a consolidated summary of the proposed improvements to various sections of the coal transport route between the mine entrance and the Whitehaven Rail Loading Facility.

Plates 2.2 to **2.5** present oblique aerial photographs of the proposed Coocooboonah Lane re-alignment and the main intersections along the coal transport route.

NMPL proposes to transport up to 3 500tpd of coal six days per week between the Sunnyside Coal Mine and the Whitehaven Rail Loading Facility. This would be achieved with approximately 88 B-Double truck loads or 176 truck movements per day based on a 40t truck capacity.

Table 2.6
Proposed Coal Transport Route Improvements

Road Section	Proposed Road Improvements
General	• Complete all relevant intersections upgrades to AUSTROADS and Gunnedah Shire Council standards. • Truck entering signs would be placed at all intersections where relevant. • Haulage vehicles would be managed to minimise speeding and other related traffic infringements through a suitable code of behaviour and disciplinary procedures. • No haulage would be undertaken during the three days of AgQuip.
Coocooboonah Lane	• Construct new re-aligned section of road parallel to the existing road (see **Figure 2.14** and **Plate 2.2**). • Merge new re-aligned section of road back with Coocooboonah Lane 450m from highway and reconstruct the 450m section of Coocooboonah Lane. • Re-align and reconstruct accesses to "Plain View" and "Lilydale".
Coocooboonah Lane – Oxley Highway Intersection	• Upgrade existing intersection (Inset C – **Figure 2.14**) (**Plate 2.3**).
Oxley Highway	• Negotiate shoulder maintenance strategy with Council. • Close all alternative accesses between the Project Site and the Highway
Oxley Highway – Blackjack Road Intersection	• Upgrade existing intersection to include a deceleration lane turning left into Blackjack Road (Inset D – **Figure 2.15**) (**Plate 2.4**).
Blackjack Road	• Widen Blackjack Road to provide two 3.5m lanes with 0.5m sealed shoulder both sides.
Blackjack Road – Quia Road Intersection	• Intersection upgrade would suffice for mine related traffic. However, roundabout may be required to accommodate other traffic generating developments. (Inset E – **Figure 2.15**).
Quia Road	• Sealed shoulder width is minimal therefore negotiate shoulder maintenance strategy with Council. • Widen Quia Road to provide two by 3.5m lanes with 0.5m sealed shoulder both sides.
Underpass and Adjoining Intersections	• Upgrades to Quia Road – Farrar Road intersection should be negotiated with Council, however, as a minimum two opposing right turn lanes and a left turn lane for laden haulage vehicles would be provided. • Upgrade Quia Road – Torrens Road intersection (Inset F – **Figure 2.15**) (**Plate 2.5**).
Torrens Road	• Reconstruct 600m failed section. Widen, where necessary, to provide two 3.5m lanes with 0.5m sealed shoulder on both sides.

NMPL has commenced negotiations with Gunnedah Shire Council to develop a road maintenance and capital improvement agreement to cover coal transport route impacts associated with the movement of coal. WCM has similar agreements with both Gunnedah and Narrabri Shire Councils in relation to other mines it operates in the Gunnedah/Narrabri area. Any agreement would reflect the specific route and stakeholders in the Sunnyside Coal Project.

Coal would not be transported from the Sunnyside Coal Mine during the three days of AgQuip during August each year.

2.6.6 Rail Transportation

Coal would be transported to Port Newcastle by rail for export. Rail loading would take place through the Whitehaven Rail Loading Facility. Coal would be initially transported along the Werris Creek-Mungindi Rail Line and join the Main Northern Line at Werris Creek. From Werris Creek, the Main Northern Line proceeds to Newcastle passing through Willow Tree, Murrurundi, Scone, Aberdeen, Muswellbrook Singleton, Maitland, and a number of other smaller locations en route. The total rail distance is approximately 325km from the Whitehaven Rail Loading Facility to Port Newcastle.

2.7 HOURS OF OPERATION AND PROJECT LIFE

The hours of operation for the Sunnyside Coal Mine would vary according to the activity. **Table 2.7** details both normal and contingency operating hours of the various activities proposed. The mine would not operate on declared Public Holidays. NMPL envisages that contingency hours of operation would only be used if protracted inclement weather, mechanical breakdowns or unforseen circumstances arise which would otherwise preclude achievement of budgeted production targets.

Based upon the projected annual mine production of up to 1.0Mt and the identified recoverable coal reserves of close to 5.0Mt, the expected mine life from site establishment to final rehabilitation is likely to be in the order of 5 to 7 years.

Table 2.7
Proposed Hours - Sunnyside Coal Mine

Activity	Monday - Friday		Saturday	
	Normal Hours	Contingency	Normal Hours	Contingency
Site Establishment Activities				
Water Management structures	0700 -1800	1800 – 2000*	0700 -1600	1600 -1800
Soil/Vegetation Stripping	0700 -1800	1800 – 2000*	0700 -1600	1600 -1800
ROM crushing, stockpile & coal haulage Facility	0700 -1800	1800 - 2000	0700 -1600	1600 -1800
Road construction	0700 -1800	1800 – 2000*	0700 -1600	-
Mining and Processing Operations				
Soil stripping and stockpiling operations	0700 -1800	1800 – 2000*	0700 -1800	-
Overburden scraper operations	0700 -1800	1800 – 2000*	0700 -1800	-
Blast-hole drilling	0700 - 2000	-	0700 -1800	-
Blasting	1000 - 1700	-	1000 -1400	
Overburden/Inter-burden removal & placement	0700 - 2200	-	0700 - 1600	-
Internal haulage of raw coal to ROM Crushing/Stockpiling Facility	0700 - 2200	-	0700 - 1600	-
On-site Coal Processing	0700 - 2200		0700 - 1800	-
Equipment Maintenance	24 hours		24 hours	Sunday if required
Rehabilitation	0700 - 1800	-	0700 - 1600	-
Coal Transportation				
Coal Transport to Whitehaven Rail Loading Facility	0700 - 1800	1800 – 2000*	0700 - 1600	
* Daylight hours only, if seasonal conditions permit				

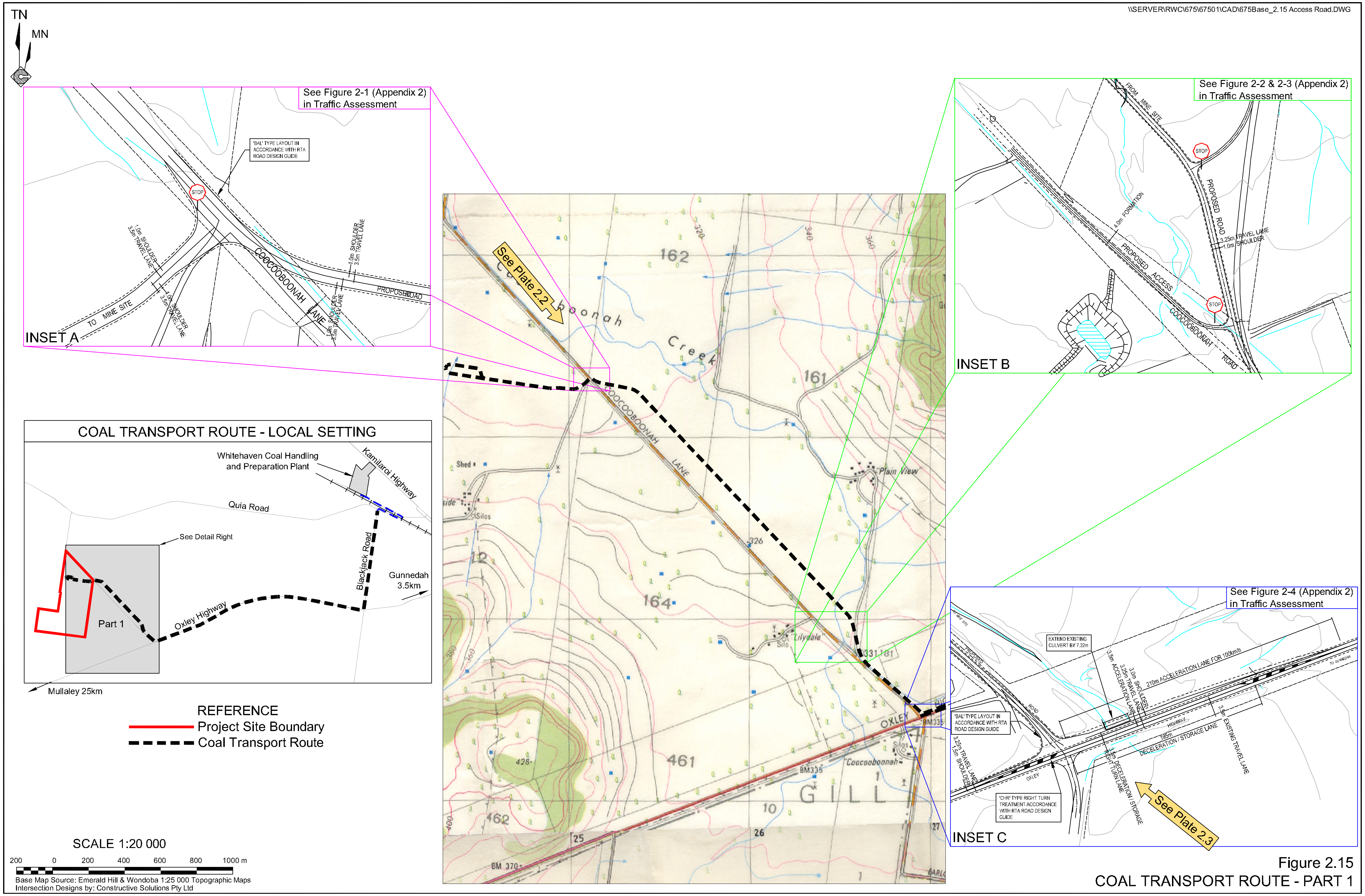
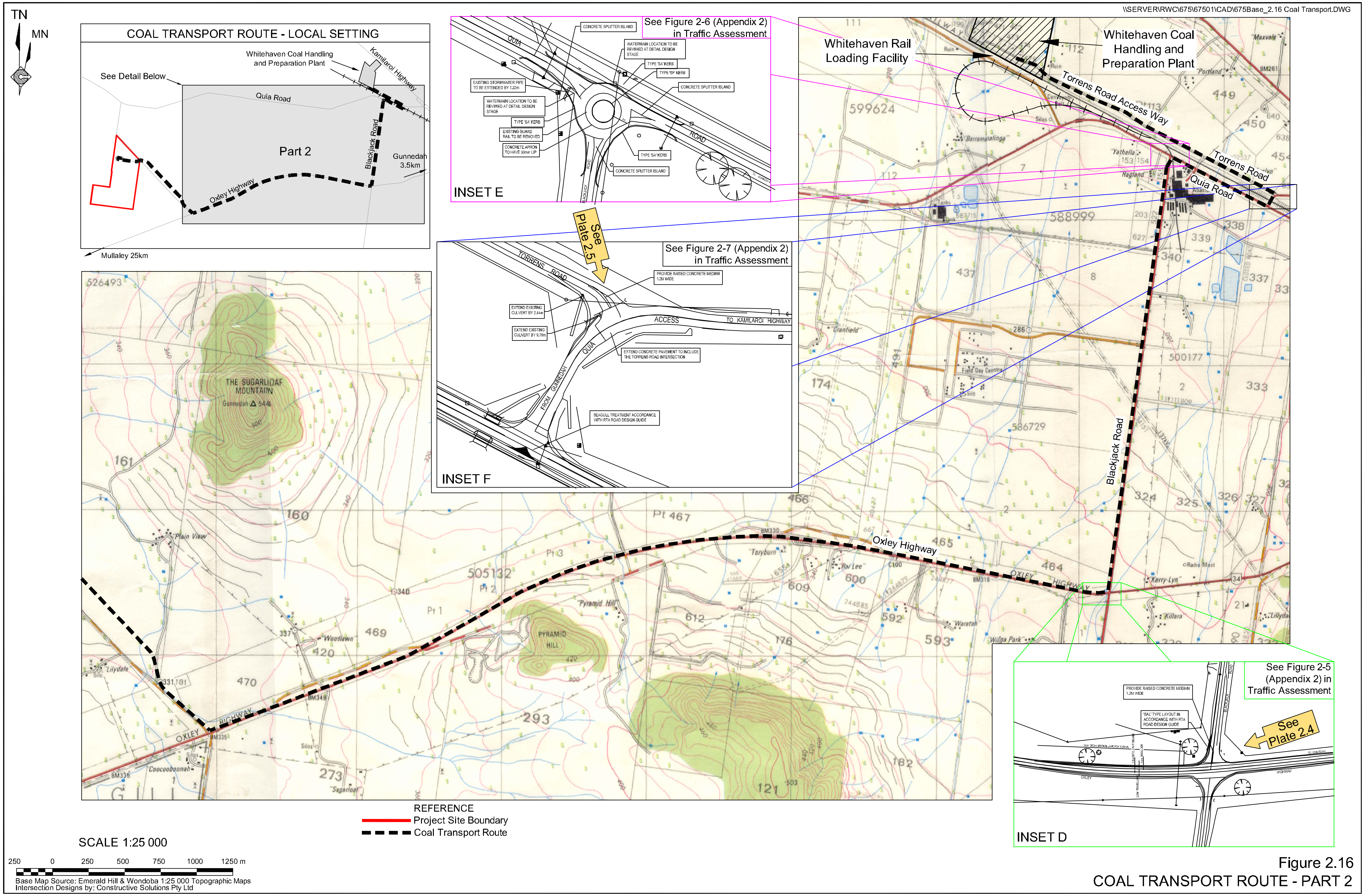


Figure 2.15
COAL TRANSPORT ROUTE - PART 1

Figure Prepared by R.W. Corkery & Co. Pty Ltd



Base Map Source: Emerald Hill & Wondoba 1:25 000 Topographic Maps
Intersection Designs by: Constructive Solutions Pty Ltd

Figure 2.16
COAL TRANSPORT ROUTE - PART 2

Figure Prepared by R.W. Corkery & Co. Pty Ltd

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Plate 2.2 : An oblique aerial view to the southeast along the proposed route of the Coocooboonah Lane Re-alignment.
(Ref: E675B-023)

Plate 2.3 : An oblique aerial view to the northwest across the intersection of Oxley Highway and Coocooboonah Lane.
(Ref: E675B-008)

Plate 2.4 : An oblique aerial view to the west across the intersection of Oxley Highway and Blackjack Road.
(Ref: E675B-003)

Plate 2.5 : An oblique aerial view to the south across the rail underpass on Quia Road.
(Ref: E675B-001)

2.8 EMPLOYMENT

2.8.1 Site Establishment

Construction of the mine entrance, internal roads, Coocooboonah Lane re-alignment, public road intersections, site facilities area and coal processing area would be undertaken prior to the mining, processing and transportation of any coal.

This construction work is expected to take approximately 4 months with an estimated workforce of up to 20 full-time equivalent persons.

2.8.2 Operations

The mine would be operated with a typical workforce of 24 full-time employees and 7 part-time employees, as required for campaign activities. **Table 2.8** identifies the projected mine workforce assuming a maximum coal production rate of 1Mtpa, the mining equipment fleet identified in Section 2.3.8 and the projected two-shift open cut mining and coal processing operations.

Table 2.8
Indicative Direct Employment for the Project

Position/Function	Full-time	Part-time and campaign
Project Manager	1	
Plant Supervisor	1	
Technical Services		1
Mining Foreman	1	
Maintenance Labour	2	
Site Clerk	1	
RH170 Operator	2	
Cat 785 Operator	6	
Cat D11R Operator	2	
Cat 14H Operator	2	
Driller	1	
Water Truck Driver	2	
Serviceman	1	
Scraper Operator		3
Blast Crew		3
Processing Plant Operator	2	
Totals	**24**	**7**

In addition to the on-site employees, 10 persons would be employed by a contractor for the planned coal transportation and a further 2 persons employed by WCM for train loading operations. The 7 part-time positions would invariably involve WCM personnel undertaking tasks at each of the WCM mines.

A number of technical, professional and mine support personnel would also be expected to visit the mine on an "as needs" basis including cleaners, rubbish removal contractors, specialist tradespersons and sales representatives, environmental, mine planning and geotechnical consultants, as well as NMPL's senior management personnel.

The mine workforce would comprise a core workforce with experience in coal mining or related industries supplemented by suitably competent local persons. NMPL would continue to implement its policy which encourages employment of local district personnel.

NMPL is part of the Whitehaven Group which currently has an employee base of approximately 125 people in the Gunnedah area. The Whitehaven Group supports the interchange of personnel at its various operations to gain workforce efficiencies and to provide development training for employees in order to meet the Group's future requirements for a suitably trained workforce.

The Group has a "Train Our Own" policy which aims at developing the existing workforce in order to meet employment requirements of the Group's expansion objectives. The Group operate significant cadetship and apprenticeship programmes giving opportunities to local people to be trained and employed in the mining industry. The Group would use internal transfers of suitably trained personnel to provide the bulk of the employee requirements for Sunnyside. The existing Whitehaven Group is expected to provide opportunity for these internal transfers without jeopardising ongoing operations.

The Sunnyside Project is a component part of the Group's planned ongoing coal mining activities in the Gunnedah Basin and existing Group employees are being trained for their employment at Sunnyside.

The employment catchment for the Project would extend well beyond Gunnedah with people willing to commute daily to work in the mining industry. As an example, approximately 50% of the employees at the Tarrawonga Coal Mine are drawn from Gunnedah with the remaining employees drawn from outlying areas who commute daily to the mine.

At this stage, it is envisaged that virtually all employees would be drawn from the local area. However, for assessment purposes, NMPL has assumed a worst case scenario of five employees being sourced from outside the local area (Refer Section 4B.12.6.1).

2.9 WASTE MANAGEMENT

The principal wastes that would be generated by the Project can be categorised as non-production and production wastes.

Non-production wastes would include:

- general domestic-type wastes from the on-site buildings and routine maintenance consumables;
- fencing materials;
- oils and greases; and
- sewage.

Production wastes generated on the Project Site would include:

- overburden from the development of the open cut mine; and
- potentially contaminated water from the maintenance workshop, washdown pad and fuel storage areas.

2.9.1 Management of Non-Production Wastes

2.9.1.1 Domestic-type Wastes and Routine Maintenance Consumables

All paper and general wastes originating from the site facilities area, together with routine maintenance consumables from the daily servicing of equipment, such as grease cartridges, would be disposed of in 205L drums and 240L mobile garbage bins located adjacent to the various buildings. These bins would generally be collected daily and the contents placed in large waste storage receptacles or dumpsters positioned adjacent to the maintenance workshop to await removal by a licensed industrial waste collection contractor. Industrial waste collection would be undertaken fortnightly, or more frequently, if required.

Separate collection systems would be employed for recyclables such as paper and cardboard, drink containers and ferrous and non-ferrous metals, each of which would be despatched off-site at appropriate intervals.

2.9.1.2 Oils and Greases

Routine maintenance of mining and earthmoving equipment would generally be undertaken in the maintenance workshop within the mine facility area, or at equipment maintenance facilities away from the mine. Within the maintenance workshop, waste oils and grease would be collected and pumped to bulk storage tanks by oil evacuation pumps. Emergency or breakdown maintenance of equipment may also be necessary within the open cut area or on the out-of-pit overburden emplacement. Under these circumstances, oils and grease would be pumped from this equipment to a tank on the service vehicle using an evacuation pump and then transferred to the bulk storage tank at the maintenance workshop. All parts and packaging would be collected and transferred to the maintenance workshop for disposal, or recycling.

Waste oils and grease would be stored in a bunded area at the maintenance workshop and collected by a licensed waste recycling contractor approximately once every two months for recycling.

2.9.1.3 Fencing Materials

Fencing materials removed as part of site establishment would be either set aside for re-use or the wire coiled and delivered to a location or facility that manages metals for recycling.

2.9.1.4 Sewage

NMPL would install adequate toilet and ablution facilities within the site facilities area for the site workforce and visitors. These facilities would incorporate a septic envirocycle sewage system approved by Gunnedah Shire Council and NMPL would irrigate the effluent within a designated area on the “Sunnyside” property. These facilities would be serviced by a licensed waste collection and disposal contractor, as required.

2.10 SAFETY / SECURITY MANAGEMENT

2.10.1 Introduction

NMPL would implement procedures and controls to protect the safety of its own or contracted employees, visitors to the mine, the public as well as local land owners and land users. Measures would also be implemented to ensure the security of the mine facilities and equipment from unauthorised access or use.

It is NMPL's policy that each person employed on or visiting the Project Site is provided with a safe and healthy working environment and to achieve this, NMPL would implement a recruitment, induction and training program to achieve the following objectives.

- To ensure compliance with statutory regulations and maintain constant awareness of new and changing regulations.
- To eliminate or control safety and health hazards in the working environment in order to achieve the highest possible standards for occupational safety.
- To ensure the suitability of prospective employees through a structured recruitment procedure.
- To provide relevant occupational health and safety working practices and job training.
- To conduct regular safety meetings and provide an open forum for input from all employees.
- To provide effective emergency arrangements for all employees and general public protection.
- To maintain good morale and safety awareness through regular employee assessment and counselling, if required.
- To ensure all contractors adopt NMPL's policy objectives and maintain safety standards at all times while working on its premises.
- To develop public awareness of the safety standards and objectives at the proposed Sunnyside Coal Mine.

Central to all aspects of site security and safety at the proposed Sunnyside Coal Mine would be:

- the adoption of a pro-active approach to employee and public safety;
- strict compliance at all times with the requirements of the:
  - Coal Mine Health and Safety Act 2002;
  - Coal Mine Health and Safety Regulations 2006;
  - Dangerous Goods Act 1975;
  - Occupational Health and Safety Act 2000;
  - Occupational Health and Safety regulations 2001;
  - Coal Services Order No. 34;
  - All other relevant legislation and Australian Standards; and
  - WorkCover Authority.

- the prioritisation given to addressing any safety issues identified by an Inspector of Mine Safety Officer or authorised government official; and
- an Occupational Health and Safety Policy to cover all component activities at the mine.

An Occupational Health and Safety Management System and a Major Hazard Management System would be developed for the approval of the Chief Inspector of Coal Mines.

2.10.2 Safety / Security Measures

NMPL would implement the following measures in association with the development of the mine.

(i) Erection or maintenance of stock fencing around the areas of activity within the Project Site and adjacent to the re-aligned section of Coocooboonah Lane. Internal fencing would also be established and/or maintained to enable the continuation of agricultural activities in those areas not designated for mining-related activities or natural regeneration.

(ii) Maintain a lockable gate at the mine entrance at Coocooboonah Lane. This would be the only public access point to the Project Site and would be locked whenever mining and associated activities are not being undertaken within the Project Site.

(iii) Position security/warning signs at strategic locations around or within the Project Site indicating the presence of earthmoving and mining equipment, deep excavations and steep slopes. The positioning of signs would depend on the location of the mining activities at any one time. Signs identifying blasting procedures and times would also be installed adjacent to the mine access road and mine entrance. The signs would be positioned to alert employees/visitors entering the mine site and passing motorists of the proposed time of the blast on or before that day, if one is to be initiated.

(iv) Employee induction in safe working practices and regular follow-up safety meetings and reviews.

(v) Installation of bunds along the margins of internal haul roads created on slopes to a height of half of the height of the largest wheel on site.

(vi) Implement appropriate controls with respect to the use of explosives to ensure compliance with statutory requirements at all times.

(vii) Ensure that NMPL's blasting contractor utilises correct blasting procedures to contain the fragmented rock and to minimise the generation of ground and air vibrations.

(viii) Ensure all earthmoving equipment complies with the Mine Design Guideline (MDG) 15 and is fitted with appropriate safety equipment eg. rollover protection structures and seatbelts, an operating reversing alarm (or other approved warning device) and an approved location and method of operation for the fire suppression system, all of which would be maintained in good condition and operated safely at all times.

(ix) Ensure all size reduction and screening equipment at all times complies with all relevant requirements and standards.

(x) Strictly complying with all mining lease, project approval and licence conditions.

(xi) Erection of advisory signage, such as "Trucks Entering 200m", on public roads prior to intersection with the proposed coal transport route along the re-aligned section of Coocooboonah Lane.

(xii) Ensure all trucks transporting product coal from the mine are roadworthy, well maintained and are driven in a safe and courteous manner.

2.11 REHABILITATION AND DECOMMISSIONING

2.11.1 Introduction

NMPL would adopt a progressive approach to the rehabilitation of disturbed areas within the Project Site to ensure that, where practicable, areas where mining or overburden placement are completed are quickly shaped and vegetated to provide a stable landform. The focus during the progressive formation of the post-mining landform and the establishment of a vegetative cover would be upon re-establishing as much land of comparable land capability as is currently present on site. At the same time, areas would be rehabilitated to improve the local Koala habitat.

2.11.2 Objectives

NMPL's rehabilitation objectives for all areas of mine-related disturbance within the Project Site can be defined in the short term and long term.

In the short term, the objectives would be to stabilise all earthworks, drainage lines and disturbed areas no longer required for mine-related activities in order to minimise erosion and sedimentation, and to reduce the visibility of the activities from surrounding properties and the local road network. Erosion control would be achieved by the early establishment of a ground cover while appropriately positioned tree lot plantings would assist in creating a visual screen to adjacent vantage points.

In the longer term, NMPL's objectives are to:

- provide a low maintenance, geotechnically stable and safe landform, which is commensurate with the agricultural land uses on and around the Project Site;
- blend the created landforms with the surrounding landform;
- revegetate with native tree, shrub and grass species and/or pasture species to enhance or increase Koala habitat in the area; and
- re-establish a small area of the endangered ecological community identified as Native Vegetation on Cracking Clay Soils of the Liverpool Plains that occurs towards the Oxley Highway end of the Coocooboonah Lane re-alignment section of the transportation route.

2.11.3 Final Landform

Figure 2.16 presents the conceptual final landform within the Project Site at the completion of mining and landform reconstruction activities. **Figure 2.17** also shows a cross section of the final landform reflecting the shaped and rehabilitated open cut area, the re-profiled out-of-pit overburden emplacement and coal processing area.

The out-of-pit overburden emplacement would be rehabilitated to create a gently sloping hill in the final landform. The created hill and basin remnant of the open cut area would have slopes no greater than 10^o.

During final site rehabilitation, surplus overburden material that has been stored on the overburden emplacement would be moved to shape the final landform and blend the hill and the basin into surrounding contours.

The crest of the hill formed by the overburden emplacement would be approximately 345m AHD, ie. approximately 15m above current surface levels on its southern side and approximately 25m above current surface levels on the northern side. The base of the depression remaining after rehabilitation of the final void within the open cut area would be at approximately 305m AHD, ie. approximately 40m lower than the current land surface. Surface water would be directed off the overburden emplacement hill and also into the depression via rock flumes. These would prevent gully erosion by dissipating energy and providing a non-eroding surface. Surface runoff water would be directed around the final void.

The final landform would also incorporate a series of contour banks whose spacing and ultimate dimensions would be a function of the final slopes and catchment areas. The spacing and dimensions of these structures would be determined at the time of installation in consultation with the local officers of Soil Services. Spacing of contour banks would typically range between 50m and 100m.

2.11.4 Decommissioning Activities

On cessation of mining and processing activities, a number of structures and facilities would be decommissioned and removed as part of the rehabilitation of the Project Site including:

- the coal processing plant;
- various fuel storage, workshop and ablutions / first aid room; and
- roads not to be maintained in the final landform.

Coal Processing Plant

In the event NMPL does not intend to re-use the plant, they would attempt to identify a buyer for the plant in its entirety or in part. Should NMPL successfully negotiate the sale, the plant would be separated into various sections and transported by road to its intended destination.

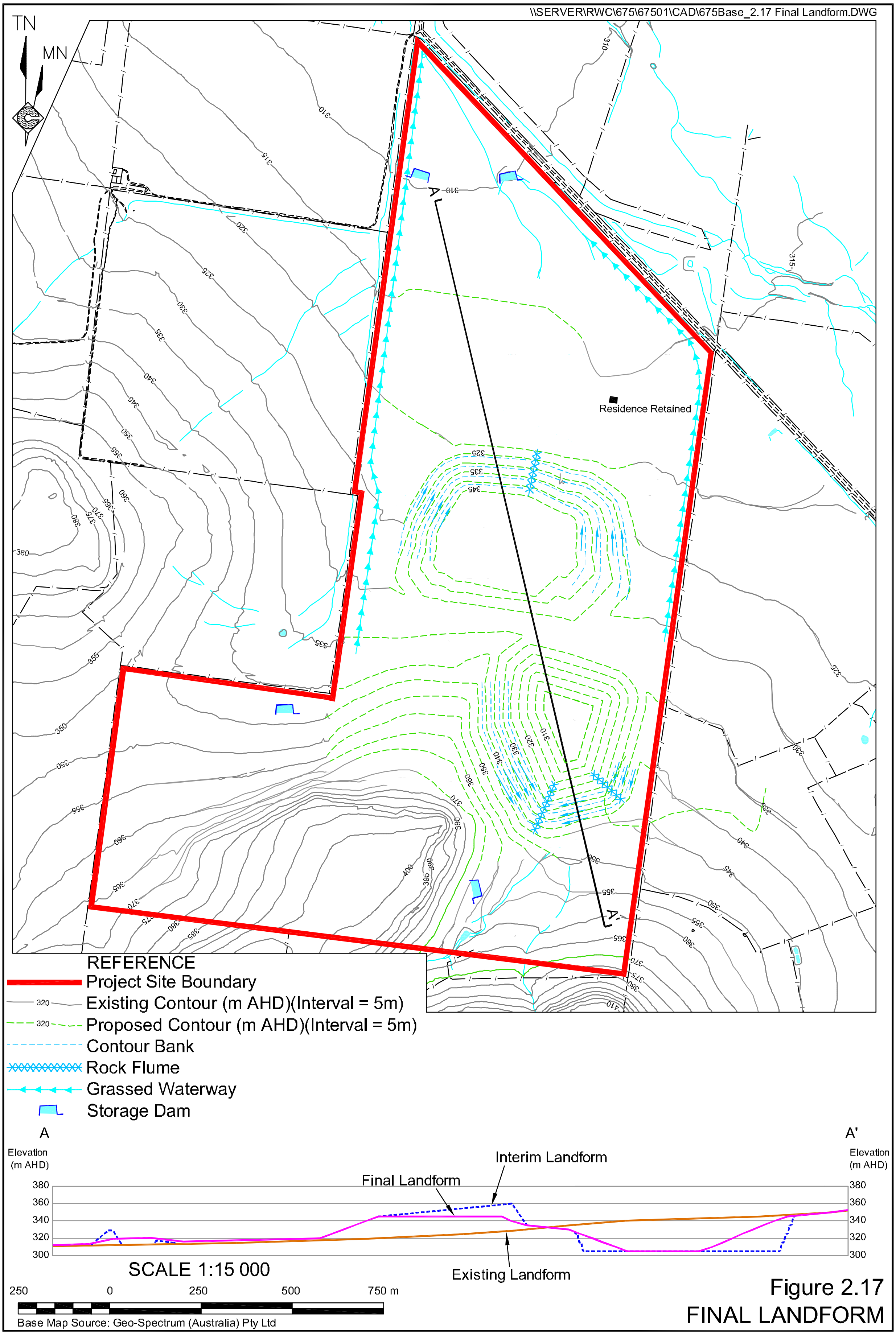

Figure 2.17
FINAL LANDFORM

Following the removal of all retrievable stockpiled coal, the landform within the coal processing area would be profiled to blend with the surrounding landform principally through the reshaping of the amenity bund immediately to the north. Topsoil would be returned and the area seeded and fertilised to enable agricultural activity to be resumed.

Miscellaneous Buildings and Structures

The relocated "Sunnyside" residence would remain in its new location for the resumption of agricultural activities on the "Sunnyside" property. All demountable buildings and structures erected on the Project Site would be transported off site. The workshop constructed on site may be retained for use during the resumption of agricultural activities on site.

A thorough inspection of the soil directly below and surrounding fuel storage and refuelling areas would be conducted to ensure any contaminated soil is identified. NMPL would conduct a Phase 1 Hydrocarbon Contamination assessment and undertake appropriate action as determined by that review. If any contaminated soil is identified at that time, it would be remediated and treated in accordance with DEC requirements.

Roads

The access road to the relocated "Sunnyside" residence would be retained whereas the access to the coal processing area would be rehabilitated and agricultural activity restored. The road material would be removed and placed in the final void area and the stockpiled topsoil originally removed from the road area would be spread across the reformed road alignment.
The re-aligned section of Coocooboonah Lane would be rehabilitated according to the lease agreement with the owner of "Plain View". Coocooboonah Lane would be re-established in its current location and standard. The road base and road surface materials would be ripped up and removed and replaced with the stockpiled topsoil and subsoil originally removed from the new alignment.

2.11.5 Final Land Use

Figure 2.18 presents NMPL's proposed final land use for the "Sunnyside" property. The property would be returned to agricultural use for grazing and cropping rotations. Four of the water storage dams created to manage surface water during site operations would be retained for stock water. Surface runoff would continue to be directed around the final depression within the former open cut area to minimise the amount of water retained in the depression centred on the final void and maximise the amount of water re-directed to other dams on the property.

Following rehabilitation, there would be five main landforms in the areas disturbed by mining and mining-related activities.

(i) The backfilled open cut pit area with contours and grades similar to those which existed pre-mining (covering approximately 50% of the area mined).

(ii) The depression representing the re-shaped final void (also covering approximately 50% of the area mined).

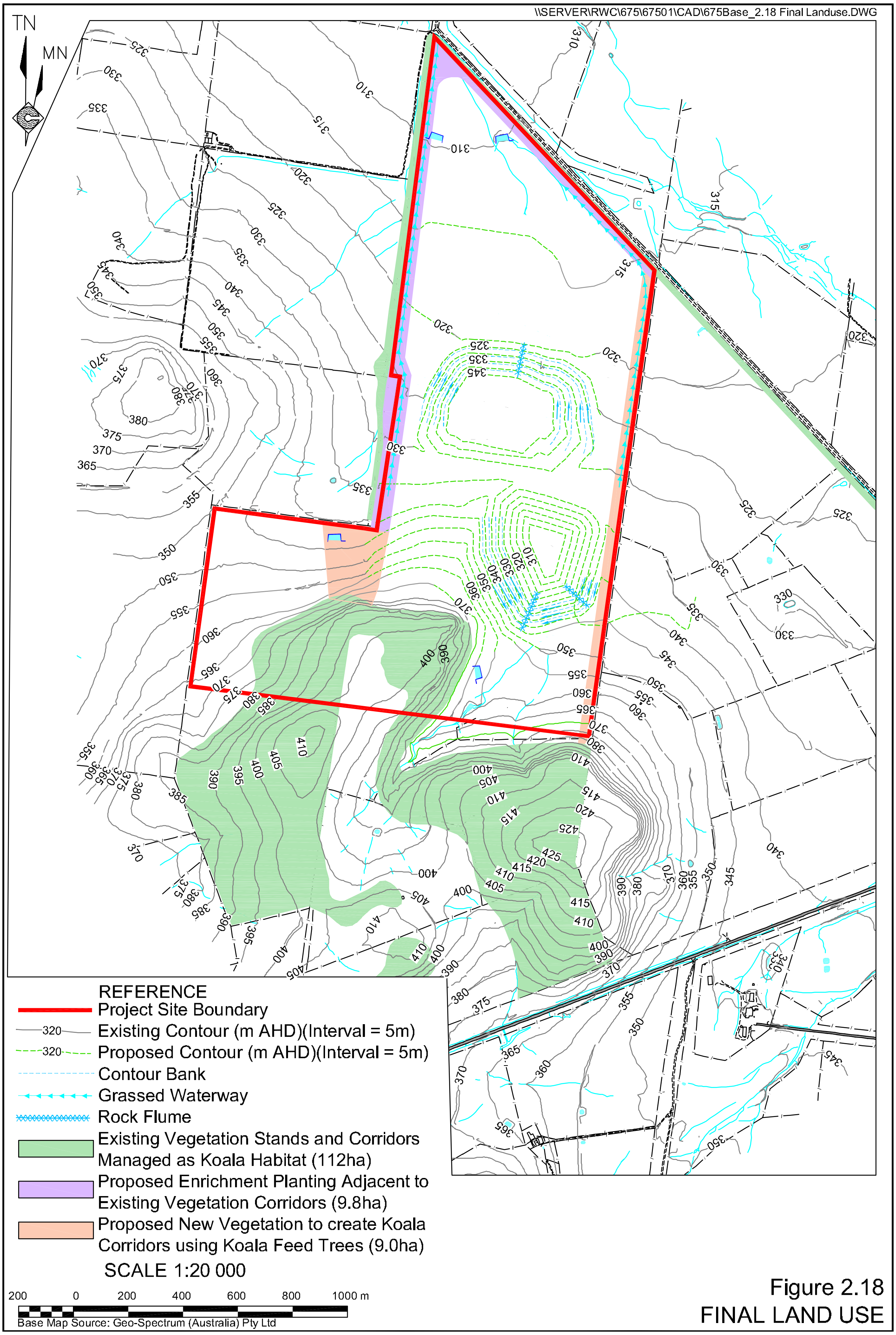

Figure 2.18
FINAL LAND USE

(iii) The mounded area created by the out-of-pit emplacement of overburden.

(iv) The shallow raised area formed by re-profiling the 15m amenity bund across the coal processing area.

(v) Those areas relatively undisturbed during the mining process which would be readily returned to agricultural use.

The backfilled open cut pit area would have land capability and agricultural land suitability similar to pre-mining levels.

The mounded area covering approximately 25.4ha would have land capability classifications of Class III (8.7ha) and Class VI (16.7ha). Class III land is *sloping land suitable for cropping on a rotational basis. Structural soil conservation works such as graded banks, waterways and diversion banks together with soil conservation practices such as conservation tillage and adequate crop rotations are required*. Class VI land is *land not suitable for cultivation, but suitable for grazing with use of soil conservation practices such as limitation of stock, broadcasting of seed and fertilizer, fire prevention and destruction of feral animals.*

The mounded area would have an agricultural land suitability classification of Class 3 (8.7ha) and Class 4 (16.7ha). Class 3 land is *grazing land that is well suited to pasture improvement. It may be cultivated or cropped in rotation with pasture*. Class 4 land is *suitable for grazing but not for cultivation. Agriculture is based on native pastures established using minimum tillage techniques*.

The depression would have an agricultural land suitability classification of Class 5. This is *land unsuitable for agriculture or at best suited only to light grazing. Agricultural production, if any, is low due to major environmental constraints.* There would be approximately 19.8 ha of Class 5 land at the conclusion of rehabilitation.

The depression located within the final void covering approximately 18.4ha would have a land capability classification of Class VIII. Class VIII land *includes cliffs, lakes and swamps and other lands incapable of sustaining agricultural or pastoral production*.

There would be approximately 3.1ha of Class VII at the conclusion of the Project. Class VII land is *land best protected by green timber. It generally comprises areas of steep slopes, shallow soils and / or rock outcrop. Adequate ground protection must be maintained by limiting grazing and minimising damage by fire*.

Trees would be planted along the northern, eastern and western property boundaries. These would provide wind breaks and weather shelter for grazing stock. The tree species planted would ultimately provide Koala habitat enhancement and upgrade Koala movement corridors in the local area. The elevated areas on the southern end of the property would be managed as Koala habitat.

The relocated “Sunnyside” residence would be retained in its new location and would provide accommodation on the property.

2.11.6 Rehabilitation Procedures

All rehabilitation activities would be undertaken progressively throughout and at the conclusion of the life of the mine. This would ensure that the direct transfer of subsoil and topsoil is maximised and the area of land remaining to be rehabilitated at the end of the mine life is minimised.

2.11.6.1 Overburden Emplacements and Open Cut Areas

Rehabilitation of areas disturbed as a result of mining or overburden placement activities would be undertaken in the following five stages.

Stage 1. Overburden Placement and Shaping

Placement and shaping of the overburden to create slopes with gradients less than 10^{o} would be undertaken in a manner which, wherever practicable, ensures that any friable or weathered materials are placed below the subsoil and topsoil layers as a cover over the more competent materials. This would avoid the exposure of large rocks on the final surface. An initial assessment of overburden materials did not identify any risk of acid generation or soluble salt formation and consequently, no specific handling or storage requirements would be required.

Stage 2. Subsoil and Topsoil Replacement

Subsoil and topsoil would be placed on the shaped landform in the reverse order to stripping, ie. subsoil then topsoil, with the materials being preferentially sourced from active stripping areas. If no such activity is being undertaken at the time, the soil material would be sourced from previously established stockpiles. The thickness of the topsoil and subsoil layers to be replaced would be determined on the basis of the actual volumes of these materials stripped as part of the mining activities. The subsoil layer would be spread on an even but roughened surface which has been ripped along the contour to break any compacted and/or smooth surfaces. Ripping would also assist the keying of the subsoil materials into the final land surface, encouraging ingress of water and minimising erosion.

Stage 3. Drainage Installation

Contour banks would be progressively installed on the rehabilitated landform. The dimensions of the individual banks would be determined on the basis of the individual sub-catchment areas, but would be typically less than 0.7m high and less than 3.0m^2 cross sectional area. Flumes would be constructed on the slopes of the final landform within the area of the former open cut and overburden emplacement to assist in controlling the flow of water off these slopes.

Stage 4. Agricultural Land Pasture Sowing

The topsoiled surface of those areas designated for a post-mining agricultural land use would be sown with a mixture of pasture species appropriate for the season. The seed mix would include fast growing short-lived species and perennial grasses and legumes. **Table 2.9** contains a proposed pasture mix for cool and warm seasons. The actual seed and fertilizer mix would be determined in conjunction with agronomists from the local Department of Primary Industries - Agriculture (DPI-Ag).

Stage 5. Native Vegetation Establishment

The topsoil surfaces of those areas designated for a post-mining Koala habitat enhancement land use (**Figure 2.18**) would be initially stabilised with a non-persistent cover crop. A selection of locally occurring tree, grass and groundcover species would then be planted on those sections. The seed for these species would be collected from plants occurring on the southern side of the "Sunnyside" property. The seed would be used to raise nursery stock in WCM's native plant nursery located adjacent to the Whitehaven CHPP and Rail Loading Facility. This nursery is operated in conjunction with the local TAFE College and the Red Chief Local Aboriginal Land Council. The list of suitable tree species is included in **Table 2.10** and a list of suitable native grasses and ground covers is included in **Table 2.11**. Subject to the extent of establishment of natural vegetation from replaced topsoil, seed of locally occurring shrub species may also be broadcast to encourage the re-establishment of the shrub layer.

All areas identified for Koala habitat re-establishment would be fenced and all farm livestock excluded.

Table 2.9
Pasture Species Seed Mix

Season	Pasture Species	Rate (kg/ha)	Fertilizer
Warm Season Grasses	Bombatsi Panic	1-2	250kg/ha Di-ammonium phosphate
	Green panic*2	2-4	
	Rhodes Grass*2	1-2	
	Purple Pigeon Grass	1-2	
Annual Legumes	Subterranean Clover	4-5	
Cool Season Legumes*1	Barrel (Sephi) medic	2-4	
	Snail (sava) medic*2	3-5	
	Wooly Pod Vetch	4-6	
	Serradella (Elagara)	1-2	
	Lucerne	0.5	
Cool Season Grasses	Phalaris (Sirolan or Holdfast)	1-2	
	Wallaby Grass	0.3-1	

Notes: *1 Inoculated with appropriate rhozobia *2 Specific Soil Conservation application

The southeastern final highwall of the open cut area may need to be reduced in height and grade through a program of blasting following the completion of all open cut and auger mining activities.

Table 2.10 lists the tree species that would provide the basis for all site revegetation including three species known to be Koala feed trees.

Table 2.10
Tree Species Suitable for Revegetation

Scientific Name	**Common Name**
Brachychiton populneus	Kurrajong
Acacia cheeli	Motherumbah
*Eucalyptus populnea**	Poplar Box
Alphitonia excelsa	Red Ash
Eucalyptus dealbata	Tumble-down Red Gum
*Eucalyptus albens**	White Box
Calitris glaucophylla	White Cypress
Geijera parviflora	Wilga
*Eucalyptus melliodora**	Yellow Box
* Denotes Koala feed tree	
Source: Geoff Cunningham Natural Resource Consultants	

Table 2.11
Native Grass and Groundcover Species Suitable for Revegetation

Scientific Name	**Common Name**
Red Soil Country	
Elymus scaber	Common Wheatgrass
Austrostipa verticillate	Slender Bamboo Grass
Austrostipa setacea	Speargrass
Austrostipa nitida	Speargrass
Enteropogon acicularis	Curly Windmill Grass
Chloris truncate	Windmill Grass
Aristida ramose	Wiregrass
Cymbapogon refractus	Barbed-wire Grass
Einadia nutans	Climbing Saltbush
Sida corrugate	Corrugated Sida
Calotis lappulacea	Yellow Burr-daisy
Bracteantha bracteate	Golden Everlasting
Chrysocephalum apiculatum	Yellow Buttons
Black Soil Country	
Austrostipa aristiglumis	Plains Grass
Dichanthium sericeum	Queensland Bluegrass
Elymus scaber	Common Wheatgrass
Enteropogon acicularis	Curly Windmill Grass
Eulalia aurea	Silky Browntop
Themeda avenacea	Tall Oat Grass
Source: Geoff Cunningham Natural Resource Consultants	

These trees would be planted in a manner that results in a tree species mix consistent with SEPP 44 and Circular B35 definitions of Koala habitat. The replanting would ensure there is >15% Koala feed trees in the planting mix. The health and survival of the trees would be monitored and monitoring would also confirm retention of the Koala habitat status. Dead trees would be replaced and the replacement species mix would be compiled to ensure retention of the Koala habitat status.

Table 2.11 lists the native grass and groundcover species for which seed is relatively easy to collect and which can be grown in a nursery. These species would be used in the revegetation program.

2.11.6.2 Water Management Structures

Where practicable, water management structures such as contour banks and drains would be constructed with longitudinal gradients, which permit the transfer of water at non-erosive velocities ie. <1:200 (V:H). Consequently, specialised rehabilitation treatments would generally not be required. Similarly, flumes constructed on the slopes of the out-of-pit emplacement and final void would be retained and allowed to revegetate naturally. However, in the event that unacceptable levels of erosion are observed, fast growing species identified as having a particular soil conservation application and/or specialised treatments such as bitumen/jute meshing or rock lining would be implemented.

2.11.6.3 Other Disturbed Areas

On completion of all mining-related and associated activities, NMPL would:

- remove, rip or otherwise rehabilitate all on-site roads not required for ongoing management of the property;
- rip the compacted rock on hardstand areas, shape the area to the designed landform, replace previously stockpiled subsoil and topsoil and apply seed and fertilizer;
- install appropriate drainage controls; and
- re-install fencing and gates at appropriate locations.

2.11.7 Rehabilitation Monitoring and Maintenance

NMPL would undertake an ongoing monitoring and maintenance program throughout and beyond the operation of the proposed Sunnyside Coal Mine. Areas being rehabilitated would regularly be inspected and assessed against the short and long term rehabilitation objectives outlined in Section 2.11.2. During regular inspections, aspects of rehabilitation to be monitored would involve:

- evidence of any erosion or sedimentation from areas with establishing vegetation cover;
- success of initial grass cover establishment;
- success of tree and shrub plantings and direct seeding;
- adequacy of drainage controls; and
- general stability of the rehabilitation site.

Where rehabilitation success appears limited, maintenance activities would be initiated. These may include re-seeding, and where necessary, re-topsoiling and/or the application of specialised treatments such as composting mulch to areas with poor vegetation establishment. Tree guards would be placed around planted seedlings should grazing by native animals be excessive. If drainage controls are found to be inadequate for their intended purpose or compromised by grazing stock or wildlife, these would be replaced and/or temporary fences installed to exclude grazing of native vegetation by native or domestic fauna.

Should areas of excessive erosion and sedimentation be identified, remedial works such as importation of additional fill, subsoil or topsoil material or redesigning of water management structures to address erosion would be undertaken.

It is envisaged post-mining rehabilitation monitoring and maintenance would be undertaken for at least 3 years following the completion of all rehabilitation. The exact period would reflect seasonal conditions during that period. In any event, maintenance would continue until such time as the objectives have been achieved.

2.11.8 Noxious Weed Management

NMPL would take the necessary precautions to prevent excessive development of weeds within the rehabilitated areas. When appropriate, this would include campaign weed spraying prior to the stripping of topsoil. The appropriate noxious weed control or eradication methods and programs would be undertaken in consultation with the DPI-A and/or the local Gunnedah Shire Council Noxious Weeds Inspector.

2.11.9 Offset Strategies

The Project does not involve significant clearing of native vegetation. However, it has the potential to affect a local Koala population. NMPL acknowledges the presence of a healthy Koala population within and around the "Sunnyside" property and the importance of existing vegetation areas for fauna habitat on unaffected parts of the "Sunnyside" property. NMPL commissioned the preparation of a Koala Management Plan (Refer Part 3B of the *Specialist Consultant Studies Compendium*) and is committed to implementing the Plan.

Implementation of this Plan would provide additional habitat for the local Koala population and would also enhance existing, and provide new, corridors of suitable vegetation that provide food and cover for the Koala. **Figure 2.18** shows tree planting and vegetation management actions proposed to achieve these objectives. Those proposals can be divided into three categories as follows.

- Manage existing vegetation stands and corridors as Koala habitat.
- Plant new areas with Koala feed species to establish new vegetation corridors.
- Plant Koala feed species adjacent to and within existing vegetation corridors. Those enrichment plantings would enhance the corridors.

NMPL Koala Management proposals would protect 112ha of existing Koala habitat, improve corridors by enrichment planting on the western boundary of the Project Site (9.8ha) and new plantings on the eastern boundary (9.0ha). In these areas, the corridor would have a minimum width of 40m, ie the width recommended by Dr Kevin Mills (pers.comm..)

The Koala habitat areas would be fenced to exclude livestock. This fencing would be a mix of fencing types constructed to ensure that it does not prevent dispersal and movement of Koalas nor constitute a hazard to their wellbeing. For example, barbed wire would not be included in the fence construction. It is proposed to build a Koala proof fence to isolate the mining area.

This fence would be cyclone mesh with a loose overhanging top section to prevent Koala access into the area. All other corridor fencing would not prevent Koala migration, but would prevent livestock access.

These proposals would provide a long term beneficial result for the local Koala population.

2.12 DEVELOPMENT ALTERNATIVES

2.12.1 Introduction

An *Environmental Assessment* needs to analyse any feasible alternatives to carrying out the proposed development or activity, having regard to its objectives, including the consequences of not carrying out the development or activity. The following alternatives were considered by NMPL during the planning stages for the Project but were rejected in favour of the components incorporated earlier in this section.

The "no development" option, ie. the consequences of not developing the proposed Sunnyside Coal Mine, are discussed in Section 6 of this document.

The consideration of feasible alternatives to the activities proposed relate principally to:

- the Project Site layout and design;
- the proposed coal transport route; and
- Coocooboonah Lane.

2.12.2 Project Site Layout

Mining the open cut from the western side of the pit towards the east was preferred because initial surface mining activity commenced at the furthest distance possible from the "Lilydale" residence to the south of the Project Site. This provided benefits in relation to reduced noise levels, visual impact matters and reduction in likely dust levels.

2.12.3 Proposed Coal Transport Route

A number or potential coal transport routes between the Sunnyside Coal Mine and the Whitehaven Rail Loading Facility were identified and assessed. **Figure 2.19** shows the alternative coal transport routes considered together with the preferred route along a re-aligned Coocooboonah Lane, Oxley Highway, Blackjack Road, Quia Road and Torrens Road (**Coal Transport Route Option 1**).

Coal Transport Route Option 2 involved a potential link to the Oxley Highway via a new access road constructed through the southern sector of the "Sunnyside" property. This route was rejected because of:

- poor site access at the intersection of the access road with the Oxley Highway;
- the access road would pass through Koala habitat;

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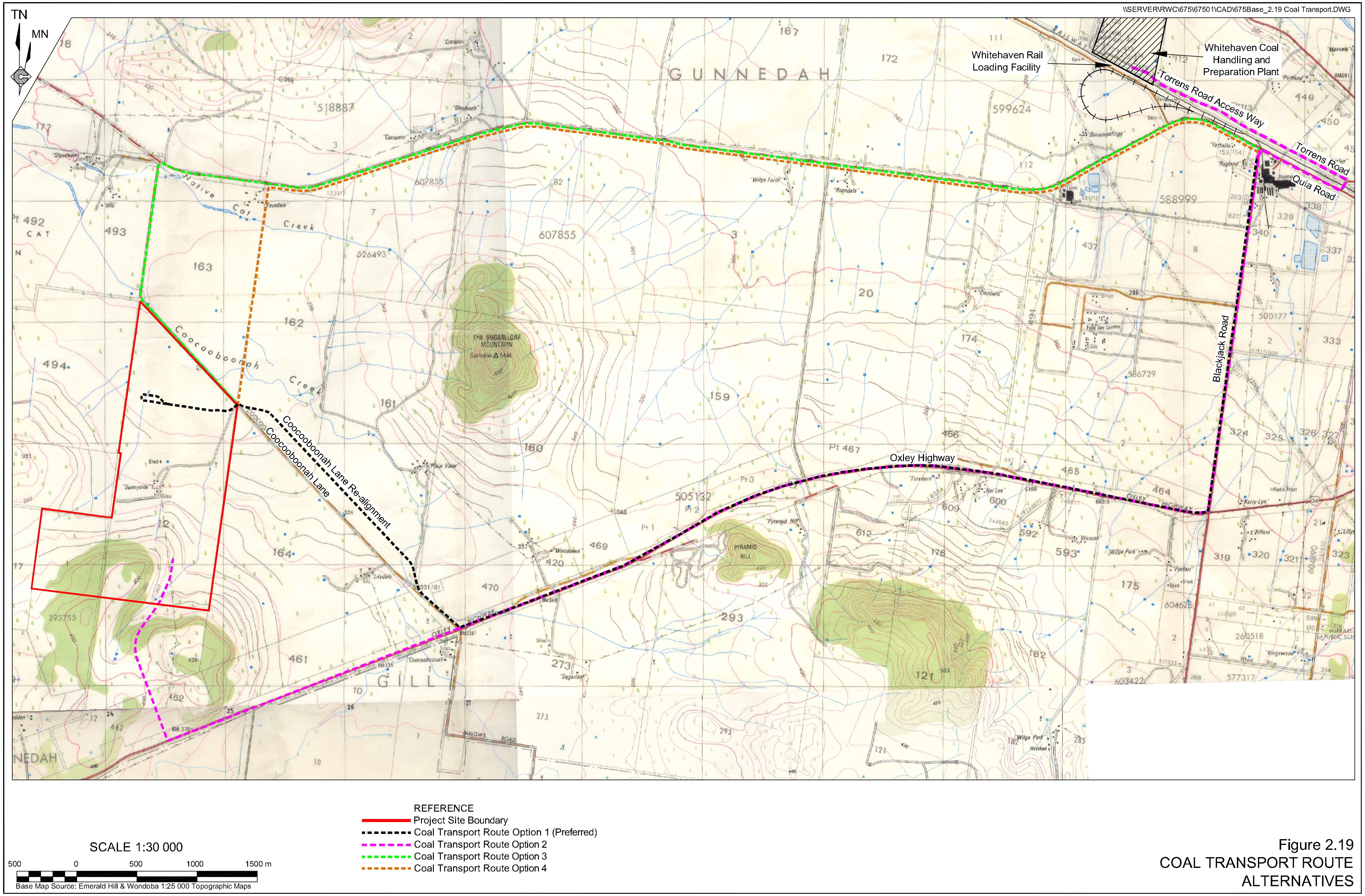

Figure 2.19
COAL TRANSPORT ROUTE ALTERNATIVES

Figure Prepared by R.W. Corkery & Co. Pty Ltd

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- there are a number of surface archaeological scatters near the potential access track through the southern part of the property; and
- the access track would ascend and descend a significant rise in topography resulting in increased fuel consumption.

Coal Transport Route Option 3 involved trucking along Coocooboonah Lane northwards towards Quia Road and travelling eastwards along Quia Road back towards Gunnedah, beneath the rail underpass and along Torrens Road to the Whitehaven Rail Loading Facility. This route was rejected because of:

- the likelihood of potential damage to Koala habitat along Coocooboonah Lane;
- the extensive road improvement works that would be required along Coocooboonah Lane and Quia Road; and
- the numerous residences along Quia Road that would be potentially affected by the coal transportation.

Coal Transport Route Option 4 involved a variation to Option 3 by providing access through a private property to Quia Road. This Option would have reduced the total coal transport distance, however, it was rejected on the basis of:

- private property access issues; and
- residence amenity issues.

The preferred coal transport route effectively maximises the use of the State highway network, minimises the use of the local roads and passing many residences.

2.12.4 Coocooboonah Lane

Coocooboonah Lane road reserve contains a corridor of remnant Koala habitat. Road works to upgrade the Lane to enable the safe transportation of coal would result in destruction of this remnant habitat. In order to avoid this destruction, NMPL has reached an agreement with the owner of the "Plain View" property to construct and use an alternative alignment of the lane for the duration of the Sunnyside Coal Mine. This alignment is shown on **Figure 2.15**.

NMPL originally proposed an intersection between the site access road and Coocooboonah Lane that required local traffic on the Lane to give way to mine-related traffic using the access road. This configuration enabled the intersection to be constructed without removing any mature trees from the edge of the Lane. It also reflected the significant difference between mine-related traffic volume and the relatively small volume of local traffic. Following consultation with the RTA, the intersection layout was modified to provide priorities for traffic on the lane over mine-related traffic. The proposed alignment shown in **Figure 2.15** shows this modified arrangement. The modified arrangement would require the removal of approximately three mature trees from the edge of Coocooboonah Lane.

Once coal transportation has ceased, Coocooboonah Lane would be returned to its current alignment and the temporary alignment would be rehabilitated.

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