

# Section 2

## Description of the Proposal

---

*This section outlines the Proponent's objectives and proposal for the development and operation of the proposed East Boggabri Coal Mine. The coal resource is described and the mining operation and sequence, together with processing activities, are detailed. This section also describes the Proponent'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 proposal.*

*The proposal 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 the Proponent would implement to protect and manage surface water, groundwater, soil, noise, air quality, Aboriginal heritage, flora and fauna and other components of the local environment are set out in Section 4 of this document.*

---



This page has intentionally been left blank



## 2.1 INTRODUCTION

### 2.1.1 Objectives

The Proponent's objectives for the development and operation of the proposed East Boggabri Coal Mine are to:

- (i) develop and operate a safe mine producing low ash, thermal and/or semi-soft coking coal;
- (ii) commence production by early 2006 to achieve an initial combined production from the proposed East Boggabri Coal Mine and Whitehaven Coal Mine of approximately 2 million tonnes per annum (2Mtpa), ie. within the approved limit of the Whitehaven CHPP and rail loading facility. The combined production for all WCM mines in the Gunnedah area is ultimately planned to reach approximately 3.1 Mtpa;
- (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 and domestic markets for the coal produced;
- (vi) provide a boost to the local economies of Boggabri and Gunnedah and their 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; and
- (viii) achieve the above objectives in a cost-effective manner and thereby ensure the ongoing viability of the proposed mine.

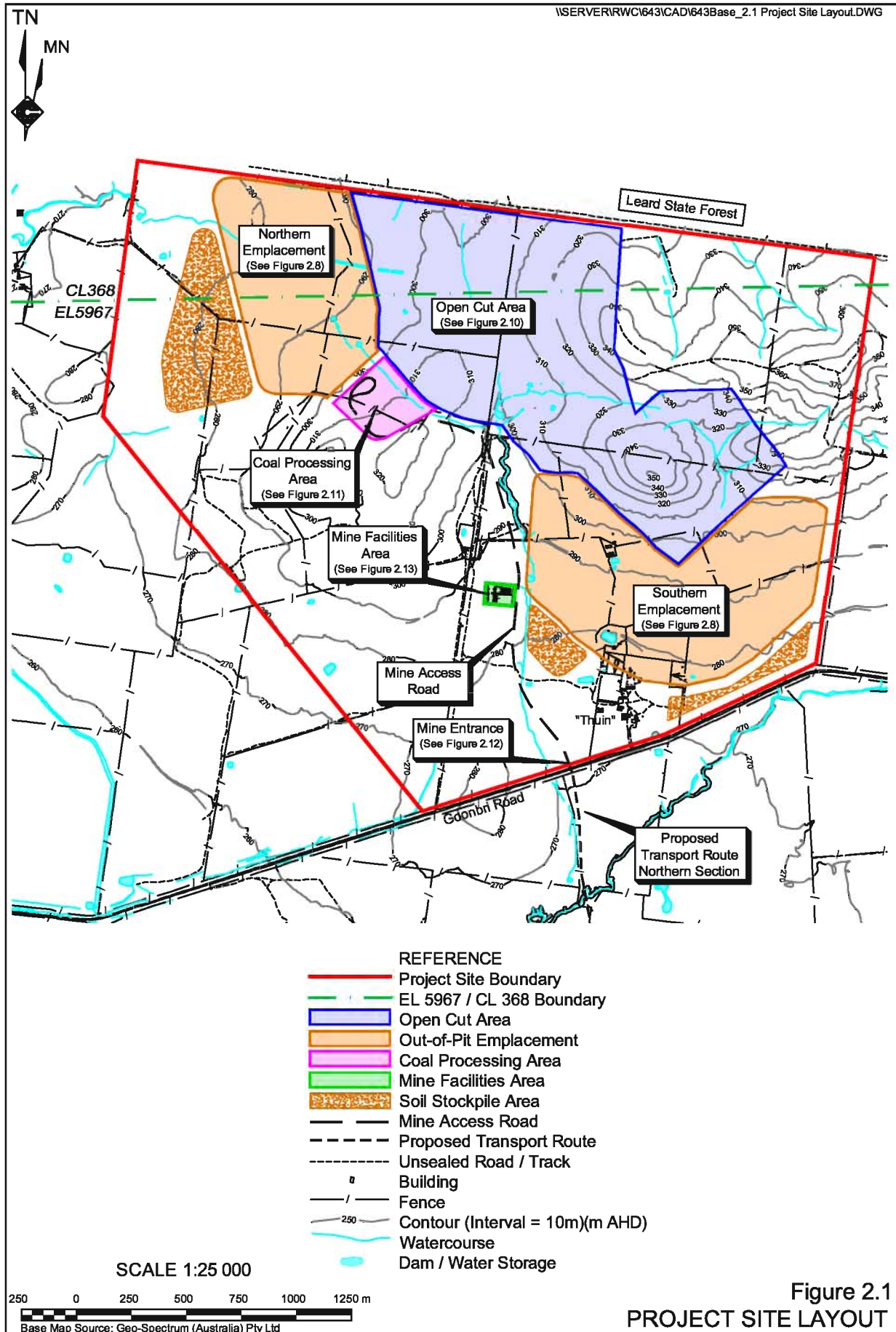
### 2.1.2 The Project Site Layout

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

- The open cut area and overburden emplacements.
- Mine facilities area.
- Coal processing area including a coal processing plant and coal stockpile areas.
- The mine entrance and mine access road.
- Soil stockpile areas.

For the purposes of describing the proposed activities, the area covering the open cut area, out-of-pit overburden emplacements, soil stockpiling, coal processing and mine facilities areas is referred to as the "mine area". The Project Site contains other areas where drainage and surface water management features would be installed as well as areas which would remain undisturbed and act as offsets to the proposed coal mine development.





### 2.1.3 The Proposed Transport Route

The proposal includes the transportation of ROM product coal between the Project Site and the Whitehaven Coal Handling and Preparation Plant (CHPP) and rail loading facility. The proposed route would incorporate existing public roads, the construction of private roads and the existing coal transport route between the product coal bin at the Whitehaven Coal Mine and Whitehaven CHPP. Throughout the EIS, that part of the proposed transport route between the Project Site and the existing coal transport route is referred to as the “northern section”, whereas that part of the proposed transport route which coincides with the existing transport route between the product coal bin at the Whitehaven Coal Mine and Whitehaven CHPP is referred to as the “southern section”.

Section 2.6 provides greater detail on the location, orientation and construction of the proposed transport route.

### 2.1.4 Outline of the Proposal

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

- Construction of a mine entrance on Goonbri Road and a mine access road from Goonbri Road to the coal processing area.
- Coal mining by open cut mining methods over an area of approximately 160ha 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 Section 2.3.
- Programmed placement of overburden and interburden materials from the open cut area to a combination of out-of-pit and in-pit overburden emplacements.
- On-site crushing and temporary stockpiling of the mined coal within a defined coal processing area southwest of the open cut area.
- Establishment of a transport route between the Project Site and the Whitehaven CHPP and rail loading facility with the importation of road construction materials from the Whitehaven Coal Mine.
- Transportation of coal from the Project Site to the Whitehaven CHPP for washing and/or despatch to export markets via rail to the Port of Newcastle.
- Backloading of coarse reject material from the Whitehaven CHPP for placement in the mined out areas of the proposed East Boggabri Coal Mine.
- Installation of a range of services, structures and transportable buildings.
- Progressive shaping and rehabilitation of the mine area and other areas of disturbance.

In addition to these activities, the proposed mine would be operated with comprehensive systems to manage groundwater, surface water, noise, blasting, air quality, visibility, Aboriginal heritage, flora and fauna.



## 2.1.5 Approvals Required

The following approvals are required from the consent authority and government agencies recognised as “approval bodies” in order for the proposed East Boggabri Coal Mine to proceed.

- (i) **Development Consent – Minister for Infrastructure and Planning.** Development Consent is required under Section 76A 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 Conservation.** An environment protection licence is required under Section 47 of the *Protection of the Environment Operations Act 1997* to develop and operate the proposed East Boggabri Coal Mine.
- (iii) **Part 3A Permit - Department of Infrastructure, Planning and Natural Resources.** A Part 3A Permit is required under Section 22(b) of the *Rivers and Foreshores Improvement Act 1948* as the northern section of the proposed transport route would require the crossing of Bollol Creek, Driggle Draggie Creek and other local watercourses identified on the Boggabri 1:25 000 Topographic Sheet.
- (iv) **Road Construction Permit – Narrabri Shire Council.** Approval of Narrabri Shire Council is required under Section 138 of the *Roads Act 1993* in order to carry out road modification work at the proposed mine entrance from Goonbri Road and the construction of public/private road intersections between the Project Site and the Whitehaven Coal Mine.
- (v) **Water Licence – Department of Infrastructure, Planning and Natural Resources.** A licence is required under Section 116 of the *Water Act 1912* to permit the extraction of groundwater during mining activities. As part of the proposal, the Proponent anticipates the extraction of up to 20ML of groundwater from established or constructed bores.
- (vi) **Water Licence – Department of Infrastructure, Planning and Natural Resources.** A licence is required under Section 10 of the *Water Act 1912* to enable the Proponent to construct dams for the collection of water for dust suppression purposes (within the maximum harvestable right relevant to the land owned by the joint venture partners).
- (vii) **Section 90 Permit – Department of Environment and Conservation.** A permit to disturb two identified Aboriginal heritage sites is required under Section 90 of the *National Parks and Wildlife Act 1974*.

As the coal is owned by the Crown, the Proponent requires a mining lease issued by DPI (MR), under Section 51 of the *Mining Act 1992* to recover the coal within the defined open cut. The Proponent intends to apply for a mining lease the boundaries of which would be coincident with or lie within, the boundary of the Project. It is noted that development consent is a pre-requisite for the granting of a mining lease.



Further approvals would be required in accordance with Section 134.1(h) of the *Coal Mines Regulation Act 1982* (relating to the commencement of operations) and the *Mining Act 1992* (relating to the preparation of a Mining Operations Plan) in order to permit the approved open cut mining activities to commence. An approval under Section 126 of the *Coal Mines Regulations Act 1982* is also required prior to the placement of coarse reject material from the Whitehaven CHPP within the void within the proposed open cut area.

The Proponent would have any buildings constructed on the Project Site certified by Narrabri Shire Council. Following the receipt of development consent, the Proponent would also seek approval for the installation of a septic system on the Project Site from Narrabri Shire Council.

## 2.1.6 Project Timetable

**Table 2.1** provides an indicative project timetable that the Proponent hopes can be followed from submission of the development application in mid May 2005, through to the sale and despatch of the first coal products in January 2006.

**Table 2.1**  
**Indicative Project Timetable**

Activity	2005									2006
	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	
Submission of DA and EIS	◆									
DA & EIS Exhibition and request for submissions from the community and government agencies	◆	◆								
Review of submissions by DIPNR and approval bodies		◆	◆							
Assessment of DA, Compilation of Draft/Final Development Consent Conditions, Determination of DA		◆	◆	◆						
Consideration of mining lease application and other applications for approvals / licences, issue of mining lease, approvals and licences		◆	◆	◆	◆					
Preparation of Mining Operations Plan and related documentation				◆	◆					
Mobilisation of mining equipment and construction of on-site infrastructure and facilities						◆	◆			
Commencement of mining activities								◆		
Construction of mine associated infrastructure						◆	◆			
Construction of northern section of the transport route						◆	◆			
Installation of coal processing equipment							◆	◆		
Initial product sale and despatch									◆	
◆ Start of period for nominated activity      ◆ Indicative conclusion of nominated activity										



## 2.2 RESOURCE ASSESSMENT

### 2.2.1 Exploration

In the late 1970s and early 1980s, Amax-BHP undertook an exploration campaign within the Maules Creek Sub-basin of the Gunnedah Coal Basin which included 34 drillholes and the preparation of a geological model and database of the area. WCM reviewed the Amax-BHP information in 2002 and, based on this review, applied for an Exploration Licence (EL) over part of this area. EL 5967, granted to WCM on 24 July 2002, covers an area of 1 100ha and incorporates the western edge of the Maules Creek Sub-basin where it adjoins the Boggabri Ridge.

Between July and December 2002, a drilling program comprising 32 drillholes with intervals of 200m to 500m was undertaken within the area covered by EL 5967. In 2004, WCM completed a further six drillholes on the adjoining Coal Lease (CL) 368 on behalf of the East Boggabri joint venture. Data from a drilling program of ten drillholes was already available from this area of CL 368. The exploration history is summarised in **Table 2.2**.

**Table 2.2**  
**Exploration History within EL 5967 / CL 368**

Company	Date	Location	Program	Comments
Amax-BHP	late 1970s – early 1980s	EL 5967 (approx.)	34 drillholes	included a geological model and database
IBC	pre 2004	CL 368	10 drillholes	
WCM	July – December 2002	EL 5967	32 drillholes	5 cored 27 non-cored
WCM / IBC	2004	CL 368	6 drillholes	2 cored 4 non-cored

Source: Whitehaven Coal Mining Limited

The locations of all drillholes referenced in **Table 2.2** are presented on **Figure 2.2**.

Exploration activities identified eight coal seams mineable by open cut methods. The identified seams are listed in descending order.

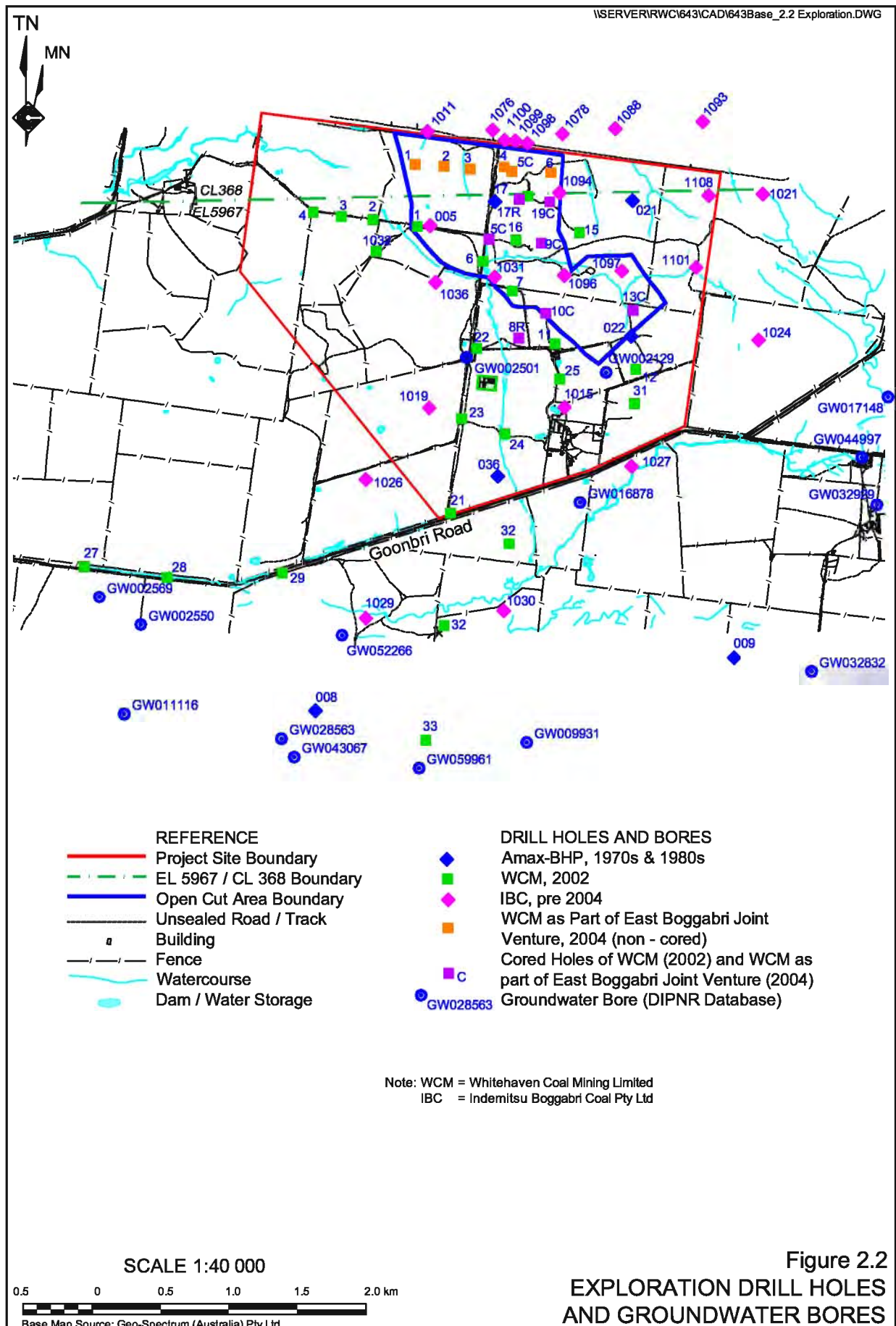
- Braymont (BR)
- Bollo Creek (BC)
- Jeralong (JE)
- Jeralong (lower) (JEL)
- Merriown (ME)
- Merriown (lower) (MEL)
- Veryama (VE)
- Nagero (NA)

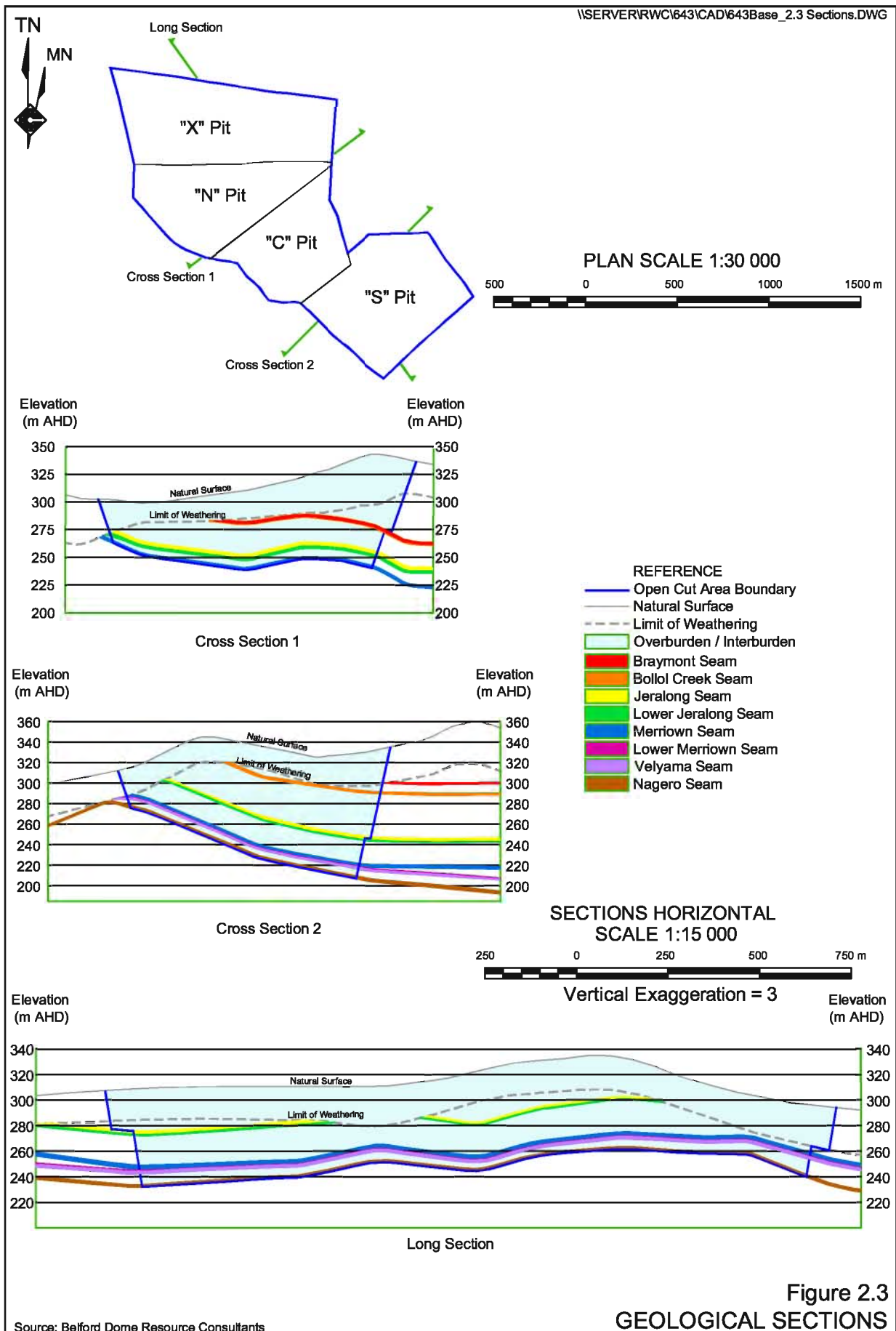
Additional coal seams lie at depths in excess of 40m below the Nagero Seam and while not amenable to open cut mining, these seams may have potential for future underground development.

### 2.2.2 Coal Resources and Reserves

**Figure 2.3** presents a long section (northwest-southeast) and two cross sections (northeast-southwest) through the proposed open cut area which illustrate the structure and relationship between the eight coal seams to be mined.







The total thickness of the coal to be mined (BR Seam to NA Seam) is approximately 20m with the depth below the natural land surface varying between 20m and 120m. The uppermost coal seams within the sequence (BR Seam and BC Seam) contain only limited quantities of coal but would form part of the total resource. Significantly greater quantities of coal are present within the JE, ME, VE and NA Seams. With the exception of an interburden layer of approximately 20m between the JE Seam and ME Seam, the coal seams are generally separated by interburden ranging in thickness from 1m to 10m.

At the request of WCM, Steffen Robertson and Kirsten (Australasia) Pty Ltd trading as SRK Consulting (SRK) prepared an assessment of the coal resources of EL 5967 and selected parts of CL 368 with specific reference to the proposed development of East Boggabri Coal Mine (SRK, 2004). The purpose of the estimation was to provide an objective assessment of geology and coal quality data, and determine the categorisation of the coal resource. The resource calculations have been endorsed by a competent person with appropriate qualifications to comply with the requirements of the Australasian JORC Code (1999) for reporting. Based on an average overburden / interburden to coal ratio of 7.2:1 (bcm:tonne) and the resource calculations of SRK (2004), Roche Mining calculated the recoverable coal quantity from the eight seams to be mined to approximate 12.4Mt. **Table 2.3** presents the recoverable coal quantities calculated for each seam.

### 2.2.3 Coal Quality

As part of the cored drilling programs conducted by WCM, coal quality sampling was undertaken by consultant geologist, Mr Jeffrey Beckett (of Belford Dome Resource Consultants), in accordance with accepted best practice. The core was logged for lithology and basic geotechnical features, and generally sealed within 30 minutes of the core being exposed from the core barrel in order to achieve an accurate moisture analysis. The samples were retained until down-hole geophysical logs were available to verify core recovery. Only core with more than 95% recovery was analysed and used in the determination of coal quality characteristics.

**Table 2.3**  
**Recoverable Coal Quantities and Quality**

Coal Seam	Recoverable Coal (t)	Density	Moisture (%)	Ash (% adb)	Volatile Matter (% adb)	Specific Energy (kcal/kg) @	Total Sulphur (% adb**) @
Braymont (BR)	260 000	1.32	3.5	6.9	36.0	7 400	0.39
Bollol Creek* (BC)	22 000					7 400	
Jeralong (JE)	1 958 000	1.34	4.4	6.7	34.4	7 400	0.35
Jeralong (lower) (JEL)	625 000	1.42	3.2	22.8	34.0	7 400	0.35
Merriown (ME)	3 262 000	1.37	3.6	10.0	34.0	7 400	0.35
Merriown (lower) (MEL)	180 000	1.55	2.6	20.8	30.6	7 400	0.30
Velyama (VE)	3 070 000	1.32	3.6	6.9	39.8	7 400	0.44
Nagero (NA)	2 960 000	1.33	3.6	5.4	34.0	7 400	0.41
<b>Total</b>	<b>12 337 000</b>						
* No information available on coal quality of Bollol Creek Seam      ** adb – Air dried basis      @ Average value							
Source: Recoverable Coal - Roche Mining / Coal Quality – SRK Consulting (2004)							



In many cases, a number of plies within each seam were sampled in order to determine any significant variation in coal quality parameters such as sulphur and ash content. The ply data was then composited to match the full seam thickness using weighting factors calculated from the thickness and relative density of each ply. The coal quality is summarised in **Table 2.3**.

In summary, the coal typically has:

- an air-dried moisture of between 2.6% to 4.4%;
- low total sulphur content (0.30% to 0.44%); and
- an ash content ranging from 5.4% to 10.0%.

Higher ash content coal was identified within the MEL and JEL Seams (ash content of 20.8% and 22.8% respectively), but these seams represent <8% of the total recoverable coal.

Based on the results of the quality analyses, the coal at the proposed East Boggabri Coal Mine can be described as a high volatility (volatile matter 30.6% – 39.8% adb) coal which, through the utilisation of selective mining techniques, would produce a very low sulphur semi-soft coking/thermal coal with typically <10% ash and a specific energy of approximately 7 400kcal/kg.

#### **2.2.4 Spontaneous Combustion Potential**

The coal quality information presented in **Table 2.3** illustrates the coal within the proposed East Boggabri Coal Mine has a low sulphur content (<0.44%) and therefore a low potential for exothermic oxidation reactions. The coal is of similar quality to that of the Whitehaven Coal Mine which, since the commencement of operations, has had only a single spontaneous combustion event, a result of an extended period of stockpiling of heat affected coal.

The coarse reject produced through the washing of the East Boggabri coal is also expected to be of similar characteristics to that of the Whitehaven coal. The coarse reject generated by washing Whitehaven coal has a low volatile matter component (14%) and therefore a low propensity for spontaneous combustion (WCM, 2004). This potential would be further reduced given any coarse reject material returned to the mine would be buried in approved sections of the mine void and covered with at least 2m of inert material.

It is reasonable to assume therefore that East Boggabri coal would have a similarly low potential for spontaneous combustion with management 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.



## 2.3 MINE PLANNING CONSIDERATIONS

### 2.3.1 Economic Considerations

The viability of mining the coal seams identified within the Project Site was assessed based on two main economic factors.

(i) The Overburden / Interburden to Coal Stripping Ratio

The overburden / interburden to coal stripping ratio of 7.2:1 over the life of the proposed mine represents a conservative limit at which, given fluctuating coal prices, the proposed coal mine would remain economically viable. This ratio is in the mid range when compared to other open cut coal mines in New South Wales.

(ii) Ash Content

The coal seams to be mined are generally low in ash and when crushed and sized, approximately 65% of the coal would be suitable for marketing as a thermal and/or semi-soft coking coal without a requirement for further beneficiation (washing). Avoiding the requirement to wash a large proportion of the coal significantly simplifies, and improves the economic basis for, the proposal.

The economic cut-off would ultimately be determined by the prevailing coal prices which, in turn, would determine the economic stripping ratio. At the eastern limit of mining, it is currently planned that the mine would be approximately 120m below ground level, with the logistics and costs of recovering coal beyond this depth negating further mining at current and projected coal prices.

### 2.3.2 Geological Considerations

The coal seams mineable by open cut methods lap onto the Boggabri Ridge to the west of the Project Site and exhibit a comparatively shallow dip to the east and northeast. This provides for relatively straightforward mining as the near surface coal seams offer a suitable low stripping ratio entry point from the west while the floors of the coal seams themselves provide suitable bench heights for open cut mine development.

Constraints posed by the geology of the proposed East Boggabri Coal Mine would be limited to the following.

- The depth of weathering of the coal seams which influences the volume of overburden requiring removal to access the coal.
- The potential presence of faulting within the seam structure which may influence the sequence and possibly method of mining.
- The potential for an uneven coal seam floor which could potentially complicate vehicular access to the coal.

Greater detail on how the geological model would be incorporated into the design of the mining methods is presented in Section 2.4.5.



### 2.3.3 Environmental 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.

- 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 pre-mining areas. Final slopes of the in-pit emplacement would typically be 10° or less which would allow the northern part of the backfilled open cut area to be used for grazing activities.

- Ecological Considerations

Parts of the Project Site have been identified to contain two significant fauna habitats, namely a threatened ecological community (White Box Yellow Box Blakely's Red Gum Woodland variant) and an area of a Belah Community. The mine area has been designed to avoid disturbance to these areas.

Leard State Forest, to the immediate north of the Project Site, has also been identified as an important remnant within the Liverpool Plains Province and Brigalow Belt South Bioregion (DEC (NPWS) pers. comm.). Development within the proposed mine area would not directly disturb this remnant. Greater detail regarding the consideration given to ecological issues is presented in Sections 2.13.6.

- Aboriginal Heritage

Several Aboriginal heritage sites comprising mainly scatters of stone artefacts have been identified within the Project Site and adjacent to the northern section of the proposed transport route. The placement of overburden has been designed to avoid all but two of these sites within the Project Site. However, the avoidance of two sites would be impractical. Disturbance of the two sites would only be undertaken following the receipt of a Section 90 Permit obtained under the *National Parks and Wildlife Act 1974* and with the consent of representatives of the Aboriginal community.

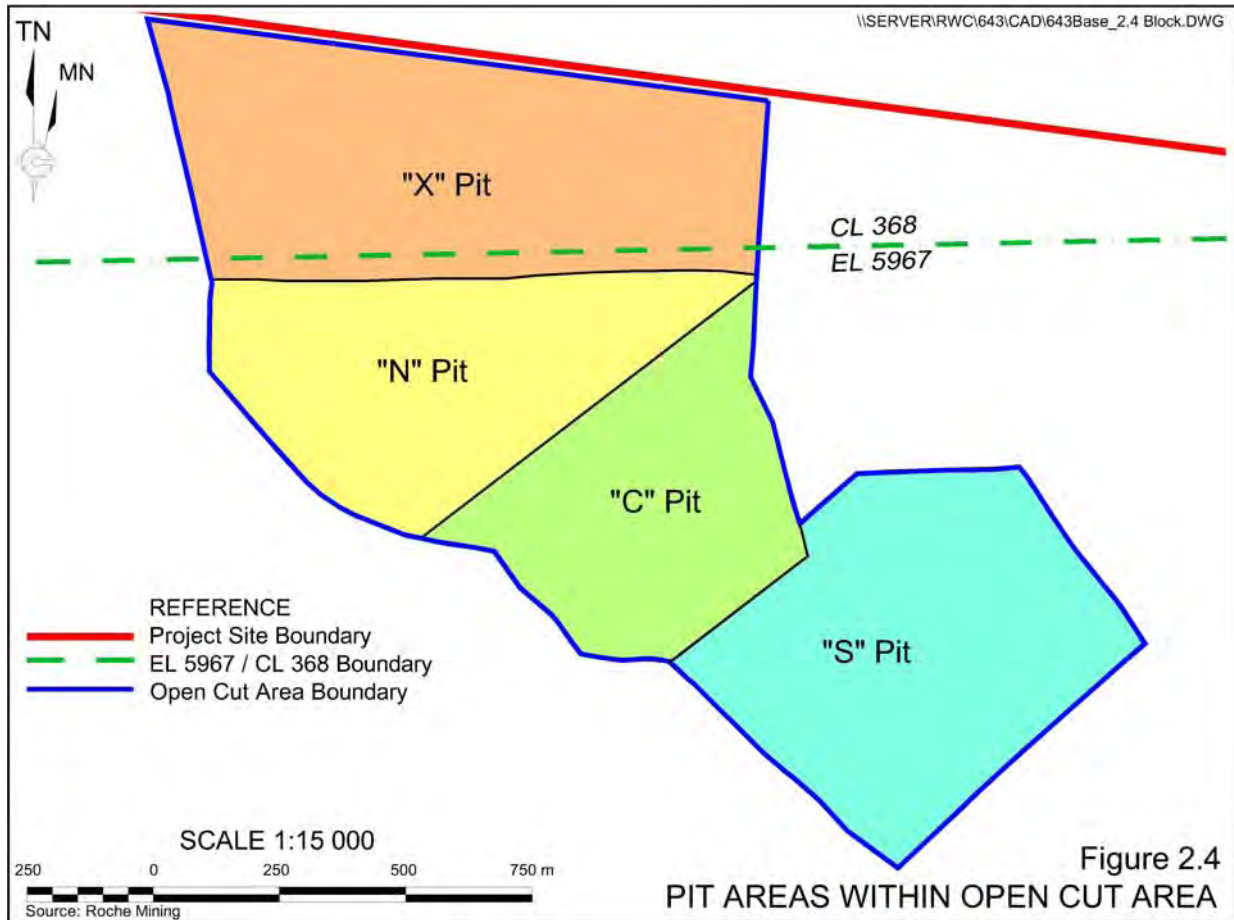
The northern section of the proposed transport route was realigned to ensure the four Aboriginal heritage sites identified adjacent to the proposed transport route would remain undisturbed.

## 2.4 MINING OPERATIONS

### 2.4.1 Introduction

Coal mining would be undertaken using conventional haulback mining methods. This would involve the sequential removal of soil, overburden and interburden above and between each coal seam, coal removal and progressive backfilling and rehabilitation of mined-out areas. To ensure a consistent stripping ratio is achieved, it is proposed to develop the open cut area as four individual and adjoining "pit areas" (see **Figure 2.4**). This would allow for the operation





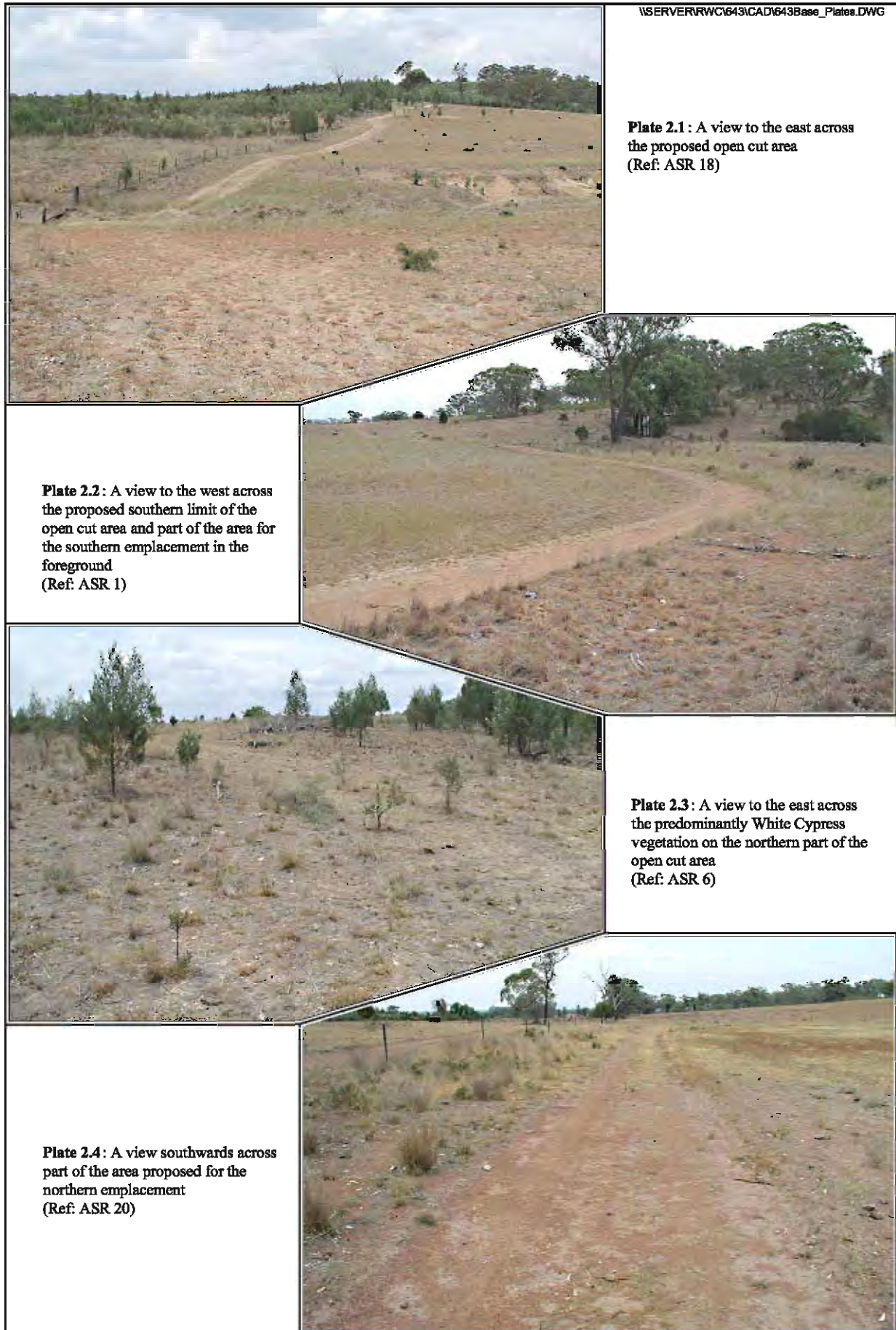
of active and developing faces concurrently in at least two pits. Put simply, as the exposed coal is extracted from one pit, overburden and/or interburden would be removed from a second pit. As the exposed coal from the first pit is exhausted, coal would be available for extraction from the second pit allowing for the continued development (extraction of overburden / interburden) within the first pit or commencement of development in a third pit. As the exposed coal from the second pit is exhausted, coal would once again be exposed and available for extraction from the first or third pits.

Each of the four pit areas (Extension ("X"), North ("N"), Central ("C") and South ("S") pits), would be oriented such that the development of mining blocks would be generally perpendicular to the dip of the coal seams. Within each pit, mining would involve the development of two benches, with overburden, interburden and coal removed principally by excavator and haul truck.

This sub-section presents information relating to vegetation clearing, soil removal, the overburden and interburden removal sequence, coal mining, production levels and equipment.

**Plates 2.1 to 2.4** display views of the current landform and vegetation within parts of the open cut area and nearby out-of-pit emplacements.





## 2.4.2 Vegetation Clearing

Clearing of vegetation within the mine area would be undertaken using a progressive campaign approach, ie. the extent of clearing undertaken in each campaign would be just sufficient for the subsequent year of mine development. When practicable, the clearing campaigns, particularly the removal of trees, would be scheduled for the late summer to autumn period in order to minimise potential impacts on fauna that might utilise the area scheduled for disturbance.

Clearing of the larger vegetation would be undertaken by chainsaw felling or bulldozer pushing with the bulldozer blade positioned just above the ground to minimise soil disturbance. The smaller vegetation, ie. pasture, crop stubble and/or shrubs, would be retained and collected with topsoil 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. Given the occurrence of isolated White Box (*Eucalyptus albens*) and Bimble Box (*Eucalyptus populnea* ssp. *Bimble*), ie. listed Koala feed tree species, within areas of native vegetation to be disturbed, prior to each clearing campaign an inspection of trees would be undertaken to identify if any Koalas are present. In the event a Koala is present within the area of proposed disturbance, clearing would be suspended until it moves away from the area or is relocated by a suitably qualified person.

Once felled, logs and branches <300mm in diameter or exhibiting hollows would be cut or broken into manageable lengths and placed on areas within the Project Site designated for the re-establishment of native vegetation, or in stockpiles for subsequent replacement as part of the Proponent's ongoing rehabilitation program. Use of the cleared vegetation in the above manner would assist in reducing erosion, assist vegetation establishment and provide fauna habitat (see Section 4.5.6). The Proponent's preferred option for suitable logs of >300mm in diameter would be to find a commercial market, eg. as saw logs, fence posts or firewood.

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 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 DoH (1998). Greater detail on water management is presented in Section 4.1.4.



## 2.4.3 Soil Removal

### 2.4.3.1 Introduction

The soil materials within the proposed areas of disturbance were assessed by Geoff Cunningham Natural Resource Consultants (GCNRC, 2005a and 2005b) to determine:

- their suitability for use as a final cover material on the post-mining landform; 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 4.3.4.

### 2.4.3.2 Soil Categories and Stripping

Four soil mapping units (SMUs) were identified within the Project Site (GCNRC, 2005a) and proposed transport route (GCNRC, 2005b). The soil mapping units are described in Section 4.3.2 and shown on **Figure 4.11**. However, **Table 2.4** provides a summary of the soil stripping suitabilities and procedures relevant for consideration as part of the description of the Proposal.

Due to their high salinity or sodicity, the subsoils of SMU2 and SMU4 would be unsuitable for use in rehabilitation. Stripping of these soils below 10cm would be avoided wherever practicable. However, if required, the stripped soil would be buried within one of the overburden emplacements.

**Table 2.4**  
**Soil Stripping Suitability and Procedures**

Page 1 of 2

Layer (Thickness)	Material	Stripping Suitability	Soil Stripping Procedures
<b>PROJECT SITE</b>			
<b>SMU 1</b>			
1 (0cm-15cm)	Sandy 10cm, sandy clay 10cm, clay 10cm, silty clay 10cm, clay sand, fine sandy clay 10cm, light to medium clay, silty clay.	Suitable for topsoiling though sandier than ideal and containing considerable amounts of gravel. Also contains valuable seed, organic matter, nutrient reserves and other favourable attributes.	Strip to a depth of 15cm in all areas disturbed by mining and associated infrastructure development.
2 (15cm-65cm)	Sandy 10cm, sandy clay 10cm or light to medium clay, some sands, silty clay 10cm, heavy clay.	Suitable for use as subsoil	Strip to a depth 50cm below layer 1 (total depth of 65cm) in areas of deeper disturbance such as mining or waste rock emplacements.
3 (65cm-115cm)		Some limitations including pH, presence of mottles and amount of gravel present.	Strip to a depth of 50cm below layer 2 (total depth of 115cm) where weathered rock is not present. Cease stripping as soon as rock is encountered.
<b>SMU 2</b>			
1 (0cm-10cm)	Light to medium clay, sometimes heavy clay.	Suitable for topsoiling provided suitable stripping and storage methods are used.	Strip to a depth of 10cm
2 (remainder of profile)		Not Suitable for stripping and stockpiling	Strip material below 10cm and mix with overburden material. This material should be targeted for priority burial in the pit once bedfilling of mined-out areas commences.



**Table 2.4 (Cont'd)**  
**Soil Stripping Suitability and Procedures**

Page 2 of 2

Layer (Thickness)	Material	Stripping Suitability	Soil Stripping Procedures
<b>PROPOSED TRANSPORT ROUTE</b>			
<b>SMU 3</b>			
1 (0cm-15cm)		Suitable for topsoiling. Contains valuable seed, organic matter, nutrient reserves and has other favourable attributes.	Strip to a depth of 15cm.
2 (15cm-45cm)	Sandy clay 10cm, silty clay 10cm, silty clay, light, medium, medium to heavy clay.	Suitable for use as a subsoil	Strip to depth of 45cm below layer 1 (total depth of 60cm).
3 (remainder of profile)	-	To be left intact under proposed road	-
<b>SMU 4</b>			
1 (0cm-15cm)	Light clay, light to medium clay, medium clay	Suitable for topsoiling. Contains valuable seed, organic matter, nutrient reserves and has other favourable attributes.	Strip to a depth of 15cm.
2 (15cm-45cm)	Light clay, light to medium clay.	Possibly suitable for traditional use as a subsoil. However, due levels of soil salinity and possible sodicity, it should not be used for any purpose where it is at or near the soil surface. This layer should not be stockpiled.	Strip to a depth of 45cm below layer 1 (total depth of 60cm) or less if possible. Remove material to either East Boggabri or Whitehaven and use as a layer under the sub-soil prior to rehabilitation.
3 (remainder of profile)	-	To be left intact under proposed road	-
Source: Modified after Geoff Cunningham Natural Resource Consultants Pty Ltd (2005a and 2005b) – Sections 7 and 8			

### 2.4.3.3 Soil Stockpiling Methods

#### Open Cut Area and Overburden Emplacements

Wherever practicable, stripped topsoil and subsoil would be directly replaced on completed sections of the final landform, it being anticipated that this would become common practice during and beyond Year 2. When stockpiling is necessary, topsoil and subsoil would be stockpiled separately with topsoil stockpiles not exceeding 2m in height. Wherever practicable, subsoil stockpiles would not exceed 3m in height. Should, due to constraints posed by the limited area available for soil stockpiling, subsoil stockpiles exceed 3m in height, these would be provided with a cover of topsoil and seeded with a non-persistent cover crop. The individual 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. Any stockpile that is to be retained in excess of 3 months would be seeded using a non-persistent cover crop to reduce erosion potential and assist in the maintenance of the biological viability of the soil resource. The stockpile surfaces would be left with a 'rough' surface to assist in runoff control, seed retention and germination.

The positioning of the topsoil and subsoil stockpiles would capitalise on 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, the Proponent would install upslope protective 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 locations of the three proposed soil stockpile areas (**Figure 2.5**), minimise the haul distance for placement and subsequent respreading. It is noted that the boundaries of the proposed soil stockpile areas are indicative and minor adjustments may occur once operations are underway. These stockpile areas, which collectively cover an area of 33.4ha, would provide storage for between 670 000m<sup>3</sup> and 800 000m<sup>3</sup> of topsoil and subsoil.

### **Mine Access Road**

Stockpiles of topsoil stripped to allow the construction of the mine access road would be windrowed along the down-slope (eastern) side of the road and positioned away from any culverts constructed along the road. The topsoil windrows would be typically <1m high.

### **Proposed Transport Route**

Soils within the northern section of the proposed transport route would be managed in accordance with the landowner agreements, as follows.

- “Tarrawonga” – topsoil would be provided for use elsewhere on the property with subsoil of SMU3 used in the construction of an access road between the northern route and the homestead.
- “Kyalla” – topsoil would be provided for use elsewhere on the property with subsoil of SMU3 used in the construction of flood embankment works.

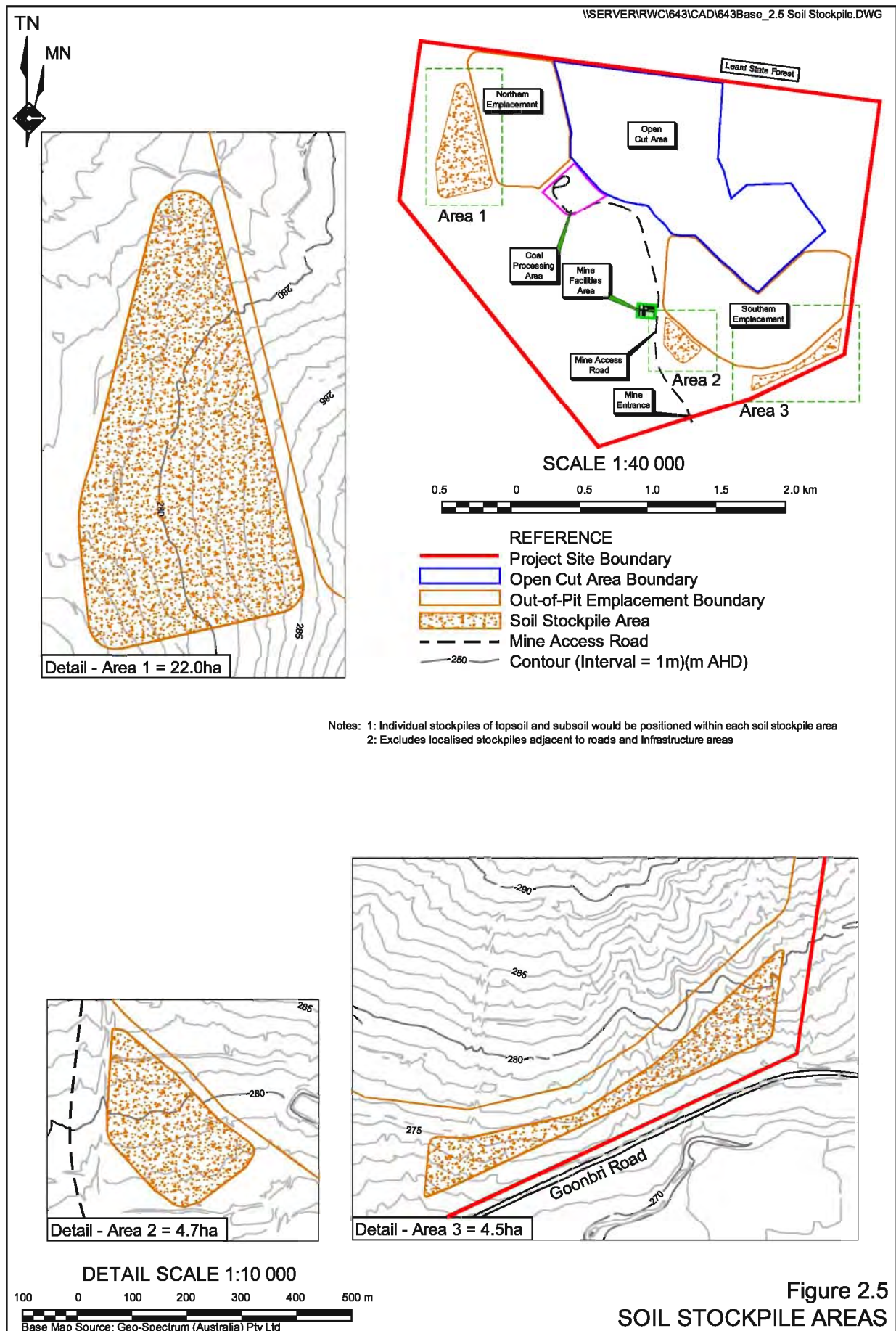
Topsoil and subsoil of SMU3 stripped on the “Thuin” and “Whitehaven” / “Bungalow” properties would be transported to the Project Site and Whitehaven Coal Mine respectively for use in ongoing rehabilitation activities. Subsoil of SMU4 stripped on all properties would be transported to either the Project Site or Whitehaven Coal Mine for burial within an overburden emplacement. Greater detail on the construction of the proposed transport route is provided in Section 2.8.3.

### **Other Areas of Disturbance**

Soil stripped from other areas of disturbance on the Project Site such as the coal processing area, mine facilities area and internal roads 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 the decommissioning of the respective area(s) 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.

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





#### 2.4.3.4 Soil Inventory and Reconciliation

In order to effectively manage the topsoil and subsoil stripped, the Proponent 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, namely, it would:

- (i) ensure appropriate volumes of soil are stripped consistent with the soil requirements of the final landform;
- (ii) identify the age of various stockpiles on the Project Site and therefore assist in minimising the length of time soils remained stockpiled; and
- (iii) assist the Proponent 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 even as the mine nears completion.

### 2.4.4 Overburden / Interburden Removal and Management

#### 2.4.4.1 Introduction

The removal of the overburden and interburden would be the main earthmoving activities undertaken at the mine. This sub-section examines the characteristics of the overburden and interburden and describes their planned removal and placement either back into the pits (in-pit emplacement) or into two separate out-of-pit emplacements. The out-of-pit emplacements, referred to as the “northern emplacement” and “southern emplacement” (see **Figure 2.1**), would merge with the overburden / interburden material placed within the in-pit emplacement.

#### 2.4.4.2 Material Characteristics

An assessment of the chemical and physical characteristics of the overburden and interburden material was undertaken on the core of one representative drillhole (DDH IEB-5C) established within the northern/central part of the open cut area. The location of DDH IEB-5C, is shown on **Figure 2.6**. A total of 41 samples were acquired from the drillhole by the Proponent’s consultant geologist at depth intervals of between 0.1m and 4m. Five composite samples, based on the lithology of the various overburden and interburden materials associated with the coal seams, were then prepared for section thicknesses of between 8m and 20m. **Figure 2.6** presents the log of DDH IEB-5C and identifies the 41 individual samples obtained. **Figure 2.6** also presents the stratigraphic section covered by each of the five composite samples analysed and illustrates the lithology of the overburden and interburden.

Australian Laboratory Services (ALS), a NATA accredited laboratory, conducted a series of standard geochemical tests on the five composite samples including pH, Electrical Conductivity (EC), total sulfur, Acid Neutralising Capacity (ANC), Net Acid Producing Potential (NAPP) and Net Acid Generation (NAG). An independent assessment of these chemical analyses was undertaken by URS Australia Pty Ltd who established that there is a low potential for both acid formation and soluble salt generation from the overburden and interburden material.



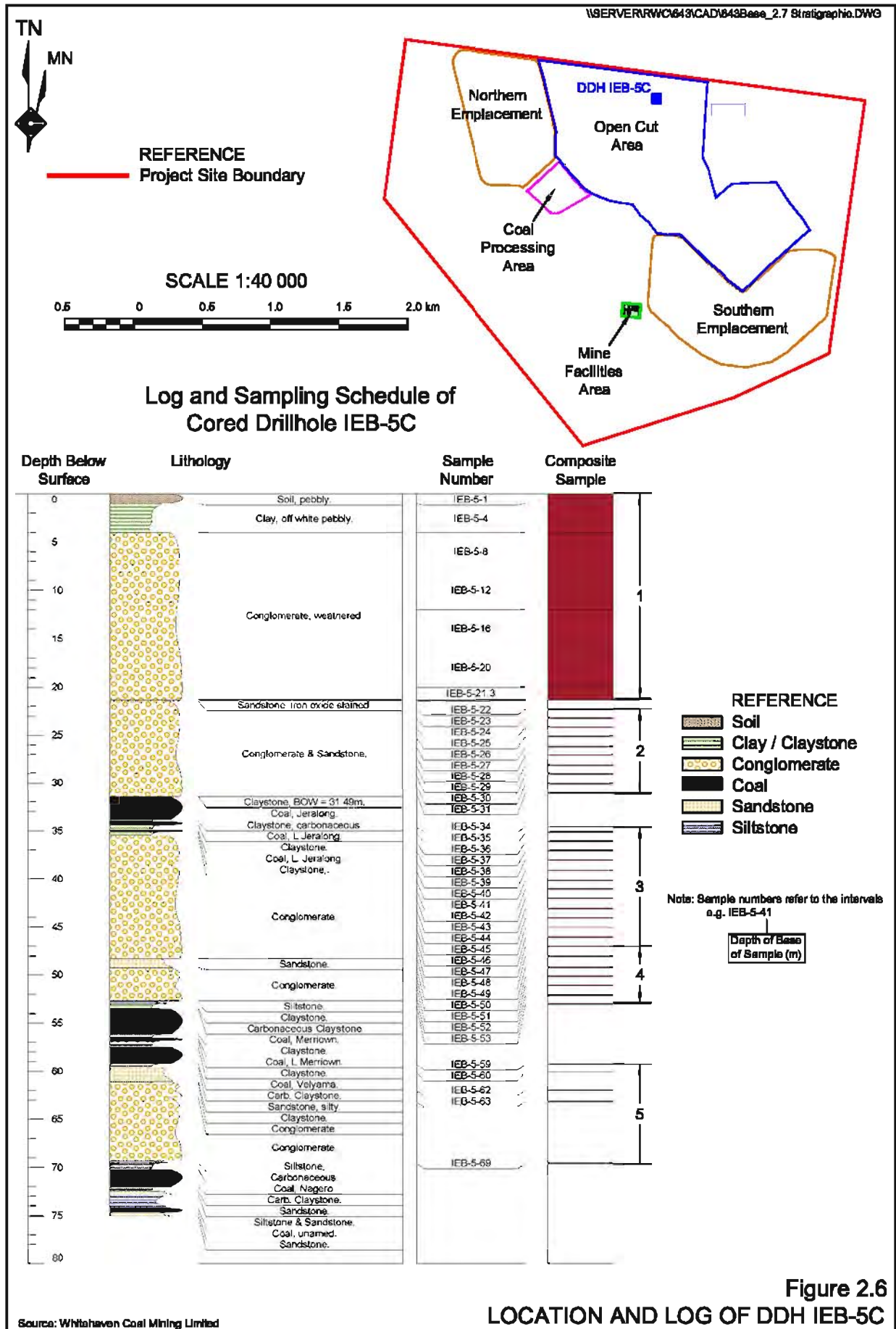


Figure 2.6  
LOCATION AND LOG OF DDH IEB-5C

Source: Whitehaven Coal Mining Limited



Given the outcome of the assessment of the chemical analyses, there are no specific handling and emplacement requirements for these materials. The independent assessment, provided as Part 9 of the *Specialist Consultant Studies Compendium* did, however, recommend further sampling and analyses of representative overburden and interburden materials throughout the life of the proposed mine. This continuing assessment would include:

- analysis of total sulfur content of representative samples;
- additional analysis for ANC, NAPP and NAG should a total sulfur content greater than 0.5 % be recorded in a significant number of samples; and
- multi-element analyses of solids and water extracts of representative overburden and interburden materials to ensure that the final landform does not contain or leach elements at concentrations that may be of environmental concern.

In the unlikely event that the additional assessments indicate an elevated risk of acid formation and/or soluble salt generation, the following handling methods would be employed.

- (i) The identified material would be separated from the inert materials.
- (ii) The identified materials would be placed in-pit and encapsulated with material with a medium to high Acid Neutralising Capacity.
- (iii) To the extent practicable, the materials would be placed at or near the base of the in-pit emplacement such that the potential for oxidation is further reduced.

#### **2.4.4.3 Overburden and Interburden Blasting**

The majority (approximately 98%) of overburden and interburden materials would be blasted to achieve a level of fragmentation suitable for its subsequent excavation, loading and transportation, or dozing. The Proponent intends to minimise the number of blasts by maximising blast size without compromising compliance with the environmental criteria identified in Section 4.9.3. Based on the conceptual mine plan and mining sequence identified in Section 2.4.5, Roche Mining estimates that an average of six blasts would be initiated per month.

Blast design, loading and firing would be undertaken by the mining 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 with acceptable environmental impact. The safeguards to be implemented with respect to the control of fly rock, air vibration (airblast overpressure) and ground vibration, noise and dust from blasting are presented in Section 4.9.4.

**Table 2.5** 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 all surrounding residences. It is noted that the closest point of the open cut area to Goonbri Road is 680m, a distance considered completely safe from fly rock.



**Table 2.5**  
**Typical Blast Design Parameters**

Parameter	Unit	Detail		
		Minimum	Average	Maximum
Bench height	m	2	25	45
Blast hole diameter	mm	229		
Blast hole inclination	deg	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
Explosive type		90% Heavy ANFO, 10% Emulsion		
Maximum Instantaneous Charge	kg	50	960	1 952
Initiation system		Nonel or electronic delay		
Source: Roche Mining				

The nominated blast design parameters have been determined using conservative predictive formulae. However, given blast design is an evolving outcome-oriented process, 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.

The potential for fly rock has been considered in the identification of the blast parameters. 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 setback, the Proponent would monitor the distance fly rock (if any) travels beyond the designed blast envelope and identify if further safeguards would be required.

#### 2.4.4.4 Overburden and Interburden Removal

Following blasting, the bulk of the overburden and interburden materials would be loaded by excavator into haul trucks and transported to the closest overburden emplacement. A small proportion of the interburden material above the Merriown Seam would be placed in mined-out areas of the open cut area by cast blasting and dozer push. Cast blasting is designed to project the blasted materials into the lower areas of the mine void, thereby minimising the volume to be loaded and transported by haul truck. The blasted interburden material would then be pushed into its final location by bulldozer or carry dozer, ie. a bulldozer with a larger than standard, purpose-built blade enabling the interburden to be lifted and pushed in a reduced friction environment. **Table 2.6** presents the approximate volumes of overburden / interburden to be removed by each method.



**Table 2.6**  
**Overburden / Interburden Removal**

Removal Method	Volume (bcm)	Proportion (%)
Excavator/Haul Truck	76 000 000	86.0
Cast blast	3 100 000	3.5
Cast blast / dozer push	9 400 000	10.5
<b>Total</b>	<b>88 500 000</b>	<b>100.0</b>
Source: Roche Mining		

Over the life of the mine, approximately 88.5 million bank cubic metres (Mbcm) (110.6 million loose cubic metres (Mlcm)) of overburden and interburden material would be mined. Of this material, approximately 12% would be placed in the northern emplacement and 18% in the southern emplacement. Of the remaining material, a small proportion would be used in the construction of hardstand areas for the coal processing and mine facilities areas (0.7% or 0.6Mbcm), with the remainder (61.3Mbcm / 76.6 Mlcm) placed in the in-pit emplacement.

**Figure 2.7** identifies the sequential placement of overburden and interburden material at the end of Years 1, 2, 4 and 6.

The initial placement of overburden and interburden would be predominantly to the northern emplacement with a small proportion placed in the mined-out sections of the X Pit. Overburden and interburden material would also be used in the construction of a central ramp within each pit. As mining progresses within the N, C and S Pits, out-of-pit overburden placement would transfer to the southern emplacement area and alternate with the placement of material in the mined-out section of the pit until the cessation of mining.

#### 2.4.4.5 Overburden Emplacement Design

**Figure 2.8** presents the location of the two out-of-pit overburden emplacements adjacent to the open cut area. The footprint of each emplacement shown on **Figure 2.8** is indicative although for the purposes of the assessments of impacts, the nominated footprint shown is considered to be the maximum extent external to the open cut area. Minor adjustments may arise as the Proponent endeavours to maximise the amount of overburden and interburden placed in the in-pit emplacement. **Figure 2.9** presents selected cross-sections through the northern and southern emplacements illustrating the comparatively gentle slopes of generally 10° or less. Only the northern slopes of the southern emplacement would exceed 10° with slopes typically up to 18°. At their highest points, the northern and southern emplacements would have elevations of between 330m AHD and 340m AHD which would be up to 40m and 50m above the surrounding natural ground level. Both the elevation and slope of the final overburden emplacements are comparable to the existing landform on the parts of the Project Site. A series of contour banks would be created at approximately 10m vertical intervals on the outer slopes of the emplacements.

Initial overburden placement within the southern emplacement area would be undertaken during favourable meteorological conditions and daytime hours in order to construct a 15m high acoustic bund along the southern, eastern and western margins of the emplacement.



USER\ER\RWC\643\CAD\643Base\_2.7 Develop.DWG

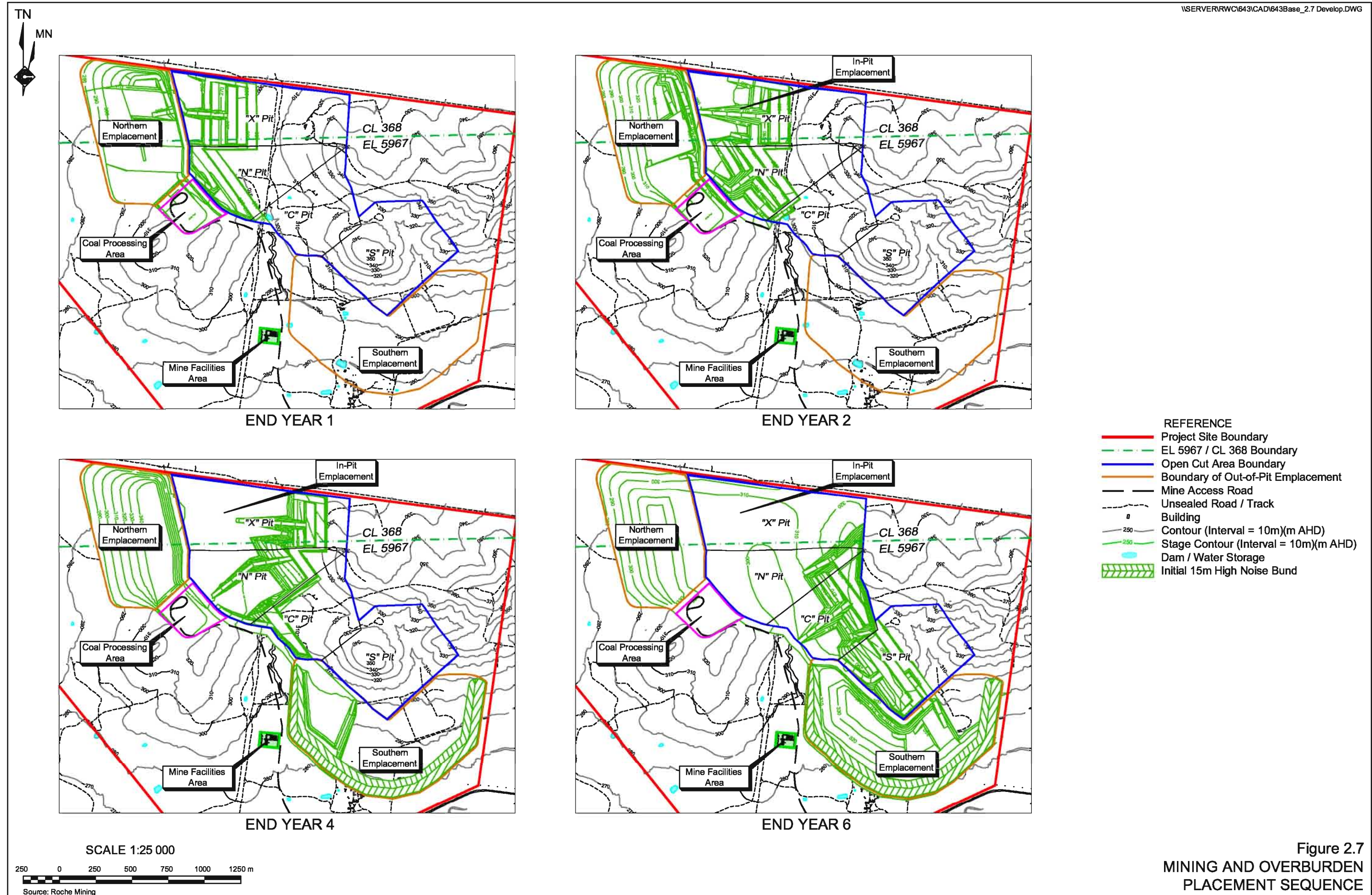
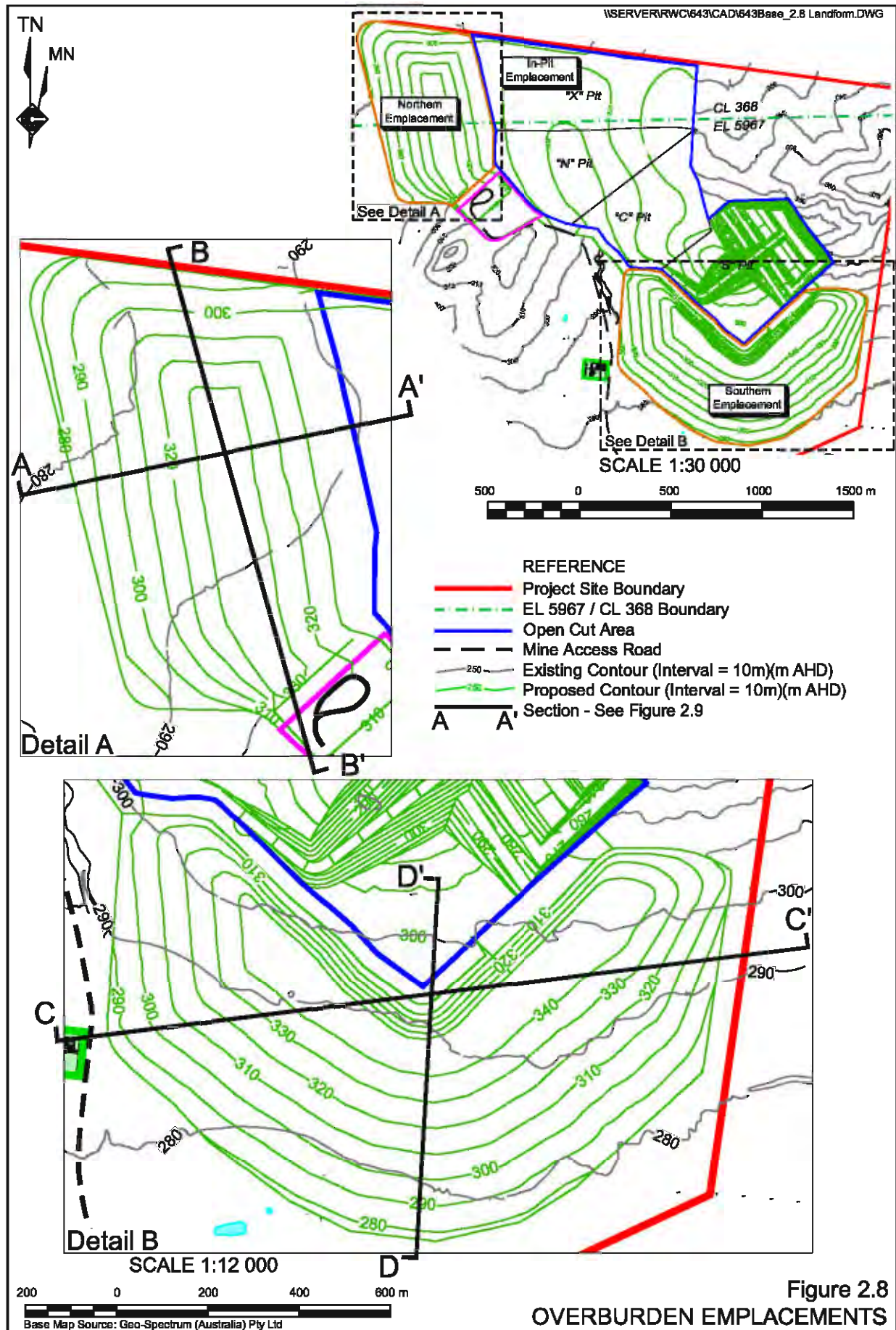
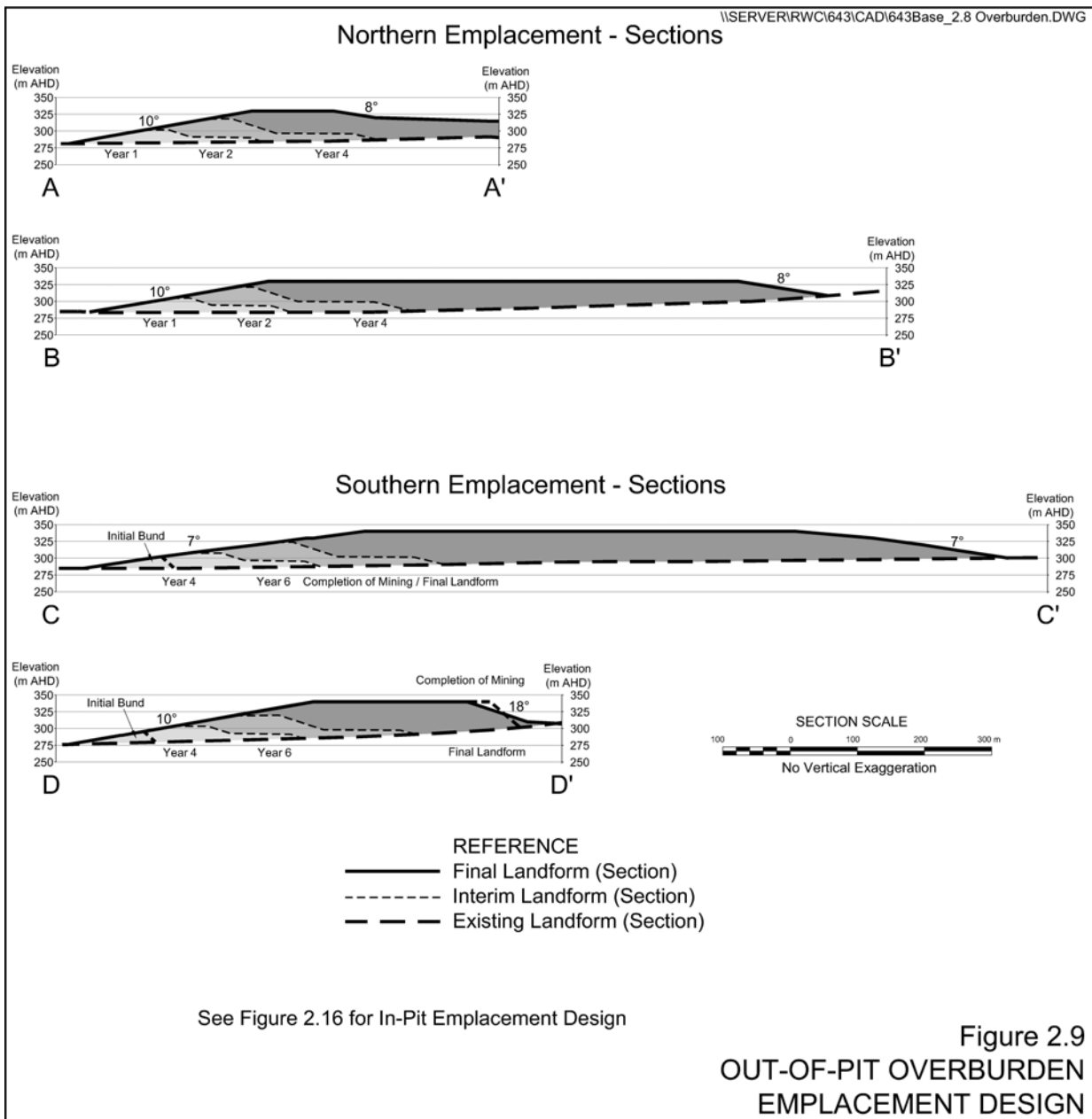


Figure 2.7  
MINING AND OVERBURDEN  
PLACEMENT SEQUENCE



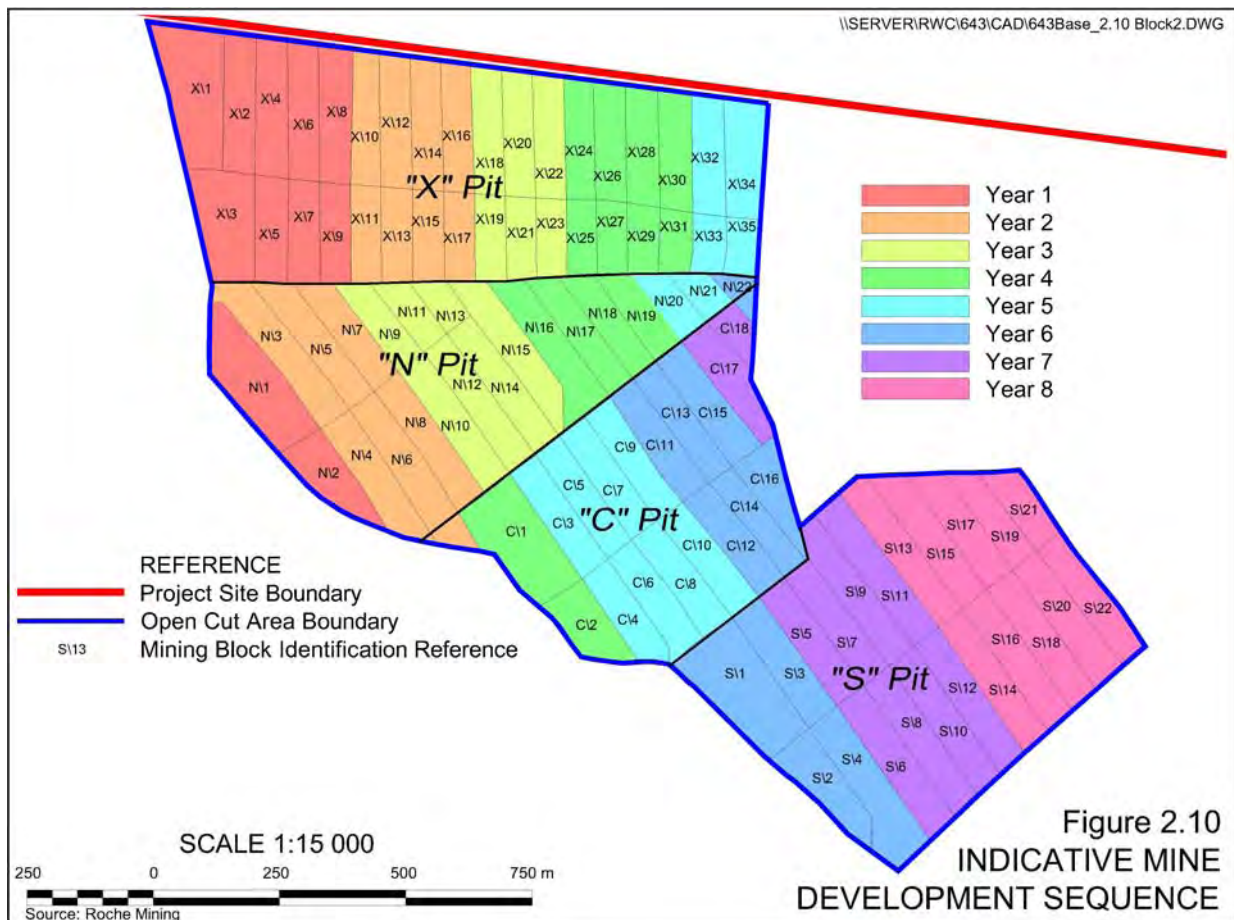


Throughout the remaining life of the mine, an acoustic bund approximately 15m high would be maintained on the outer margins of the southern emplacement. Overburden placement to raise the height of the acoustic bund would be scheduled during daytime hours and non-adverse meteorological conditions. At night or during adverse meteorological conditions (inversion events or winds from the northwest), overburden placement would revert to behind and within 30m of the bund.

### 2.4.5 Coal Mining Methods and Mining Sequence

**Figure 2.10** presents the proposed sequence of coal mining within the open cut area. Mining would commence in the X Pit area and active benches would be established either side of a central haulage ramp developed to intersect the various seams (see **Figure 2.7**). The N, C and S Pits would be developed and mined in a similar fashion.





To remove the coal, benches would be developed along the length of coal seams exposed through blasting and removal of overburden/interburden. As sufficient coal is exposed, it would be ripped, excavated and transported to the ROM pad within the coal processing area. The coal immediately adjacent to the roof and floor of each seam would inevitably be diluted by the adjoining rock materials during mining. This coal would be stockpiled separately and used for blending into coal products with a higher ash tolerance.

Various thicknesses of interburden, particularly between the main seams and associated lower seams (eg. JE / JEL Seams and ME / MEL Seams), occur throughout the coal seam sequence. Where the interburden is greater than approximately 0.3m thick, it would be mined separately from the coal seams as a thickness of 0.3m generally represents the practical limit to the separate mining of these layers. Interburden layers up to 2m thick would be ripped with a bulldozer prior to loading into haul trucks for delivery to the active area(s) of the overburden emplacement. Where required, interburden greater than 2m thick would be blasted for subsequent loading and disposal.

Annual production is currently projected to increase from approximately 1.0Mt in the first full year of operations to approximately 1.6Mt in each subsequent year until the cessation of mining. Economic considerations may dictate that in some years a higher output level is required. Consequently, approval is being sought for a maximum annual production of 2.0Mtpa to accommodate this possibility. **Table 2.7** provides an estimate of the quantity of coal to be produced each year based on the indicative mining sequence presented in **Figure 2.7**.

