

## WESTSIDE MINE SOUTHERN EXTENSION

# Environmental Impact Statement



**Umwelt (Australia) Pty Limited**  
*Environmental and Catchment Management Consultants*

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**OCEANIC COAL AUSTRALIA LIMITED**

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ENVIRONMENTAL IMPACT STATEMENT**

**VOLUME 1 - MAIN TEXT**



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## EXECUTIVE SUMMARY

### THE PROPOSAL

Westside Mine is an existing open cut coal mine located approximately 20 kilometres southwest of Newcastle, in the Lake Macquarie Local Government Area, New South Wales. The mine has been operating since 1992, including operations within 220 metres of the closest urban area of Killingworth. Barnsley is located to the northeast and the rural residential community of Wakefield is located to the south.

The mine is managed by Oceanic Coal Australia Limited (OCAL) on behalf of Macquarie Coal Joint Venture (MCJV). The Great Northern and Fassifern seams are mined to produce thermal coal primarily for use in local power stations. The mine currently extracts approximately 0.6 million tonnes per annum (Mtpa) using truck and shovel methods, and employs 18 people onsite in addition to 12 contract truck drivers.

OCAL seeks development consent to enable grant of a mining lease to allow extension of open cut mining to the south of the existing Westside Mine boundary and for realignment of Wakefield Road, to enable mining in the new East Pit on the eastern side of the existing Wakefield Road alignment. In response to community concern, the limit of mining to the south has been restricted such that, on the western side of the existing Wakefield Road alignment, it does not extend beyond an existing ridgeline that provides a considerable buffer for the Wakefield rural residential community. The realignment of Wakefield Road will incorporate relocation of the Great North Walk, with provision of a walkway adjacent to the entire section of new road. In addition, upgrading of the intersections of Wakefield Road with School Road and Rhondda Road, will be achieved as part of the Wakefield Road realignment.

It is estimated that there are 4.59 million tonnes of recoverable coal reserves enabling Westside Mine to continue open cut operations for an additional 7 to 12 years. These operations may also incorporate high wall augering for a short period at the southern and eastern limits of open cut mining. The existing coal handling and transportation system will continue to be utilised, with the majority of coal transported along the existing private haul road to Eraring Power Station. Flexibility is also sought to enable occasional coal transport to Vales Point Power Station, using a combination of public and private roads.

This Environmental Impact Statement (EIS) has been prepared to accompany a development application (DA) for the project, referred to as the Westside Mine Southern Extension. Approval of this project would extend the life of the mine, maintaining continuity of operations and associated employment.

### ENVIRONMENTAL CONTEXT

The proposed Westside Mine Southern Extension comprises approximately 42 hectares of land extending to the south and east of the existing Westside Mine South Pit. The topography of the site is gently undulating, steepening in the southwest corner with the presence of a natural east-west trending ridgeline, which forms the southern boundary of open cut operations. Cockle Creek flows between the existing North and South Pits, with treated runoff from the site ultimately flowing to this watercourse. The extension area is dominated by natural vegetation ranging from swamp forest, to dry sclerophyll forest, much of which has been modified and degraded over time by mining activities, grazing, frequent fire and human access. Shallow underground mining was conducted in parts of this area in the 1960s and severe subsidence periodically occurs within these areas.

The natural vegetation of the study area forms part of a relatively large expanse of remnant bushland extending to the north, southeast and most continuously to the west where it effectively links with both the Heaton and Awaba State Forests.

The surface facilities of the existing West Wallsend Colliery adjoin the northern boundary of the Westside Mine. Newstan Colliery is located approximately 3.25 kilometres to the south and the former Rhondda Colliery is located immediately to the southeast. The current Teralba Quarry is located 1.75 kilometres to the southeast and the Macquarie Coal Preparation Plant is located 3 kilometres to the east.

Rural residential land uses dominate the area to the south and southwest of Westside Mine in the vicinity of Wakefield, a small rural residential community. Westside Mine has undertaken open cut operations to within 220 metres of the urban area of Killingworth during previous mining of the North Pit. Fifteen private residences are located within 1 kilometre of the proposed open cut mining boundary, to the south of current operations in the Wakefield rural residential area. OCAL is currently seeking agreements and/or purchase for two potentially affected residences and one potentially affected additional landholding.

## **CONSULTATION**

Extensive consultation with government agencies and the local community was undertaken throughout the environmental impact assessment process. Community consultation included participation in community meetings and distribution of information leaflets. In addition, the owners of private land in the vicinity of the proposed Westside Mine Southern Extension Area were individually consulted in person on a number of occasions throughout the assessment process.

Government agencies were briefed on the proposal at the Planning Focus Meeting coordinated by PlanningNSW and through a number of meetings to discuss key technical issues. The government agencies involved in these meetings included the respective approval bodies for this project: Department of Land and Water Conservation (DLWC), Lake Macquarie City Council (LMCC), Environment Protection Authority (EPA) and Mine Subsidence Board (MSB).

## **KEY ENVIRONMENTAL ISSUES**

### **Water Resources**

The existing water management system is to be maintained and extended to service the proposed operations, with the extended system having significant excess capacity to service water management needs. On this basis it is considered that proposed development can be undertaken without adversely impacting on water quality or water quantity in the Cockle Creek and Diega Creek systems. The proposed realignment of Wakefield Road will cross Diega Creek at two locations, with adequate culverts incorporated into the road design to maintain flow and aquatic fauna movement. Groundwater resources in the area comprise low permeability alluvial deposits along Cockle and Diega Creek floodplains, groundwater within the Fassifern and Great Northern seams, and mine water stored in old underground workings within the Great Northern seam. The proposed mining operation has negligible potential to adversely impact the groundwater regime of the surrounding area.

### **Flora and Fauna**

The proposed mining will involve the progressive clearing of up to 50 hectares of dry sclerophyll forest, swamp forest and regenerating mined land.

One flora species currently listed on Schedule 2 of the *Threatened Species Conservation Act 1995* (TSC Act) was recorded within the study area, namely *Tetratheca juncea*. Additionally, the Swamp Mahogany (*Eucalyptus robusta*) dominated forest recorded within specific portions of the site is listed as an Endangered Ecological Community on Part 3 of Schedule 1 of the TSC Act (Sydney Coastal Estuary Swamp Forest Complex). Four threatened fauna species (two microchiropteran bats, one bird and one marsupial) were considered to potentially exist on the site. Three of these threatened fauna species (Common Bent-winged Bat, Little Bent-winged Bat and the Squirrel Glider) were confirmed on the site.

These threatened flora, fauna and Endangered Ecological Communities recorded within the study area are not considered to be significantly affected by the proposed development based on the 8-part test of significance specified in Section 5A of the *Environmental Planning and Assessment Act 1979* (EP&A Act). Specific amelioration measures have been incorporated into the project to reduce the potential impact on these species and communities.

Assessment in accordance with the requirements of SEPP 44 indicates that potential koala habitat exists on the site in limited areas, however no core koala habitat was identified. Completion of the 8-part test required by Section 5A of the EP&A Act indicates that a species impact statement is not required for this development.

Mitigation measures include modification of the original mine plan to limit mining to the northern side of the east-west trending ridgeline, progressive rehabilitation and revegetation, maintenance of significant habitat features and preparation of a Flora and Fauna Management Plan. The proposed rehabilitation strategy includes the re-instatement of habitat of a similar diversity and type to that which exists in the naturally-forested portions of the locality. The rehabilitation works will utilise a range of locally indigenous species and will ensure that the cumulative impact on flora and fauna communities will be minimised in the long term.

## **Cultural Heritage**

### *Aboriginal Heritage*

Aboriginal archaeological investigations conducted in conjunction with representatives of the Koompahtoo Local Aboriginal Land Council (LALC) identified no Aboriginal sites or relics that might be a constraint to the proposed development. Some areas have the potential to contain evidence obscured by ground cover and/or sub-surface evidence of Aboriginal occupation. OCAL will consult with the LALC prior to conducting work in these areas and provide the opportunity for LALC to undertake monitoring for Aboriginal sites during vegetation clearance and the stripping of the upper soil horizons in these identified areas.

### *Historic Heritage*

An assessment of the historic heritage within and in the vicinity of the proposed development identified a number of potential historic sites. These relics primarily related to former mining related activities and each site was assessed according to its scientific, social, educational and aesthetic values, on a local and regional scale. All sites were found to be of low significance and do not justify preservation or salvage.

## **Air Quality**

Emissions of atmospheric dust from the proposed operation of the Westside Mine Southern Extension project have been quantified and assessed in the context of background dust levels within the area.

All private residences in the area are predicted to experience air quality that complies with the goals applied by the NSW EPA except for four located in the Wakefield community to the south of

the project area. These are predicted to experience annual average  $PM_{10}$  concentration that exceed the NSW EPA's annual average  $PM_{10}$  concentration goal of  $30 \mu g/m^3$  in only the early years of the project. They are not however expected to experience levels above the equivalent US EPA annual goal of  $50 \mu g/m^3$ . OCAL is currently negotiating agreements with two of these affected properties. None of the other air quality goals are predicted to be exceeded at any private residences.

There are no other significant air quality impacts expected as a result of the proposed development.

## **Noise and Blasting**

### *Noise*

Noise levels were predicted using an environmental noise model to determine the acoustic impacts of the proposed development. The model considered two worst case phases of development based upon the Westside Year 3 conceptual mine plan (being the closest development to Wakefield residences) and Year 6 conceptual mine plan (being the highest production level). This assessment determined that, based on the Year 3 scenario, one private residence in Wakefield is located within the Noise Affectionation Zone. This being the area in which noise exceedance of the relevant planning goal of 42 dBA is such that agreement is required with the owners of the residence regarding appropriate noise mitigation measures. OCAL is currently negotiating an agreement with this residence. This may include particular noise controls at their residence or purchase of the property. Based on the Year 3 scenario, a further four residences are located within the Noise Management Zone, where the relevant planning goal is exceeded during operation of the drill at daytime, but is met at all other times. This assessment indicates the need for targeted monitoring and noise management for these residences, to control noise from these operations such that it does not cause significant impact at these residences.

Predicted Year 3 mine plan noise levels meet the NSW EPA's relevant noise planning goal during the evening period and at times when the drill is not operating. Noise emissions predicted for the Year 6 mine plan comply with the noise goals at all non-mine owned residences during both the daytime and evening periods.

Noise from the traffic along the proposed Wakefield Road realignment and the road transport of product coal has been predicted to be within relevant noise criteria.

### *Blasting*

The level of airblast and ground vibration from blasting has been predicted using the developed site laws for the mine, for Year 3 and Year 6 mine plans. The maximum instantaneous charge (MIC) will vary, depending on the location of the area being mined and its relation to the nearest affected receiver.

The blast predictions indicate that the ground vibration levels will be within current EPA standards. However, the blast predictions also indicate that the airblast levels will exceed current EPA standards at two non-mine owned residences when the mine is closest to Wakefield. OCAL is currently negotiating agreements with the owners of these residences.

## **Visual Amenity**

In response to community concerns raised during the consultation process, the initial mine plan proposed by OCAL was considerably modified. The extent of mining was limited to the northern side of a natural east-west trending ridgeline, on the western side of Wakefield Road, substantially reducing the potential visual impact of the development from the Wakefield community.

The proposed development area will potentially be viewed from a limited number of Wakefield residences and from Wakefield Road. Potential views from private Wakefield residences are

restricted to short term overburden removal activities in a minor portion of the proposed East Pit on the eastern side of Wakefield Road. These views will be further mitigated by establishment of a tree screen in advance of mining in this area. Potential views from the proposed Wakefield Road realignment are intermittent through intervening vegetation and proposed tree screens.

Views of the proposed Wakefield Road realignment from Wakefield residences will include construction earthworks that will create colour contrast over a limited length of the landscape. The potential visual effect of these earthworks is moderate and of short duration. These road realignment works will not form a dominant part of the landscape from most residences.

Potential views of the proposed development area from Barnsley and Killingworth are restricted due to natural undulations of the landform, existing vegetation and reshaping/rehabilitation of the Westside Mine North Pit mining area. Overall, the visual impact of the proposed development is expected to be low, as the development is not discernible in most areas due to the topographic features between the mine and surrounding lands.

Project features that will assist in protection of the scenic amenity of the area include progressive rehabilitation of disturbed areas and provision of tree screening adjacent to the proposed Wakefield Road realignment.

## **Roads and Traffic**

The proposed development will have a low impact on traffic during the 7-12 year mining operations. There will be no significant change to the existing workforce and service vehicle traffic. Operational traffic impacts will be restricted to additional traffic movements associated with the projected maximum production levels, potentially increasing from an average 148 laden truck movements to an average of 185 laden truck movements per day, travelling via private haul road to Eraring Power Station.

In the past, up to 50000 tonnes per year of coal has also been hauled by road to Vales Point Power Station. It is possible that similar volumes may be transported on a campaign basis in the future. The proposed haulage of coal via the Newstan private haul road to Awaba Road and then via the F3 Freeway to Wyee Road and Rutleys Road would equate to approximately 0.2% of average annual traffic movements.

It is proposed to realign approximately 1.2 kilometres of Wakefield Road, permanently close a portion of Rhondda Road and move the intersection of the two roads approximately 750 metres to the east of its current location. To minimise disruption to traffic it is proposed that the realigned section of Wakefield Road will be fully constructed prior to being opened to traffic. As a result only minor disruptions to traffic using Wakefield Road and Rhondda Road will occur when works are required to connect the road systems.

During road construction it will be necessary for heavy earthmoving equipment to cross Rhondda Road on frequent occasions. A Traffic Management Plan outlining appropriate traffic control measures to be implemented will be developed in consultation with LMCC prior to access being required to cross Rhondda Road.

## **Socio-economics**

The most significant economic impact resulting from the continuation of mining at Westside is the continuation of employment for 18 employees and 12 contract employees, with the potential for a maximum of 5 further jobs at full production. The continuation of employment for up to 35 personnel for the 7 to 12 year life of the mine extension will have significant flow on effects in the local community. Federal, State and local governments can expect economic benefits from continued operations in terms of taxes, royalties, rates and charges.

The social impact of the continuation of employment is in the maintenance of employees' current lifestyle. The proposed development will not have a significant social impact on the local community in terms of workforce needs, as the requirement for a maximum of 5 additional personnel is not a significant addition to the workforce. As a result there will be no impact on social infrastructure such as education and recreational services and similarly there will be no housing and accommodation impacts within the local area or Lake Macquarie as a whole. The social impact on the Wakefield community is proposed to be minimised by incorporation of detailed environmental controls to limit off-site impacts and by arrangement of appropriate compensation and/or purchase agreements for the private landholders likely to be significantly affected by the proposed development.

## **PROJECT JUSTIFICATION AND ALTERNATIVES**

During development of the proposal, a number of alternative mining methods and environmental management options were considered. The preferred option, as detailed in this EIS, provides the most cost-effective method of extracting coal, whilst minimising environmental impacts.

The environmental impact assessment has comprehensively addressed potential impacts associated with continued operation of Westside Mine. Environmental impacts have been assessed for each project component, as well as the cumulative impacts associated with the continued operations.

These investigations have determined that there are aspects of the project that will require careful management to minimise environmental impacts. The environmental impact assessment has determined that, providing that the environmental management and monitoring procedures discussed in the EIS are adopted, all potential environmental constraints can be appropriately managed to enable extension of Westside Mine.

Extension of Westside Mine will provide immediate benefits to the community through the continuation of employment opportunities. In addition, the proposal will improve long-term efficiency and economics of the Westside Mine operations, ensuring ongoing product flexibility and competitiveness in the domestic coal market. If the development does not proceed these opportunities will be lost.

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# **SECTION 1**

## **Introduction**

## 1.0 INTRODUCTION

### 1.1 BACKGROUND

Westside Mine is an existing open cut coal mine located approximately 20 kilometres southwest of Newcastle, in the Lake Macquarie Local Government Area (LGA), New South Wales (**Figure 1.1**). The mine is managed by Oceanic Coal Australia Limited (OCAL) on behalf of Macquarie Coal Joint Venture (MCJV). The Great Northern and Fassifern seams are mined to produce thermal coal for use in local power stations. The mine currently extracts approximately 0.6 million tonnes per annum (Mtpa) and employs 18 people on site in addition to 12 contract truck drivers. Open cut mining has been conducted at this locality since 1992 in relatively close proximity to urban areas, including within 220 metres of Killingworth. An aerial view of the general locality of existing operations is shown in **Figure 1.2**.

OCAL seeks development consent to enable grant of a mining lease to allow extension of open cut mining to the south of the existing Westside Mine lease and for realignment of Wakefield Road, to enable mining in the new East Pit on the eastern side of the existing Wakefield Road alignment (**Figure 1.3**). High wall augering is also proposed for a short period at the southern and eastern limits of open cut mining. It is estimated that there are 4.59 million tonnes of recoverable coal reserves enabling Westside Mine to continue operation for an additional 7 to 12 years. The existing coal handling and transportation system will continue to be utilised, with the majority of coal transported along a private haul road to Eraring Power Station.

Umwelt (Australia) Pty Limited has prepared this Environmental Impact Statement (EIS) to accompany a development application (DA) for the project, referred to as the Westside Mine Southern Extension. Approval of this project would extend the life of the mine, maintaining continuity of operations and associated employment. This EIS addresses all components of the operation within the proposed DA area shown in **Figure 1.3**.

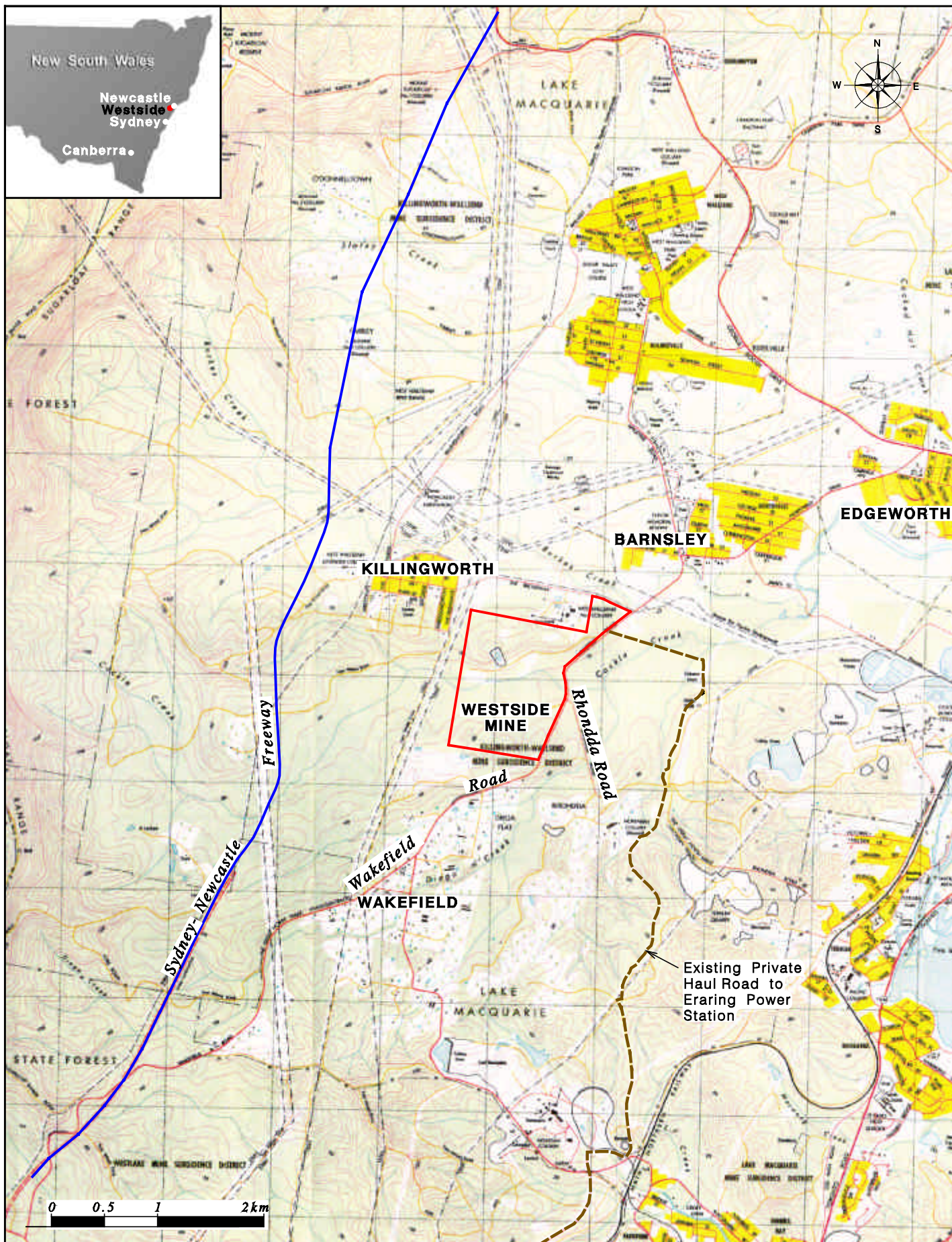
OCAL has conducted extensive consultation with the Wakefield community regarding the proposal (refer to **Section 1.6.1**), and seeks to maintain close liaison with the local community during future operations. In response to community concerns, the initial mine plan was modified to limit the extent of mining to the northern side of a natural east-west trending ridgeline, that provides a natural barrier between the mine and Wakefield residents. Under the current proposal no open cut mining operations are proposed for the southern side of the ridgeline, on the western side of the existing Wakefield Road alignment.

### 1.2 HISTORY OF DEVELOPMENT AND EXISTING APPROVALS

Development consent for the existing Westside Mine was granted by Lake Macquarie City Council (LMCC) (DA No 90/0242) on 18 July 1990. The consent identified two separate mining areas in the northern and southern portions of the mine lease area. The proposed initial coal recovery rate was 300000 tonnes/year, increasing to 600000 tonnes/year during the life of the operation.

Development of the mine started in early 1992 with the construction of the surface buildings. During June 1992, the process of overburden removal commenced with coal production starting in August 1992.

From January 1993, coal production was supplied to the domestic market to fulfil a 10 year contract for the nominal supply of 0.5 Mtpa to Eraring Power Station. Raw coal is crushed on site, with the majority transported from the mine by truck via private haul roads to



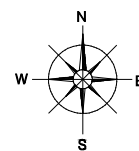
**Legend**  
 Existing Westside Mine Boundary  
 Existing Private Haul Road

Umwelt (Australia) Pty Limited  
 Base Map Source: WallSEND 1:25 000 Topographic Map 9232-3-S

**FIGURE 1.1**  
 Locality Plan

A4 Scale 1:48 000

Ref No.: R02\_V1/1377\_076.dgn



#### Legend

— Existing Westside Mine Boundary

#### Note

Aerial Photograph taken May 2001

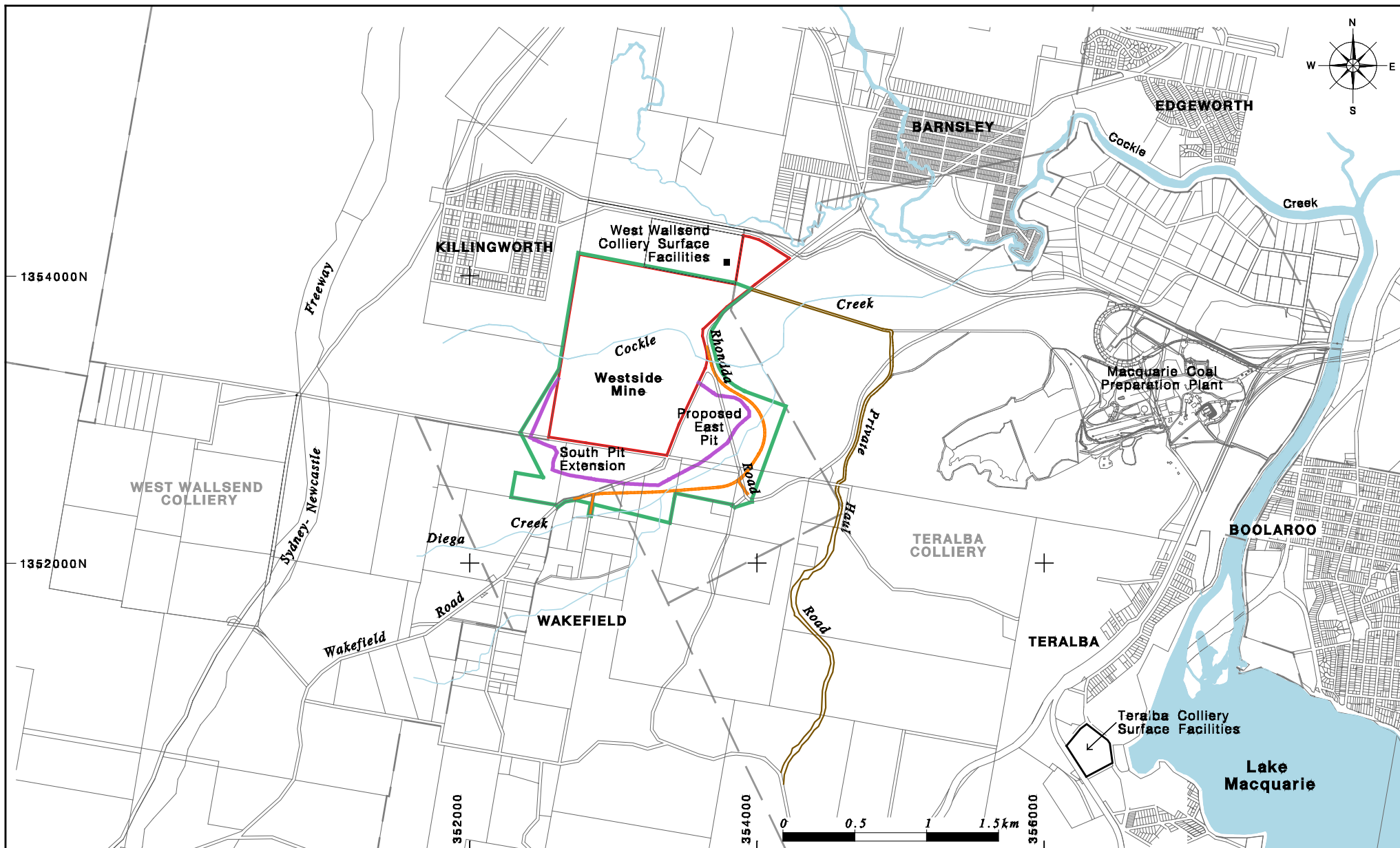
Umwelt (Australia) Pty Limited

#### FIGURE 1.2

Aerial View  
Existing Operations & Locality

A4 Scale: 1:17 000

Ref No.: R02\_V1/1377\_061.dgn



#### Legend

- |                                                                         |                                                                           |                                                                                          |
|-------------------------------------------------------------------------|---------------------------------------------------------------------------|------------------------------------------------------------------------------------------|
| <span style="color: red;">—</span> Existing Westside Mine Boundary      | <span style="color: orange;">—</span> Proposed Wakefield Road Realignment | <span style="color: grey;">---</span> Other MCJV Colliery Holding Boundary               |
| <span style="color: purple;">—</span> Proposed Open Cut Mining Boundary | <span style="color: green;">—</span> Development Application Area         | <span style="color: brown;">—</span> Existing Private Haul Road to Eraring Power Station |

Umwelt (Australia) Pty Limited

**FIGURE 1.3**  
Proposed Development Area

A4 Scale 1:36 000

Ref No.: R02\_V1/1377\_070.dgn

Eraring Power Station. Approval was obtained from LMCC (DA No 91/00557) for Westside Mine's haul road which was constructed to link with the existing Powercoal haul road extending from Newstan Colliery to Eraring Power Station. The section of private haul road extending from Westside Mine to Newstan Colliery includes an underpass under Wakefield Road and crosses Rhondda Road.

The mining operation is a controlled emplacement method, which involves backfilling of mined strips and rehabilitation on a progressive basis. Strips are mined sequentially using bulldozers, loaders, excavators and trucks with overburden placed directly on mined strips to meet final landform requirements.

In March 1998, coal mining ceased in the North Pit area (refer to **Figure 1.2**). This area has been substantially rehabilitated, with an area within the void being designated for water storage in order to increase the stormwater retention capacity on site. Mining is now situated in the South Pit, which first commenced during 1998. In some sections of this pit, mining involves the removal of overburden from above the old workings in the Great Northern seam of the abandoned Northern Rhondda Colliery - West Tunnel workings. These former mining operations were conducted at shallow depth more than 40 years ago and have resulted in extensive subsidence damage. Open cut mining through these areas provides an effective means of recovering remaining resources and remediating subsidence by creation of a stable final landform.

During the period from 1993 until December 2001, a total of 4.7 million tonnes of coal (an average of approximately 0.53 Mtpa) was produced at Westside Mine and sold entirely as a domestic thermal coal for Eraring and Vales Point Power Stations. During 1999-2001, 90% of coal produced was despatched to Eraring Power Station, located on the western shores of Lake Macquarie approximately 14 kilometres south-southwest of the site. The remaining 10% was sold to Vales Point Power Station situated on the southern shores of Lake Macquarie at Vales Point. The coal was crushed on site before being transported to the power stations.

Available coal resources within the currently approved mining area are nearing depletion. OCAL proposes to commence mining within the Southern Extension Area in 2003.

### 1.3 THE APPLICANT

Westside Mine is managed by OCAL, on behalf of the MCJV participants. OCAL is the major participant in MCJV, with an effective 80% interest (including the 10% interest of wholly owned subsidiary OCAL Macquarie Pty Limited). The other participants are Marubeni Coal Pty Ltd (17%) and Kokan Kogyo (Aust) Pty Ltd (3%). OCAL was acquired in July 1999 by Glencore Coal Australia Pty Limited (now Enx Coal Pty Limited).

OCAL also manages and operates two underground coal mines (Teralba Colliery and West Wallsend Colliery) and a coal preparation plant (Macquarie Coal Preparation Plant) in the Lake Macquarie area on behalf of MCJV. Along with Westside Mine, these operations are referred to collectively as the Macquarie Operations. Recently, production ceased at Teralba Colliery and it is currently on a care and maintenance program pending review of the feasibility of future mining options. The location of the existing Westside Mine lease boundary and other facilities operated by OCAL in its Macquarie operations are shown on **Figure 1.3**.

## 1.4 PROPOSED DEVELOPMENT AND OBJECTIVES

The objectives of the proposed development are to:

- enable continuation of mining operations at Westside Mine for an additional 7 to 12 years in a manner that minimises impacts on the surrounding community;
- enable increased coal extraction, with future production to increase from an existing 0.6 Mtpa up to 1 Mtpa;
- maximise resource recovery within areas not previously subject to open cut mining;
- permanently rehabilitate subsidence within areas subject to shallow underground mining conducted in the 1960s;
- maintain continuity of coal production and employment; and
- conduct mining in an environmentally sensitive manner.

It is proposed to achieve these objectives by:

- continuation of mining the Great Northern and Fassifern seams to the south and east from the existing southern mining area;
- realignment of Wakefield Road to enable mining in the East Pit, on the eastern side of the current alignment of Wakefield Road;
- increased coal supply to the Eraring and Vales Point power stations from the existing production level of 0.6 Mtpa to in the order of 1 Mtpa; and
- continued use of existing surface facilities and road transportation system.

Further details regarding proposed continued operations are provided in **Section 4**.

## 1.5 APPROVAL PROCESS

The proposed Westside Mine Southern Extension is Designated Development under Schedule 3 of the *Environmental Planning and Assessment Regulation 2000*, as it will produce more than 500 tonnes of coal per day and will involve blasting within 500 metres of a dwelling not associated with the mine. Consequently, this EIS has been prepared to accompany the DA. The Department of Urban Affairs and Planning (now PlanningNSW) has advised that under the *Environmental Planning and Assessment Act 1979*, the project is also State Significant Development. Consequently, the Minister for Planning will determine the DA. As a number of relevant post development consent approvals will be required, the proposal is also Integrated Development under the *Environmental Planning and Assessment Act 1979* (refer to **Section 2.2.2.2**). The relevant approval bodies for this proposal are identified in **Table 1.1**.

**Table 1.1 – Approval Bodies**

| Approval Body                             | Subsequent Approval                                                                                                                                             |
|-------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Department of Land and Water Conservation | Licence to extract water and undertake activities covered by the <i>Water Management Act 2000 / Water Act 1912 / Rivers and Foreshores Improvement Act 1948</i> |
| Lake Macquarie City Council               | Approval to undertake works within a road reserve under the <i>Roads Act 1993</i>                                                                               |
| Environment Protection Authority          | Variation of the existing Environmental Protection Licence (No. 004033) under <i>Protection of the Environment Operations Act 1997</i>                          |
| Mine Subsidence Board                     | Approval for works within a mine subsidence district under the <i>Mine Subsidence Compensation Act 1961</i>                                                     |

The DA and this EIS will be submitted to PlanningNSW and the EIS placed on public exhibition for a minimum of 30 days. During the public exhibition period submissions in relation to the EIS may be made to PlanningNSW. Notice of the public exhibition period will be published in local newspapers and posted on the PlanningNSW website.

The relevant Approval Bodies will assess the DA and provide General Terms of Approval for the Minister's consideration for inclusion in the development consent conditions. In addition, all other relevant government authorities will assess the DA and provide recommendations to PlanningNSW regarding determination and relevant development consent conditions, if consent is to be granted. The Department of Mineral Resources is able to grant a mining lease for the Westside Mine Southern Extension following development consent.

## 1.6 COMMUNITY AND AUTHORITY CONSULTATION

Consultation with the community and all relevant government and non-government agencies has been conducted throughout the project planning and environmental impact assessment phase.

### 1.6.1 Community Consultation

#### 1.6.1.1 Extent of community consultation

Westside Mine has been operating in relatively close proximity to Killingworth, Barnsley and the rural residential area of Wakefield for ten years. OCAL owns the majority of land within and adjacent to the proposed development area, although there are a number of privately owned rural residential holdings located to the south and east of the development area (refer to **Section 2.1.2**).

Community consultation has been an integral part of this EIS preparation. The objectives of the community consultation program were to:

- initiate and maintain open communication with the local community on all aspects of the proposed development and assessment process;
- allow early identification of community concerns and issues in relation to the proposed development; and

- proactively respond to community concerns by interacting with the community to develop suitable strategies to minimise any negative impacts and maximise the positive impacts associated with the development.

OCAL has undertaken extensive consultation with the Wakefield community since 1997 regarding potential mining in closer proximity to this area. Individual meetings were held with community members to discuss the project details and any particular issue of concern to each individual. This forum provided the opportunity to discuss matters in greater detail than would be achieved in a community meeting situation and also enabled the community consultation to include those people who may not have been comfortable participating in a larger public forum.

OCAL has also participated in meetings with the Wakefield community, held on 28 January 1998, 22 May 2000, and 19 October 2000. At the meetings, participants were provided with a description of the proposed development and environmental assessment completed to that time. All participants were then provided with the opportunity to ask questions, comment on or discuss any aspects of the development. Issues raised at the meetings were noted for consideration during preparation of the EIS.

Following community and LMCC concern, the initial mine plan was modified on the western side of Wakefield Road, to limit mining to the northern side of the natural east-west trending ridgeline situated between the mine and the Wakefield community.

Upon modification of the initial mine plan, further individual meetings were held with Wakefield residents and a community meeting was held on 6 November 2000, to discuss OCAL's decision to limit open cut mining activities to the northern side of the ridgeline. Again, participants were encouraged to comment and discuss all aspects of the proposed development.

A community newsletter was forwarded to approximately 940 residents of Barnsley, Killingworth and Wakefield in December 2001. This newsletter provided information regarding some of the key environmental issues surrounding the proposed development, and outlined the sequence of events prior to, and following lodgement of the EIS (refer to **Appendix 1**). The newsletter contained a standard response form (refer to **Appendix 1**) and reply paid envelope which requested comments regarding environmental and community issues to be considered in the EIS. A total of 21 response forms were received, five from Wakefield, 11 from Barnsley, three from Killingworth, one from Edgeworth and an anonymous response.

Further individual consultation was conducted with local residents during late March and April 2002. These sessions provided the residents with detailed feedback on the project details and outcomes of environmental investigations and further opportunity to discuss issues regarding the project.

The opportunity to participate in these individual consultation sessions was provided to all individuals that responded to the community newsletter and indicated that they wished to be involved in further consultation. In addition, phone contact was made with all Wakefield residents, whether or not they had responded to the newsletter, in order to offer the opportunity to participate in a detailed individual consultation session. Most residents agreed to participate in these sessions and provided further feedback, as outlined in **Section 1.6.1.2**.

### 1.6.1.2 Outcomes of community consultation

Social and environmental issues were raised by the community during the consultation process. The issues identified related to the presence of mining in the area generally and were largely based on respondents' perceptions of the existing mining operation.

As outlined above, a range of consultation mechanisms were employed by OCAL in an attempt to identify issues of relevance and concern to the surrounding community. In addition to the matters raised during community and individual meetings, five community response forms were returned by Wakefield residents in response to the community newsletter. The issues of most concern to the residents of Wakefield relate to the proposed proximity of the Southern Extension Area and its operations to the community. Concerns regarding increased noise and dust levels and the effect of blasting have been raised consistently throughout the consultation process. The potential for devaluation of property values in Wakefield and an alteration of social amenity and lifestyle due to the proposed proximity of the mine and buyout of properties in the zone of affectation, is also an issue of concern.

The proposed Wakefield Road realignment is also of concern to many Wakefield residents on the grounds that it may be moved closer to residential properties, creating increased noise in addition to lengthening the distance and associated journey time of this transport corridor.

A few residents indicated that lowering the elevation of the Wakefield Road realignment, near the intersection of School Road may assist in traffic noise reduction by lessening the road gradient and providing further opportunity for screening. In addition, a number of owners of land accessed via School Road indicated a preference for establishment of a cul de sac at the northern end of School Road, alleviating the need for major intersection works at this location and restricting flow through traffic on School Road.

Many residents questioned the hours of operation for the mine and indicated that they would prefer that operating hours did not extend beyond the current practice of mining operations ceasing at 7.00 pm, although the mine is approved to operate up to 10.00 pm.

The impact of the proposed mine extension on the natural amenity of the local area, including the native flora and fauna and local creeks (Diega and Cockle Creeks) and the ability of the mine to effectively rehabilitate the area post mining has also been raised as an issue of concern to Wakefield residents.

Issues raised by residents of Barnsley during the community consultation process centred around noise, dust and blasting concerns. Other issues of concern related to the proposed hours of operation for continued mining and the proposed environmental management/controls. Based on perceptions of existing operations a number of residents believe that the current environmental controls, particularly for noise and dust, are not stringent enough and should be reviewed for the proposed operations. During detailed discussion with Barnsley residents, it was found that the main concerns regarding existing dust and noise levels were based on perceived impacts from OCAL's other closer operations in the locality (West Wallsend Colliery and Macquarie Coal Preparation Plant). OCAL's Environmental Scientist participated in these discussions and undertook to further investigate these concerns, in consultation with the residents. The potential for subsidence as a result of the proposed augering operations was also raised.

Issues raised by Killingworth residents related to the proposed realignment and associated extension of Wakefield Road, the effect of blasting operations and the visual impact of the proposed extension area. Concern was also raised as to the justification of the environmental degradation associated with open cut mining operations under the current economic climate.

A single submission, in the form of a community response form, has been made from an Edgeworth resident concerning the potential dust levels particularly during southerly wind events. An additional community response form concerning the impact of the proposed southern extension on native flora and fauna and the need to research alternative power sources was returned from an unknown address.

Issues raised by the community have been considered in project planning, environmental assessment and are addressed throughout this document.

#### **1.6.1.3 Further consultation**

Westside Mine will distribute final copies of this EIS to local residents upon request. Consultation with the surrounding community will continue to be conducted throughout the development and operation of the Westside Mine Southern Extension, in order to discuss potential environmental impacts and proposed environmental management procedures. In particular, the community will be consulted prior to key activities such as construction of Wakefield Road and commencement of public use of the realigned Wakefield Road.

### **1.6.2 Authority Consultation**

Consultation with government agencies has been conducted throughout the project planning and environmental assessment phase. Feedback gathered from the consultation has been used to refine the environmental assessment and project planning for this development.

The Department of Mineral Resources was consulted at the outset of this project.

Initial consultation with LMCC was held in 1997 to provide a general project briefing, and to submit a rezoning application for land zoned Environmental Protection (Scenic).

Consultation was held with the Department of Urban Affairs and Planning (now PlanningNSW) in 1998, in order to brief them on the project and to determine which agency would be the determining authority. In January 1999, a conceptual mine plan was presented to the Department of Mineral Resources.

LMCC was further consulted on 27 July 2000 to follow up on the rezoning application submitted in 1997. A further meeting was held on 23 August 2000 at which OCAL provided a presentation of the proposed development and again raised the issue of rezoning. LMCC conducted an inspection of the land to be rezoned on 19 October 2000 and, in consultation with the local community it was determined that mining would be limited to the northern side of the natural east-west trending ridgeline situated between the mine and the rural residential area of Wakefield.

A Planning Focus Document was prepared prior to a Planning Focus Meeting, which was held on 18 July 2001, to explain the proposed development and environmental assessment completed up to that time. The Planning Focus Document was distributed to the following government agencies:

- Department of Urban Affairs and Planning (DUAP) (now PlanningNSW);
- Lake Macquarie City Council (LMCC);
- Environment Protection Authority (EPA);
- Department of Land and Water Conservation (DLWC);
- National Parks and Wildlife Service (NPWS);

- Department of Mineral Resources (DMR);
- Mine Subsidence Board (MSB);
- Roads and Traffic Authority (RTA);
- NSW Agriculture; and
- NSW Heritage Office.

Government agencies represented at the Planning Focus Meeting were DUAP, LMCC, EPA, DLWC, DMR, MSB and RTA. In addition, Kooppahtoo Local Aboriginal Land Council (LALC) was provided with a copy of the Planning Focus Document and participated in the Planning Focus Meeting.

Since the Planning Focus Meeting, further consultation has been conducted. LMCC has been consulted in relation to the conceptual design of the Wakefield Road realignment. The Councillors were also provided with an updated project briefing on 29 April 2002. In addition, the DMR provided comment on the draft EIS.

Kooppahtoo LALC participated in the archaeological surveys for this project and provided written comment on the archaeological assessment and proposed management recommendations (refer to **Section 5.9.1**).

The feedback received from the various authorities during the consultation process has been considered in preparation of this EIS. Correspondence received from government authorities is provided in **Appendix 2**. The requirements of these authorities have been identified and addressed in this document. **Section 8** provides a checklist of requirements from the Director-General of DUAP (now PlanningNSW), which incorporates the written requirements received from the above authorities.

## 1.7 PROJECT TEAM

Umwelt (Australia) Pty Limited prepared this EIS on behalf of OCAL. A number of organisations undertook specialist studies as part of the environmental assessment. A full listing of all project team members is provided in **Appendix 3**.

## 1.8 EIS STRUCTURE

This EIS has been prepared in accordance with Clauses 72 and 73 of the *Environmental Planning and Assessment Regulation 2000* (refer to the EIS form in **Appendix 3**). An overview of the layout of this document is provided below.

The Executive Summary provides a brief overview of the project, key environmental assessment results and an outline of proposed environmental management procedures.

**Section 1.0** is an introduction to the document, providing background to, and an overview of, the proposal for which development consent is sought. The objectives of the proposal are stated and an overview of authority and community consultations provided. Also included is an outline of the structure of the EIS.

**Section 2.0** describes the relevant planning considerations for the proposal.

**Section 3.0** provides a description of the existing operations of Westside Mine, including an outline of existing environmental management procedures.

**Section 4.0** provides a detailed description of the proposed development, including the coal resource, conceptual mine plan, mining operations and equipment, and continued use of existing facilities.

**Section 5.0** contains a comprehensive analysis and assessment of environmental impacts and mitigation measures relating to the proposed continued operations of Westside Mine. Cumulative impact assessment is also discussed in this section.

**Section 6.0** outlines the ongoing environmental management and monitoring programs that will be implemented by OCAL as part of this development, including post-EIS legislative controls.

**Section 7.0** is a discussion of alternatives and justification of this proposal, with consideration of ecologically sustainable development principles.

**Section 8.0** is a checklist of all matters raised during consultation, considered in preparation of this EIS.

**Section 9.0** is a reference section, providing a list of all documents referred to throughout this EIS.

**Section 10.0** contains a list of abbreviations and a glossary of technical terms used throughout the document.

The **Appendices** include technical reports relied on in preparation of the EIS. Each of the appendices is referred to in the relevant section of the EIS.

## **SECTION 2**

# **Planning Context**

## 2.0 PLANNING CONTEXT

This section describes the planning context for the proposal, outlining relevant site features and all Commonwealth, State, regional and local planning considerations relevant to this project.

### 2.1 SITE DESCRIPTION AND LOCALITY

#### 2.1.1 Site Features and Surrounding Land Uses

The proposed Southern Extension Area (**Figure 2.1**) comprises approximately 42 hectares of land extending to the south and east of the existing Westside Mine South Pit. The topography of the site is gently undulating, steepening in the southwest corner with the presence of a natural east-west trending ridgeline, which forms the southern boundary of open cut operations. Cockle Creek flows between the existing North and South Pits, with treated runoff from the site ultimately flowing to this watercourse. The extension area is dominated by natural vegetation ranging from swamp forest, to dry sclerophyll forest, much of which has been modified and degraded over time by previous mining activities, grazing, frequent fire and human access (**Plate 2.1**). Shallow underground mining was conducted in parts of this area in the 1960s and severe subsidence continues to occur periodically within these areas (refer to **Plate 2.2**).

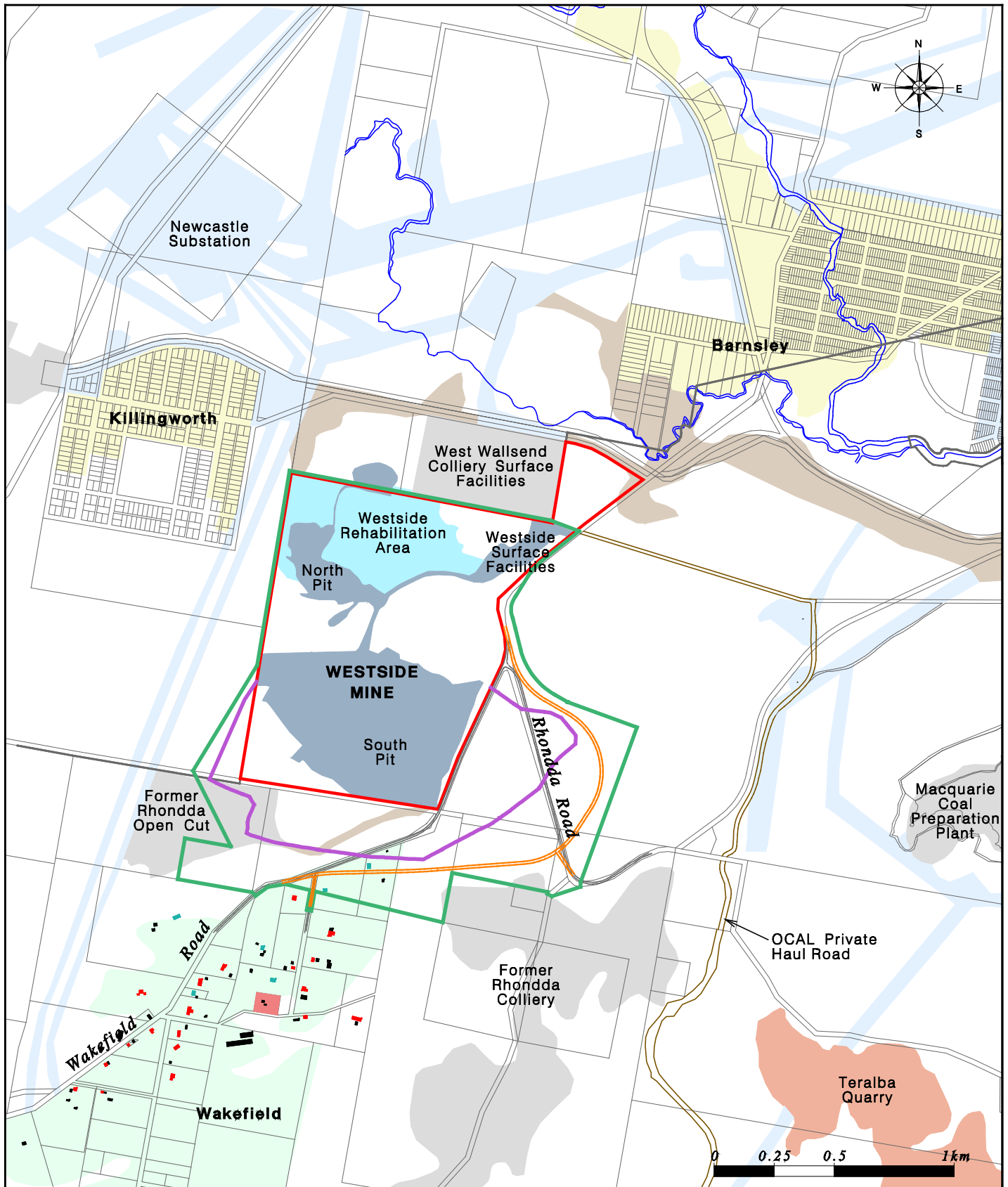
The natural vegetation of the study area forms part of a relatively large expanse of remnant bushland extending to the north, southeast and most continuously to the west where it effectively links with both the Heaton and Awaba State Forests.

The surface facilities of the existing West Wallsend Colliery adjoin the northern boundary of the Westside Mine. Newstan Colliery is located approximately 3.25 kilometres to the south and the former Rhondda Colliery is located immediately to the southeast. The current Teralba Quarry is located 1.75 kilometres to the southeast and the Macquarie Coal Preparation Plant is located 3 kilometres to the east (**Figures 1.2 and 2.1**).

Rural residential land uses dominate the area to the south and southwest of Westside Mine, in the vicinity of Wakefield, a small rural residential community. The closest urban areas are Killingworth located approximately 200 metres to the west of the existing Westside Mine lease boundary and Barnsley located approximately 600 metres from the northeast corner of the mine boundary, as shown in **Figure 2.1**. Westside Mine has undertaken open cut operations to within 220 metres of the urban area of Killingworth during previous mining of the North Pit. Fifteen private residences are located within 1 kilometre of the proposed open cut mining boundary, to the south of current operations (refer to **Figure 2.1**). OCAL is currently seeking agreements and/or purchase for two potentially affected residences and one additional land holding.

#### 2.1.2 Property Description, Land Ownership and Mining Titles

The proposed development is located on land described in **Appendix 3** and is within the Parish of Teralba, County of Northumberland, Lake Macquarie LGA. Existing mining titles cover the proposed development area but there are strata limitations on some mining titles required in the southern portion of the site, as shown on **Figure 2.2**. Existing mining titles are shown in **Table 2.1**.



#### Legend

- Existing Westside Mine Boundary
- Proposed Open Cut Mining Boundary
- Development Application Area
- Proposed Wakefield Rd Realignment
- Rural/Residential
- Department of Education Facility
- Westside Open Cut
- Westside Rehabilitation

- Other Mining Surface Disturbance
- Public Service Utility
- Urban
- Quarry
- Cleared Land
- Bushland

- Buildings
- Private Residences
- MCJV Residences

**FIGURE 2.1**  
Land Use



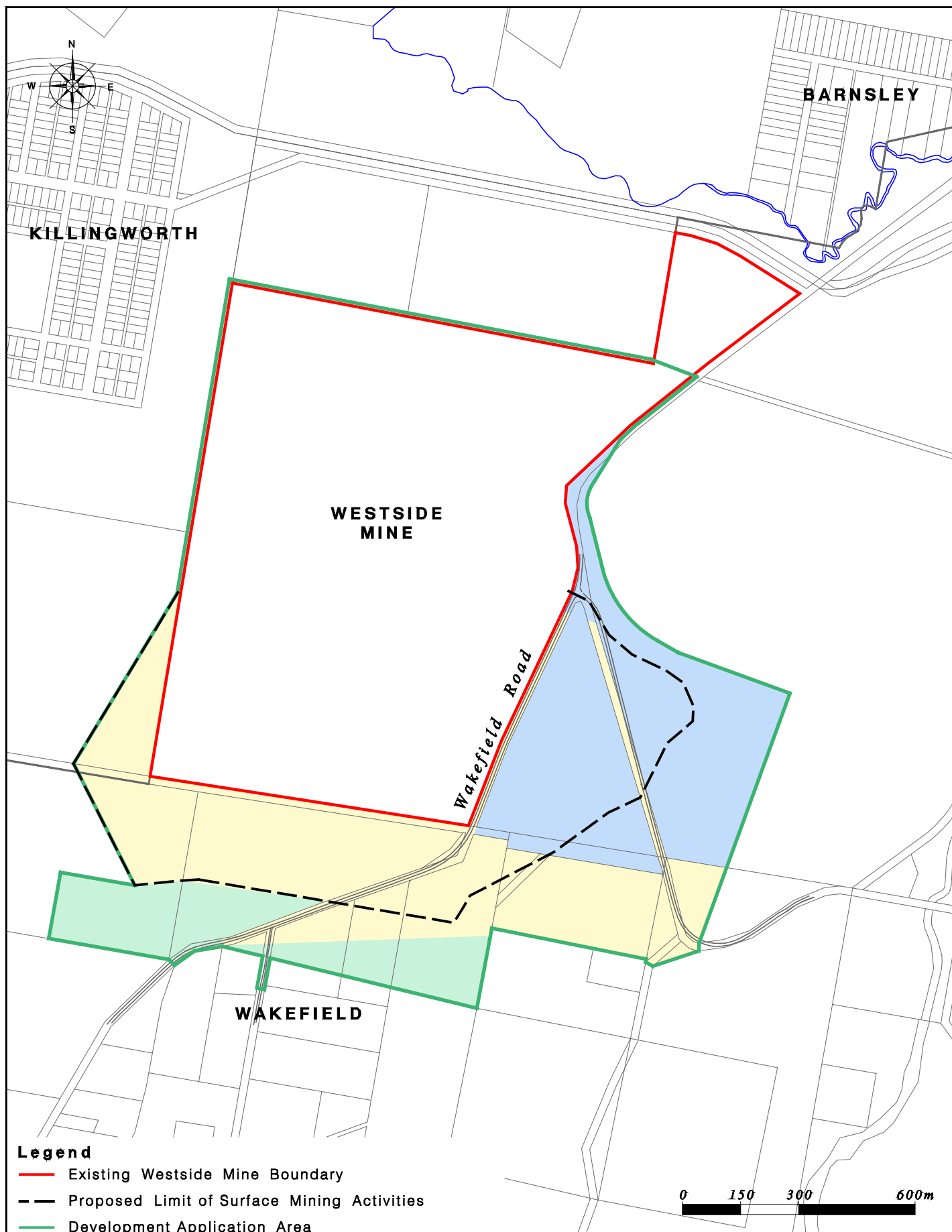
**PLATE 2.1**

View of the Proposed Extension Area in the foreground  
and Existing South Pit in the background



**PLATE 2.2**

Subsidence caused by previous shallow underground mining  
in the Proposed Southern Extension Area



**Table 2.1 – Existing Mining Titles**

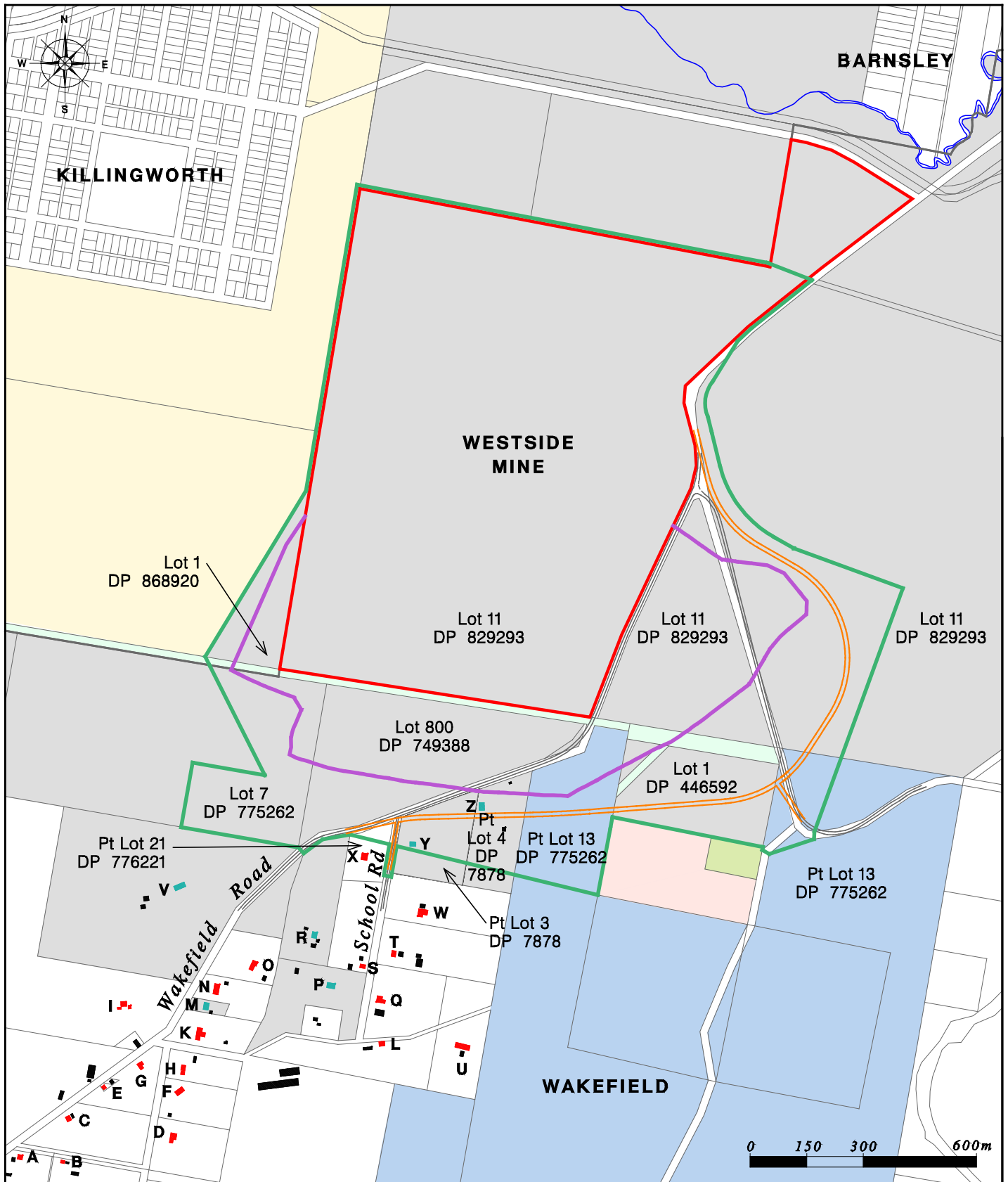
| <b>Mining Title</b> | <b>Current Holder(s)</b>                  |
|---------------------|-------------------------------------------|
| CCL 725             | Macquarie Coal Joint Venture Participants |
| CCL 718             | Macquarie Coal Joint Venture Participants |
| ML 1336             | Macquarie Coal Joint Venture Participants |
| PLL 153             | Macquarie Coal Joint Venture Participants |
| ML 1248             | Macquarie Coal Joint Venture Participants |
| CL 532              | Macquarie Coal Joint Venture Participants |
| CCL 774             | Mt Thorley Operations Pty Limited         |

As shown on **Figure 2.3**, MCJV participants own the majority of land within the DA area, in addition to extensive land to the north, east and southwest. Other private land holders within the DA area are Peel and Dewez, and the beneficiaries of the Donaldson Estate. The Donaldson Estate property lies within the area of the Rhondda Colliery Holding. In addition, portions of Crown Land, and Wakefield Road and Rhondda Road (which are Crown Roads under the jurisdiction of LMCC), are located within the DA area (refer to **Figure 2.3**). Real property descriptions of the affected land are provided in Schedule 1 of **Appendix 3**. The ownership of properties labelled on **Figure 2.3** is listed in **Table 2.2**.

**Table 2.2 - Property Ownership**

| <b>Location - refer to Figure 2.3</b> | <b>Ownership</b>             |
|---------------------------------------|------------------------------|
| A                                     | J. Peterson                  |
| B                                     | Gillard                      |
| C                                     | Brown                        |
| D                                     | Pulik                        |
| E                                     | R. Bird                      |
| F                                     | Dawson                       |
| G                                     | P. Bird                      |
| H                                     | Melrose                      |
| I                                     | P. Maroney                   |
| K                                     | Sutherland                   |
| L                                     | Harm                         |
| M                                     | Macquarie Coal Joint Venture |
| N                                     | Aurish                       |
| O                                     | Riley                        |
| P                                     | Macquarie Coal Joint Venture |
| Q                                     | W. Donnelly                  |
| R                                     | Macquarie Coal Joint Venture |
| S                                     | Maher                        |
| T                                     | M. & L. Burns                |
| U                                     | R. Donnelly                  |
| V                                     | Macquarie Coal Joint Venture |
| W                                     | R. & J. Heesemann            |
| X                                     | R. Peel & V. Dewez           |
| Y                                     | Macquarie Coal Joint Venture |
| Z                                     | Macquarie Coal Joint Venture |

*Note: J is not allocated on **Figure 2.3** and therefore does not appear in the above table.*



#### Legend

- Existing Westside Mine Boundary
- Proposed Open Cut Mining Boundary
- Development Application Area
- Proposed Wakefield Road Realignment

- Private Residences
- Buildings
- MCJV Residences

- Macquarie Coal Joint Venture
- BHP
- R.W. Miller Co. Pty Ltd
- J.P. Farrell

- Donaldson Estate/  
Former Rhondda Colliery
- Crown Land
- Other (including Residential)

(Refer to Table 2.2 for Ownership Details)

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**FIGURE 2.3**  
Land Ownership

A4 Scale 1:14 000

Ref No.: R02\_V1/1377\_072.dgn

OCAL has submitted a mining lease application for areas of mining title that are not currently held and the Minister for Mineral Resources has requested OCAL to submit a DA for the project. Consequently, land owners' consent is not required prior to lodgement of the DA.

## 2.2 RELEVANT PLANNING CONSIDERATIONS

Following are details regarding relevant Commonwealth, State, regional and local planning provisions which could potentially apply to the development, and discussion of the relevance of these planning provisions to the proposed development.

### 2.2.1 Commonwealth Legislation

#### 2.2.1.1 Environment Protection and Biodiversity Conservation Act 1999

The *Environmental Protection and Biodiversity Conservation Act 1999* (EPBC Act) commenced on 16 July 2000 and is administered by Environment Australia. The EPBC Act repeals the following Commonwealth Acts:

- *Environmental Protection (Impact of Proposals) Act 1974*;
- *Endangered Species Protection Act 1992*;
- *World Heritage Properties Conservation Act 1983*;
- *National Parks and Wildlife Conservation Act 1974*; and
- *Whale Protection Act 1980*.

Under the EPBC Act, approval of the Commonwealth Minister for the Environment is required for any action that may have a significant impact on matters of national environmental significance. These matters are:

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

As the proposed continuation of mining operations at Westside Mine does not relate to any of the matters of national environmental significance prescribed by the EPBC Act, approval from the Commonwealth Minister for the Environment is not required for this proposal. Further details relating to the EPBC Act are provided in **Section 5.6**.

### **2.2.1.2 Native Title Act 1993**

The *Native Title Act 1993* was passed by the Commonwealth government in response to the High Court judgement in the case of *Mabo v Queensland* (1992), which found that the native title rights of Australia's indigenous people were recognised in common law.

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

It is believed that the *Native Title Act 1993* is not relevant to this assessment, as the various small areas of Crown Land that are included in the DA area are either Crown Roads (not subject to native title) or lie within an existing mining lease that includes the surface (ML 1336).

### **2.2.1.3 Australian Heritage Commission Act 1975**

The *Australian Heritage Commission Act 1975* provides for the Register of the National Estate to assist in the protection of places, being components of the natural or cultural environment of Australia, that have aesthetic, historical, scientific or social significance, or special value for future generations, as well as the present community. Listing on the Register provides authoritative statement of a place's significance but does not impose any legal obligation on individuals, private organisations, or State and local governments.

There are no heritage items within the DA area that are listed on the Register.

## **2.2.2 New South Wales Legislation**

### **2.2.2.1 Environmental Planning and Assessment Act**

The *Environmental Planning and Assessment Act 1979* (EP&A Act) is administered by PlanningNSW. It institutes a system of environmental planning and assessment for the State of New South Wales.

The objectives of the EP&A Act relevant to the proposed development are to encourage:

- the proper management, development and conservation of natural and man made resources;
- the promotion and co-ordination of the orderly and economic use and development of land;
- ecologically sustainable development; and
- the protection of the environment.

### **2.2.2.2 Environmental Planning and Assessment Regulation 2000**

The *Environmental Planning and Assessment Regulation 2000* sets out a number of matters that an EIS must address as well as requiring the proponent to consult with the Director General of Urban Affairs and Planning to determine the requirements for the EIS. This EIS has been prepared in consultation with DUAP (now PlanningNSW) and in accordance with

the Regulation (refer to **Section 8.0** for a checklist of requirements and **Appendix 3** for the EIS form required under Section 71 of the Regulation).

### **State Significant Development**

The EP&A Act provides that development proposals that are of State significance are to be determined by the Minister administering the EP&A Act (currently the Minister for Urban Affairs and Planning). This project is State Significant Development as discussed in **Section 1.5**.

### **Designated Development**

Schedule 3 of the *Environmental Planning & Assessment Regulation 2000*, prescribes the types of development that require preparation of an EIS. These types of proposals are referred to as ‘designated development’. The consent authority, when considering the DA, consider the likely impacts of the development as well as any submissions made by other government agencies, local councils and the public.

As coal mining is included in Schedule 3 of the Regulation, the proposed development is designated development and an EIS is required.

### **Integrated Development**

Any development proposal that requires subsequent approvals identified in section 91 of the EP&A Act is defined as ‘integrated development’. The agencies that administer these subsequent approvals are referred to as Approval Bodies. A copy of the DA and EIS is to be provided to the Approval Bodies within two days of lodgement of the DA with the consent authority. The Approval Bodies assess the EIS and provide General Terms of Approval to the consent authority for incorporation in any development consent conditions for the development. The terms of any approvals, permits or licences issued by these Approval Bodies required to enable the DA to proceed must be consistent with any development consent granted. Further, the consent authority must refuse the application if any Approval Body will not grant an approval.

As a number of relevant post-development consent approvals will be required for continued operations at Westside Mine, the proposal is integrated development.

#### **2.2.2.3 Mining Act 1992**

The *Mining Act 1992* is administered by DMR and, amongst other legislative instruments, places controls on methods of exploration and mining, the disposal of mining waste and land rehabilitation, and environmental management activities. A new mining lease may not be granted unless a valid development consent is in place under the EP&A Act.

A mining lease entitles the leaseholder to mine coal from a deposit; however, a number of conditions must be met in regard to safety, environmental management, waste disposal and payment to the State of a royalty for each tonne of coal recovered. The proponent is required to prepare a Mining Operation Plan (MOP) prior to commencement of mining. Detailed proposals for mining plans, geological data, rehabilitation and environmental management must be provided in the MOP. DMR also requires the preparation of an annual environmental management report (AEMR), which documents the environmental performance of the mining operation. Further details of the regulatory framework administered by DMR are provided in **Section 6.12**.

#### **2.2.2.4 Water Management Act 2000**

This Act is administered by DLWC and consolidates water management in NSW. It repeals a number of Acts including the *Water Act 1912* and the *Rivers and Foreshores Improvement Act 1948*. At the time of preparation of this EIS, regulations detailing the licensing provisions of the *Water Management Act 2000* had not been gazetted. The licensing provisions of the *Water Act 1912* and *Rivers and Foreshores Improvement Act 1948* remain in effect until such time as the Water Management Regulation is gazetted. The relevant provisions of that legislation are provided below.

#### **2.2.2.5 Water Act 1912**

This Act is administered by DLWC. A permit and/or licence is required to extract surface or groundwater. Westside Mine will require a licence to extract groundwater for the purposes of pit dewatering. This licence will be held by OCAL until such time as the Water Management Regulation is gazetted and a new licence is issued.

#### **2.2.2.6 Rivers and Foreshores Improvement Act 1948**

This Act is also administered by DLWC. A permit is required under Part 3A of the Act to excavate or remove materials from 'protected land' or do anything likely to interfere with the flow of 'protected waters'.

The legislation defines 'protected waters' as rivers, lakes into and from which rivers flow, and coastal lakes / lagoons along with their channels to the sea. 'Protected land' covers the bed, bank or shore of protected waters as well as land within 40 metres, including any deposited material.

A permit is not required for works within an area covered by a surface mining lease, as these works are covered by approvals granted under the *Mining Act 1992*.

Westside Mine will require a permit for works within 40 metres of protected waters on land for which there is no surface mining lease. These works include construction of the Wakefield Road realignment across Diega Creek.

#### **2.2.2.7 National Parks and Wildlife Act 1974**

The *National Parks and Wildlife Act 1974* is administered by NPWS. A Consent to Destroy permit is required prior to the destruction of any known Aboriginal archaeological sites. As archaeological sites have not been identified within areas to be disturbed by the proposed development (refer to **Section 5.9**), a Consent to Destroy permit will not be required from NPWS.

#### **2.2.2.8 Threatened Species Conservation Act 1995**

The *Threatened Species Conservation Act 1995* is also administered by the NPWS. Either development consent or a licence is required under Section 91 of this Act to harm any animal that is a member of a threatened species, population or community. The assessment of potential impacts on threatened species and communities is discussed in **Section 5.6**.

#### **2.2.2.9 Environmentally Hazardous Chemicals Act 1985**

The *Environmentally Hazardous Chemicals Act 1985* is administered by the EPA. A licence is required for any storage, transport or use of prescribed chemicals. Should such a licence be required during future operation, that licence will be held by Westside Mine or the relevant subcontractor.

#### **2.2.2.10 Dangerous Goods Act 1975**

The *Dangerous Goods Act 1975* is administered by WorkCover and requires that licences be held for the storage, transport and use of dangerous goods, as prescribed by the *Dangerous Goods Regulations 1978*. Should such a licence be required during operation of the mine, that licence will be held by Westside Mine or the relevant subcontractor.

#### **2.2.2.11 Protection of the Environment Operations Act 1997**

The *Protection of the Environment Operations Act 1997* (PoEO) Act is administered by the EPA and establishes the procedures for issuance of licences for environmental protection including waste, air, water and noise pollution control. The owner or operator of a premise that is engaged in scheduled activities is required to hold a licence to pollute and comply at all times with the conditions of that licence. As coal mining is a scheduled activity under Schedule 1 of the PoEO Act, Westside Mine currently holds an Environment Protection Licence (EPL No. 004033) which will need to be modified to cover the extended premise boundary.

#### **2.2.2.12 Roads Act 1993**

The *Roads Act 1993* is administered by either the RTA, local Council or DLWC: the RTA has jurisdiction over major roads, local Council over minor roads and DLWC over road reserves.

The *Roads Act 1993* determines the rights of the public and adjacent land owners to use public roads, and establishes procedures for the opening and closing of public roads. Under the Act applications are required to be made to the Minister for the closure of Crown Roads. All applications are published in the local newspaper and determined by the Minister after consideration of any submissions.

It is proposed to realign a section of Wakefield Road and to close a section of Rhondda Road which are administered by LMCC, therefore approval is required under the Roads Act from Council.

Crown Road closures will also be sought for the Crown Road shown on **Figure 2.3**.

#### **2.2.2.13 Crown Lands Act 1989**

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

There are several small parcels of Crown Land within the DA area, three located between the existing Wakefield Road alignment and Rhondda Road, and one located west of Wakefield Road. The MCJV participants have held discussions with DLWC and have proposed to acquire the three small areas of Crown Land comprising Crown Roads, whilst the remaining area of Crown Land is already included in a mining lease held by the MCJV participants.

#### **2.2.2.14 Aboriginal Land Rights Act 1983**

The *Aboriginal Land Rights Act 1983* provides for the constitution of local, regional and State Aboriginal Land Councils. Part 6 of the Act prescribes a mechanism for Land Councils to claim Crown Land. As of October 2001, no land rights claims had been made over the Crown Land within the DA area. Part 6 of the Act is not relevant to this assessment due to

the small area of Crown Land affected by the proposal and the limited opportunity for future claims.

Where a Land Council owns land that is subject to a mining lease application, Part 7 of the Act requires the consent of the Land Council be obtained prior to the granting of a new mining lease. However, as there is no land held by a Land Council within the DA area, Part 7 of the Act does not apply to this proposal.

#### **2.2.2.15 Heritage Act 1977**

The *Heritage Act 1977* provides for the conservation of the State's natural and built heritage. The Act is administered by NSW Heritage Council and it provides for the constitution of the Heritage Council of NSW. The Heritage Council maintains the State Heritage Register, which lists heritage items of State significance. The Heritage Council may also request local councils to prepare environmental planning instruments to protect items of local significance. There are no State heritage listed items within the DA area.

#### **2.2.2.16 Fisheries Management Act 1994**

The *Fisheries Management Act 1994* provides for the conservation of the State's aquatic resources and is administered by NSW Fisheries. The Act applies to all aquatic animals, whether alive or dead, excluding marine mammals, reptiles, birds and amphibians, which are covered by the provisions of legislation administered by NPWS. The Act requires that potential impacts on fish passage, water quality, fish habitat, riparian vegetation and threatened species be addressed. This EIS has assessed the impacts of the proposal on aquatic flora and fauna. Further details are provided in **Section 5.6**.

### **2.2.3 State Environmental Planning Policies**

The State Environmental Planning Policies (SEPPs) that are potentially relevant to the proposed development include SEPP 11 – Traffic Generating Development, SEPP 33 – Hazardous and Offensive Development, SEPP 44 – Koala Habitat Protection and SEPP 45 – Permissibility of Mining. The applicability of these SEPPs to the proposed development is discussed below.

#### **2.2.3.1 State Environmental Planning Policy 11**

SEPP No. 11 – Traffic Generating Developments requires that the Roads and Traffic Authority is made aware of and given the opportunity to make representations in respect of developments listed in Schedule 1 of that SEPP, including mining developments. The RTA has been consulted in regard to this proposal (refer to **Section 1.6.2**) and a traffic assessment of the proposed development is contained in **Section 5.11**.

#### **2.2.3.2 State Environmental Planning Policy 33**

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

A hazard assessment of the proposed development is contained in **Section 5.13**.

### 2.2.3.3 State Environmental Planning Policy 44

SEPP No. 44 – Koala Habitat Protection applies to the extent that a Council is restricted from granting development consent for proposals on land identified as core koala habitat without preparation of a plan of management. A detailed assessment has been conducted to determine whether the site contains core koala habitat. As discussed in **Section 5.6**, no core koala habitat was found to occur at the site.

### 2.2.3.4 State Environmental Planning Policy 45

SEPP No. 45 – Permissibility of Mining provides that if mining is permissible on land with development consent in accordance with an environmental planning instrument and provisions of that instrument are satisfied, mining is permissible on that land with development consent without those provisions having to be satisfied. However, mining is permissible under the current Rural 1(a) and Rural 1(b) zonings, which together constitute the majority of the DA area, and therefore there is no need to invoke SEPP 45 for this proposal (refer to **Section 2.2.5.1**).

## 2.2.4 Hunter Regional Environment Plan

Relevant objectives of the Hunter Regional Environmental Plan (1989) (Hunter REP) for management and transportation of regional coal resources are:

- (a) manage the coal and other mineral resources and extractive materials of the region in a co-ordinated manner so as to ensure that adverse impacts on the environment and the population likely to be affected are minimised;*
- (b) ensure that development proposals for land containing coal and other mineral resources and extractive materials are assessed in relation to the potential problems of rendering those resources unavailable; and*
- (c) ensure that the transportation of coal and other mineral resources and extractive materials has minimal adverse impact on the community.*

The Hunter REP specifies that land use planning in areas where coal with open cut mining potential has been identified should provide only for development that is compatible with mining or extractive activity. Mining is regarded as a priority land use in these areas.

The Hunter REP stresses the importance of environmental management of mining sites, and sets out issues that should be considered by consent authorities. The following relevant issues relating directly to assessment of developments involving mining are also outlined in the Hunter REP and the sections of the EIS in which issues are addressed are noted:

- the conservation value of the land and appropriate post-mining land use (**Section 5.4**);
- progressive rehabilitation of mined areas (**Section 6.10**);
- minimising any adverse effects on groundwater and surface water quality and flow characteristics (**Section 5.5**);
- consideration of any likely impacts on air quality and the acoustical environment (**Sections 5.7 and 5.8**);
- provision of environmentally acceptable transport (**Section 5.11**); and
- reference to Total Catchment Management strategies (**Section 5.5**).

The proposed continuation of open cut coal mining operations and associated activities, including the environmental management procedures outlined in this document, are considered to meet the objectives of the Hunter REP. In particular:

- management of the Westside Mine Southern Extension will be integrated with the existing mining operations, and environmental impact mitigation measures have been developed with consideration of the cumulative impacts of mining within the area;
- potential resource sterilisation has been assessed (refer to **Section 4.2**) and there will be no sterilisation of economic coal seams beneath the target seams;
- the conceptual mine plan has been designed to maximise resource recovery whilst limiting community impacts, and to enable progressive rehabilitation of past disturbances, in particular ongoing subsidence damage caused by previous shallow mining activities; and
- the use of existing coal handling and transport infrastructure, minimises the environmental impact of transporting product coal to the local power stations.

There are no particular provisions of the Hunter REP - Heritage (1989) relevant to this proposal, as outlined in **Section 5.9.2**.

## 2.2.5 Local Environmental Plan and Permissibility

### 2.2.5.1 Lake Macquarie Local Environmental Plan

The proposed development is within the City of Lake Macquarie. Planning provisions for the City are contained in the Lake Macquarie Local Environmental Plan 1984 (as amended). A brief outline of relevant provisions of the LEP relating to the development is provided below.

#### Zoning

The LEP divides Lake Macquarie Shire into land use zones, with different uses permissible in the various zones. Land affected by this DA is subject to the following zonings, Zone No. 1(a) - Rural "A"; Zone No. 1(b) – Rural "B"; Zone No. 4(b) Special Industry and Zone No. 7(a) – Environmental Protection (Scenic). The general intention of each of the relevant zones is listed in **Table 2.3**.

**Table 2.3 – Intentions of Land Zonings in Lake Macquarie LEP**

| Lake Macquarie LEP zone                | Intention of Zone                                                                                                                                       |
|----------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------|
| Rural "A" 1(a)                         | "land is set aside to promote rural development and protect against urban encroachment"                                                                 |
| Rural "B" 1(b)                         | "land is set aside to promote rural development, to protect against urban encroachment and to protect the safety and efficiency of main arterial roads" |
| Special Industry 4(b)                  | "land is set aside for the purpose of industry development"                                                                                             |
| Environmental Protection (Scenic) 7(a) | "land is set aside for the purpose of preserving areas of high scenic landscape quality"                                                                |

The proposed mining activities are permissible within zone No. 1(a), zone No. 1(b) and zone 4(b) with development consent. They are not, however, permissible within zone No. 7(a) – Environmental Protection (Scenic) which comprises approximately 6% of the DA area.

In relation to the 7(a) zoning, a rezoning application was prepared by AB Nelson and Associates on behalf of OCAL in 1997. This application covered part Lot 7 DP 755262 and Lot 800 DP 749388 and requested that the current Environmental Protection (Scenic) 7(a) zoning be changed to Rural “A” 1(a) zoning.

The rezoning application was submitted to LMCC in June 1997 and covered sufficient area to cater for a previously proposed more southerly extension of mining (refer to **Figure 2.4**). On 9 February 1998, Council resolved that the draft amendment to the Lake Macquarie Local Environmental Plan (LMLEP) not be exhibited until the DA and EIS for the proposed southern extension has been lodged. During 2000, OCAL requested LMCC to reconsider this decision, in order to allow sufficient certainty for the DA process to proceed.

On 19 October 2000, the Councillors conducted an inspection of the subject site. The Councillors also met with members of the Wakefield community who raised concerns regarding the extent of mining proposed, including the removal of a prominent ridgeline that currently forms a visual and physical barrier between the current operating mine and the Wakefield community.

The Councillors concluded that mining should not disturb this southern facing ridgeline west of Wakefield Road but that rezoning should proceed to allow consideration of a DA for mining to the north of the ridgeline.

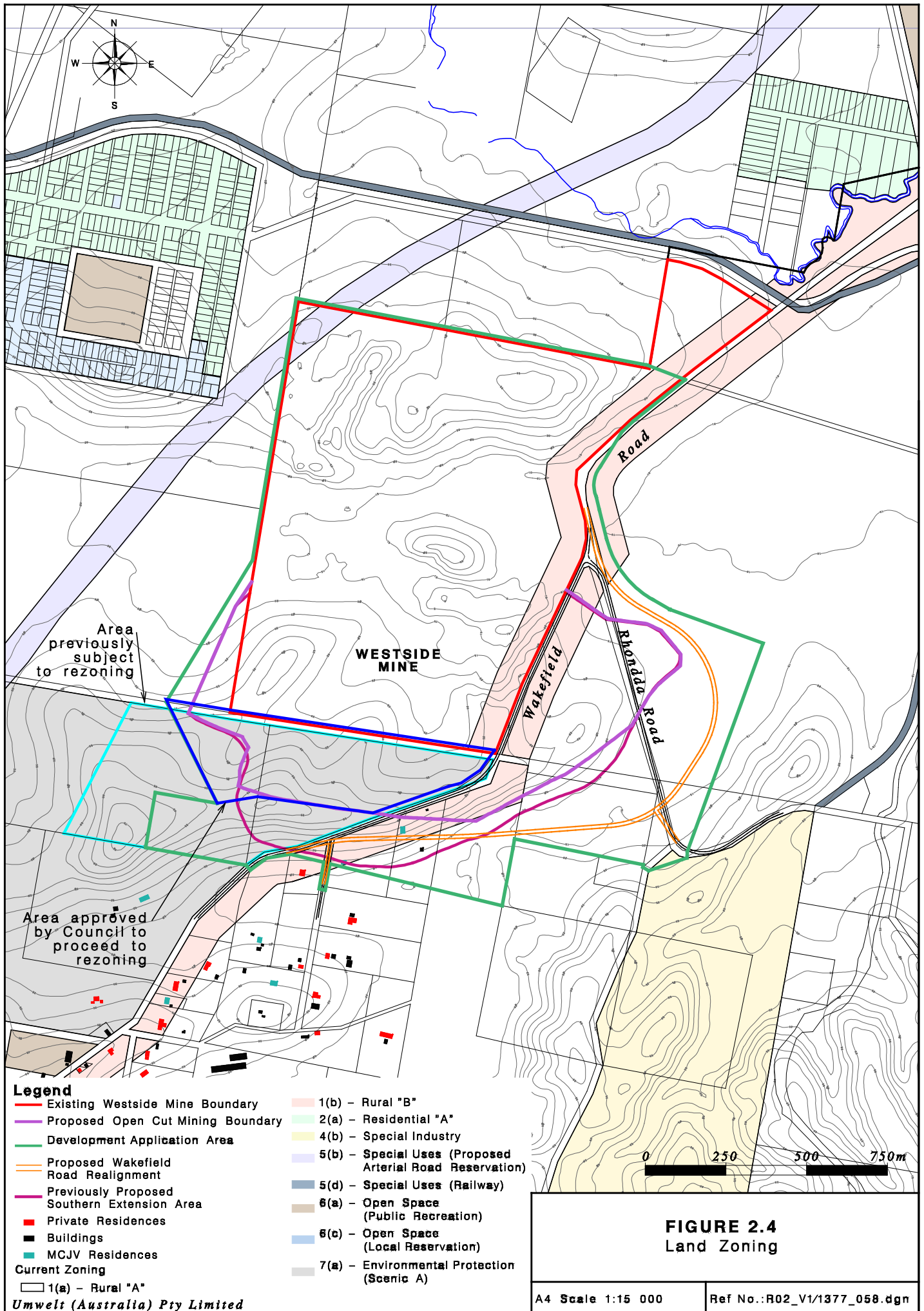
On 27 November 2000, Council resolved:

- to prepare an amendment to the LMLEP 1984, pursuant to s54 of the *Environmental Protection and Assessment Act 1979* to allow open cut mining as a use permissible with consent on Part Lot 7 DP 755262 and Lot 800 DP 749388, Wakefield Road, Wakefield (the area of rezoning is shown on **Figure 2.4**);
- to notify DUAP of Council’s decision within 28 days; and
- to notify the Department that it intends to use its delegation under s65 of the Act to place the draft amendment to the LMLEP on public exhibition.

Following this process and consideration of community concerns, OCAL resolved to reduce the proposed extent of mining to that shown on **Figure 2.4**. Subsequently, DUAP advised that as the majority of the DA area is within a zone that permits the activity (ie Zoned 1(a) and 1(b)) the activity is permissible on land where zoning excludes it, under s76A(8) of the EP&A Act.

A number of aims and objectives in the Lake Macquarie LEP are relevant to this development and are as follows:

- “(a) to promote and co-ordinate the orderly and economic use and development of land;
- (b) to ensure that the development of land does not exceed the environmental capacity of the City of Lake Macquarie;
- (e) to ensure that new industrial and commercial developments are located so as to provide good access to suppliers and markets;



- (i) *to prevent the sterilisation of prime economic resources, primarily coal, other extractive materials and forests;*
- (q) *to control development so as to minimise potential hazards of air, water and land pollution;*
- (r) *to prevent future soil erosion and combat existing erosion;*
- (s) *to protect areas of high landscape value and natural areas of conservation and recreation significance, including coastal wetlands;*
- (t) *to protect areas of scientific, historical or archaeological significance to the region or the State;*
- (u) *to protect Lake Macquarie from the adverse effects of urbanisation and improper recreational use, and specifically from increased siltation and from pollution from sewage, industry, power generation and mining;*
- (v) *to protect the scenic value and rural character of the western and southern areas of the City as a buffer to Central Coast development, and as a quiet recreational zone;*
- (aa) *to encourage the provision of employment opportunities in locations close to places of residence, particularly for young people and women;*
- (gg) *to conserve the City's environmental heritage."*

The extraction of the coal resources present in the Westside Mine Southern Extension Area can be achieved in a manner consistent with these goals and objectives and will assist in achieving a number of the stated goals and objectives of the Lake Macquarie LEP.

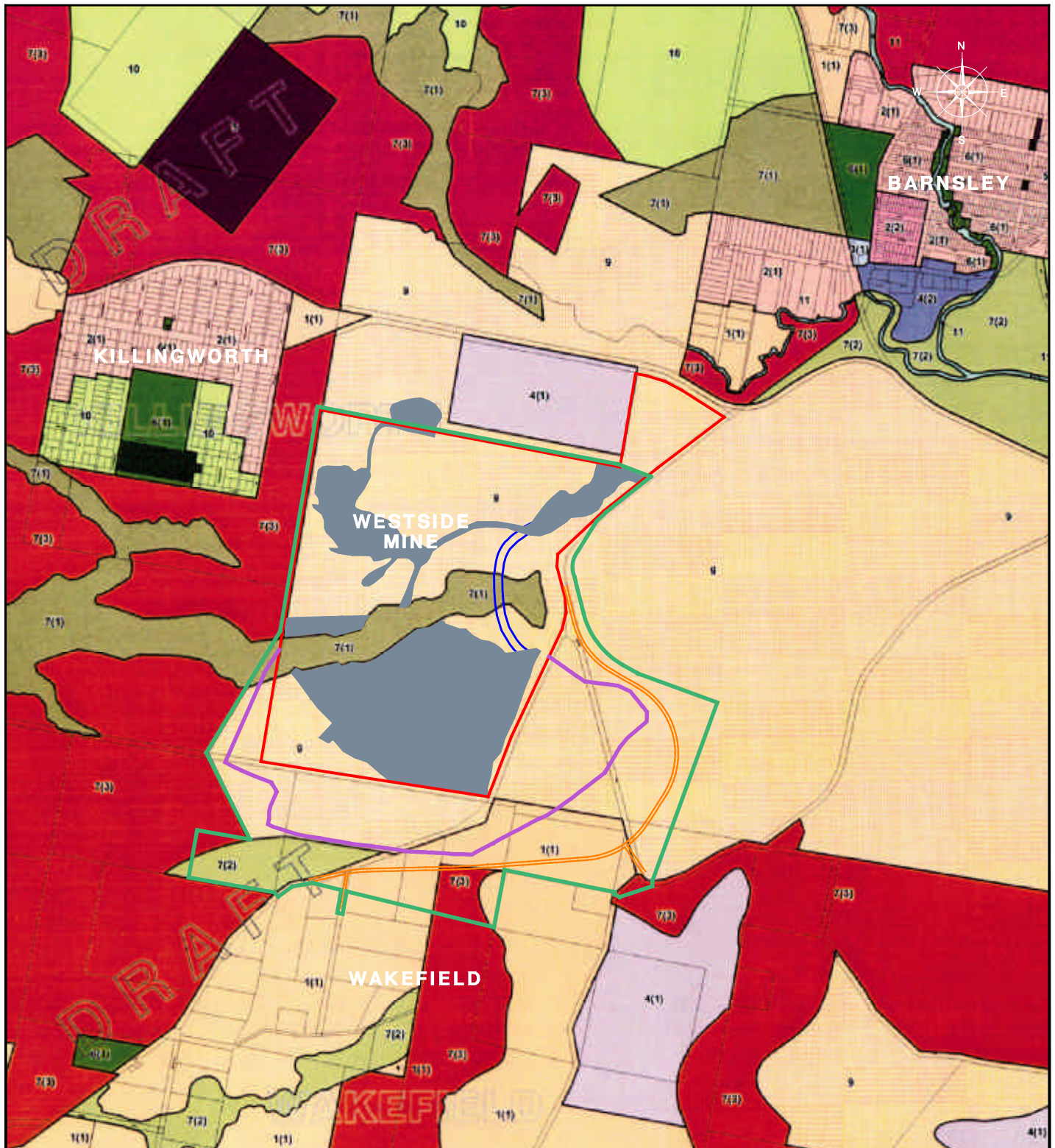
## 2.2.6 Draft Lake Macquarie Local Environmental Plan 2001

The City of Lake Macquarie has recently exhibited a draft Environmental Planning Instrument (EPI), being the Draft Lake Macquarie Local Environmental Plan 2001 (DLEP 2001). The revised draft LEP 2001 is expected to be re-exhibited in mid 2002.

Land affected by this DA will be subject to the following zonings under the Draft LEP 2001; Zone 1(1) - Rural (Production); Zone 7(1) - Conservation (Primary); Zone 7(2) - Conservation (Secondary); Zone 7(3) - Conservation (General); Zone 9 - Natural Resources.

The proposed open cut mining activities are located on land proposed to be zoned 1(1), 7(1), and 9, as shown in **Figure 2.5**. Such activities will be permissible within zone 1(1) and zone 9, but not permissible within zone 7(1). The particular area of land proposed to be zoned 7(1) appears to relate to the riparian margin of Cockle Creek. However, close examination of the zone boundary map, as publicly exhibited, in relation to the actual creek position, reveals a possible inaccuracy, whereby the riparian margin as mapped is actually further north (see **Figure 2.6**). LMCC has been consulted regarding this matter and has indicated that the mapping error will be rectified during the LEP finalisation process. Consequently, the proposed mining activities are not likely to encroach onto land proposed to be zoned 7(1).

Further, part of the mining activity proposal includes the construction of a coal haul road (refer to **Figure 2.5**) on land proposed to be zoned 7(1) and 9. Such an activity will be permissible within those zones.



#### ZONE INDEX DRAFT 2001 LEP

##### 1. RURAL

1(1) 1(1) Rural (Production)

##### 2. RESIDENTIAL

2(1) 2(1) Residential

2(2) 2(2) Residential (Urban Living)

##### 3. BUSINESS

3(1) 3(1) Urban Centre

##### 4. INDUSTRIAL

4(1) 4(1) Industrial (Core)

4(2) 4(2) Industrial (Urban Services)

##### 5. INFRASTRUCTURE

5 Infrastructure

##### 6. OPEN SPACE

6(1) 6(1) Public Open Space (Community Ownership)

##### 7. ENVIRONMENTAL PROTECTION

7(1) 7(1) Conservation (Primary)

7(2) 7(2) Conservation (Secondary)

7(3) 7(3) Environmental (General)

##### 8. NATIONAL PARK

8 National Park

##### 9. NATURAL RESOURCES

9 Natural Resources

##### 10. INVESTIGATION

10 Investigation Zone

##### 11. LAKE AND WATERWAYS

11 Lake and Waterways

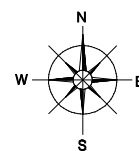
##### 12. OTHER

Acquisition

- Existing Westside Mine Boundary
- Proposed Open Cut Mining Boundary
- Development Application Area
- Proposed Wakefield Rd Realignment
- Proposed Coal Haul Road (South/East Pit)
- Westside Open Cut

0 0.25 0.5 1 km

**FIGURE 2.5**  
Draft Lake Macquarie Local  
Environmental Plan 2001



#### Legend

- Existing Westside Mine Boundary
- Proposed Open Cut Mining Boundary
- Development Application Area
- Proposed Wakefield Road Realignment
- Proposed Coal Haul Road (South / East Pit)
- ▨ Draft Lake Macquarie LEP Zone 7(1)

0 200 400 600m



**FIGURE 2.6**

Aerial View of Existing & Proposed Operation in Relation to Zone 7(1)

Furthermore, it is proposed to realign Wakefield Road as part of the development (refer to **Figure 2.5**), on land proposed to be zoned 1(1), 7(3), and 9, which will be a permissible activity within those zones.

The Vision Statement and a number of aims in the Draft LEP 2001 will be relevant to this development, as follows:

- Vision** The vision for the city is that it is a fair place that respects people, the environment and the economic foundation that will enable the city to prosper into the future.
- Aim (3)** Facilitate local employment opportunities and to promote economic development consistent with the city's natural, locational and community resources;
- Aim (5)** Encourage a strong sense of community identity through the development of local communities that are safe, liveable and offer a diversity of use, economic opportunity and access to services;
- Aim (6)** To develop an attractive setting that reflects the natural environment, visual and heritage character of the city;
- Aim (7)** Protect the natural environment so that ecological functions and biodiversity are maintained and enhanced.

The extraction of the coal resources present in Westside Mine Southern Extension Area can be achieved in a manner consistent with this Vision Statement and will assist in achieving a number of the stated aims of the draft Lake Macquarie LEP 2001.

#### **2.2.6.1 Development Control Plans**

The only development control plan (DCP) relevant to the proposed southern extension of Westside Mine is LMCC's Landscape Development Control Plan No. 31.

#### **2.2.6.2 Lake Macquarie Landscape Development Control Plan No. 31**

The objectives of the Landscape Control Plan are to:

- Protect existing landscape assets and continuation of environmental processes;
- Provide aesthetic and functional landscape solutions which are in keeping with the surrounding landscape character;
- Benefit the community by providing balanced and visually satisfying landscapes, maintaining privacy, increasing ecological connections, and improving market gains to the developer;
- Maximise recreation potential in line with LMCC's city wide theme of quality lifestyle and environment;
- Minimise the environmental, visual and ecological impact of new developments;
- Maintain tree cover in the city and encourage the use of indigenous tree species as appropriate to the development;
- Minimise long term maintenance and liabilities associated with landscape works for both Council and property owners;

- Reinforce existing characteristics of a landscape or built environment which are of aesthetic, historic, scientific or social significance; and
- Provide a regulatory means to advance quality landscape design and construction in the city using professionally trained and qualified people.

In accordance with this DCP, a landscape management plan will be prepared for the development, based on the visual assessment detailed in **Section 5.10**. The plan will include planting of native trees and shrubs, reuse of topsoil and establishment of stable groundcover, as described in **Sections 5.6** and **6.10**. An overview of the types of visual control measures to be employed on site are provided in **Section 6.9**.

## **SECTION 3**

### **Existing Operations**

## 3.0 EXISTING OPERATIONS

This section provides a description of the existing Westside Mine operations, including an outline of existing environmental management procedures.

### 3.1 CURRENT MINING OPERATIONS

The existing Westside Mine open cut operation extracts in the order of 0.6 Mtpa of run-of-mine (ROM) coal from the Great Northern and Fassifern seams. Mining is conducted by the contractor and managed by OCAL. The extent of mining as at May 2001 is shown in aerial view on **Figure 1.2**.

The mining concept was selected to provide semi-continuous coal production while allowing progressive rehabilitation.

Mining is usually progressed in a series of strips varying in width from 45 to 75 metres. Five adjacent strips are operated concurrently to ensure that coal is accessible from both of the coal seams at any time. Overburden/interburden removal is carried out in two strips and coal extraction is carried out in two strips, with backfilling of overburden occurring in the previously mined strips.

Topsoil is removed separately by a tracked dozer prior to overburden removal. Where possible, the upper layer of overburden is free-dug by hydraulic excavator. The remaining overburden is drilled and blasted to enable it to be loaded by the excavator and hauled by rear-dump trucks to the opposite side of the pit where it is placed to backfill the previously mined void. Where overburden is to be removed above old underground workings in the Great Northern seam, blasting is utilised to ensure that any major open voids are filled before mining equipment works directly above them. An excavator then digs rock from between any remaining coal pillars. Interburden between the two seams is removed using dozers which push broken rock across into the previously mined strip until the lower coal seam is exposed.

A dozer then rips and pushes exposed coal seams into stockpiles on the pit floor. A front end loader loads the stockpiled coal into 60 tonne off-highway trucks to be transported to the crushing plant.

### 3.2 COAL HANDLING AND TRANSPORTATION

ROM coal is hauled by 60 tonne capacity rear dump trucks to the crushing plant, which is located beside the haul road at the eastern end of the north pit. Most of the ROM coal is dumped directly into a hopper above the feeder breaker that directly feeds the primary crusher. A smaller proportion of ROM coal is temporarily stockpiled adjacent to the hopper from where it can be loaded into the hopper when coal is unavailable from the pit. Coal is weighed by a weightometer fitted to a conveyor belt prior to being fed via a screen into the secondary crusher. The last stage of the process involves conveying coal past an ash analyser up to a 250 tonne product bin.

After the coal crushing process, coal from the product bin is loaded directly into 27 tonne capacity, on-highway type semi-trailers for haulage to the power station. An average of 4000 tonnes of coal is hauled per day, with approximately 296 truck movements (that is, 148 truck trips). A small saleable product stockpile area with a capacity of up to 3000 tonnes is located beside the coal crushing plant.

From January 1993 up until December 2001 Westside Mine's product coal was sold entirely on the domestic market. The vast majority of coal is hauled to Eraring Power Station via OCAL's private haul road (refer to **Figures 1.1** and **1.3**) that connects to Newstan Colliery's haul road to Eraring Power Station. Occasionally, coal has been hauled to Vales Point Power Station with trucks travelling via the private haul road to Awaba Road, to the F3 Freeway, and then south on the Freeway to access the power station via Wyee Road and Rutleys Road. Although Council has removed the load limits on Wakefield Road, OCAL continues to use the longer route described above in order to meet Wakefield residents' requests to have no coal haulage through Wakefield.

During December 2001 to February 2002 around 30000 tonnes of coal produced at Westside Mine was exported under a spot contract. This coal was transported to Newstan Colliery via the private haul road where it was loaded into trains for transport to the port.

### **3.3 REJECT DISPOSAL**

Coal is marketed in raw crushed state to local power stations at contract ash specifications. Coal is mined selectively to ensure continuous compliance with contract quality specifications. The only treatment process required to meet current market requirements is crushing, and therefore, no coarse or fine reject is produced as a part of the coal treatment process.

### **3.4 MINE FACILITIES**

The Westside Mine administration building, contractors' workshop, office and amenities are located at the mine entrance off Wakefield Road (**Figure 3.1**).

The crushing plant is located beside the internal haul road at the eastern end of the North Pit, southwest of the administration area (refer to **Figure 3.1**).

Equipment is refuelled from a service truck that draws fuel from an on-site 60 kilolitre bunded diesel storage tank.

All mining equipment is serviced and maintained on site either in the field or at the contractors' workshop located between the administration office and the crushing plant.

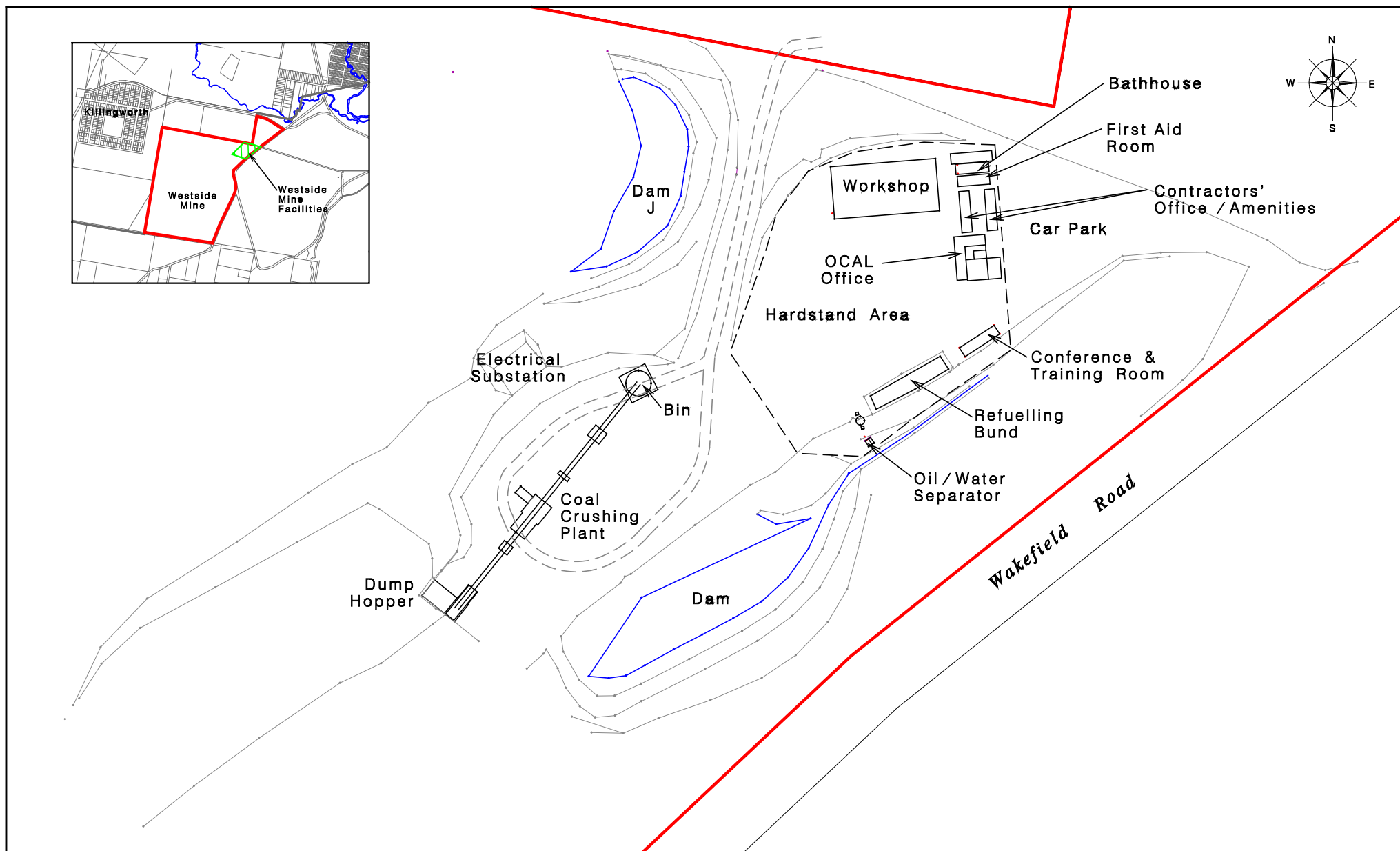
### **3.5 WORKFORCE AND HOURS OF OPERATIONS**

Westside Mine currently provides direct full time employment for 18 mine workers, plus approximately 12 contract truck drivers. People employed in the OCAL Regional Office also carry out work for Westside Mine.

Approved operating hours are Monday to Saturday, 7.00 am to 10.00 pm, but mining and coal preparation activities are generally conducted between 7.00 am and 7.00 pm Monday to Friday with equipment maintenance carried out for the remainder of the time.

### **3.6 ENVIRONMENTAL MANAGEMENT AND CONTROLS**

Westside Mine operates a comprehensive environmental management system. This system includes water, noise and air quality management, visual mitigation and land rehabilitation. The environmental management system is regulated by the various conditions of development consent, mining lease conditions and the environmental protection licence.



# **Legend**

- Existing Westside Mine Boundary
- - - Fence Compound
- - - Coal Haulage Road

Umwelt (Australia) Pty Limited  
Source: OCAL



**FIGURE 3.1**  
Existing Westside Mine Facilities

A4 Scale 1:1500

Ref No.: R02\_V1/1377\_088.dgn

The mining contractor (Hunter Valley Earthmoving Company Pty Limited) holds a single environmental protection licence (No. 004033) under the *Protection of the Environment Operations Act 1997* for Westside Mine. Internal monthly reporting of dust, blasting and water quality monitoring is undertaken to assist mine planning and operations. Dust and water quality results are assessed to ensure compliance with licence conditions. These monitoring locations are shown in **Figure 3.2**.

### 3.6.1 Meteorology

Wind speed and direction are measured continuously at the mine. The mine also measures rainfall on an hourly/daily basis via a continuous automatic rain gauge. The results of this monitoring are considered in ongoing management of the mine and collated for inclusion in the AEMR.

### 3.6.2 Water Management

Water management systems at Westside Mine currently address three main areas – rainfall runoff from the disturbed areas, groundwater inflows and water contained in old underground workings.

The objectives of the water management systems are to provide a suitable supply of water for use in dust suppression on the site and to ensure that discharges from the site are consistent with the protection of the health of aquatic ecosystems in Cockle Creek and Burkes Creek. Both water quality and flow characteristics are considered.

Groundwater and rainfall runoff within the open cut pit is directed to a sump at the lowest point of excavation. Temporary diversion banks and channels are used where necessary to direct runoff. Water is pumped from the sump to a mine dam for storage and treatment prior to discharge off site.

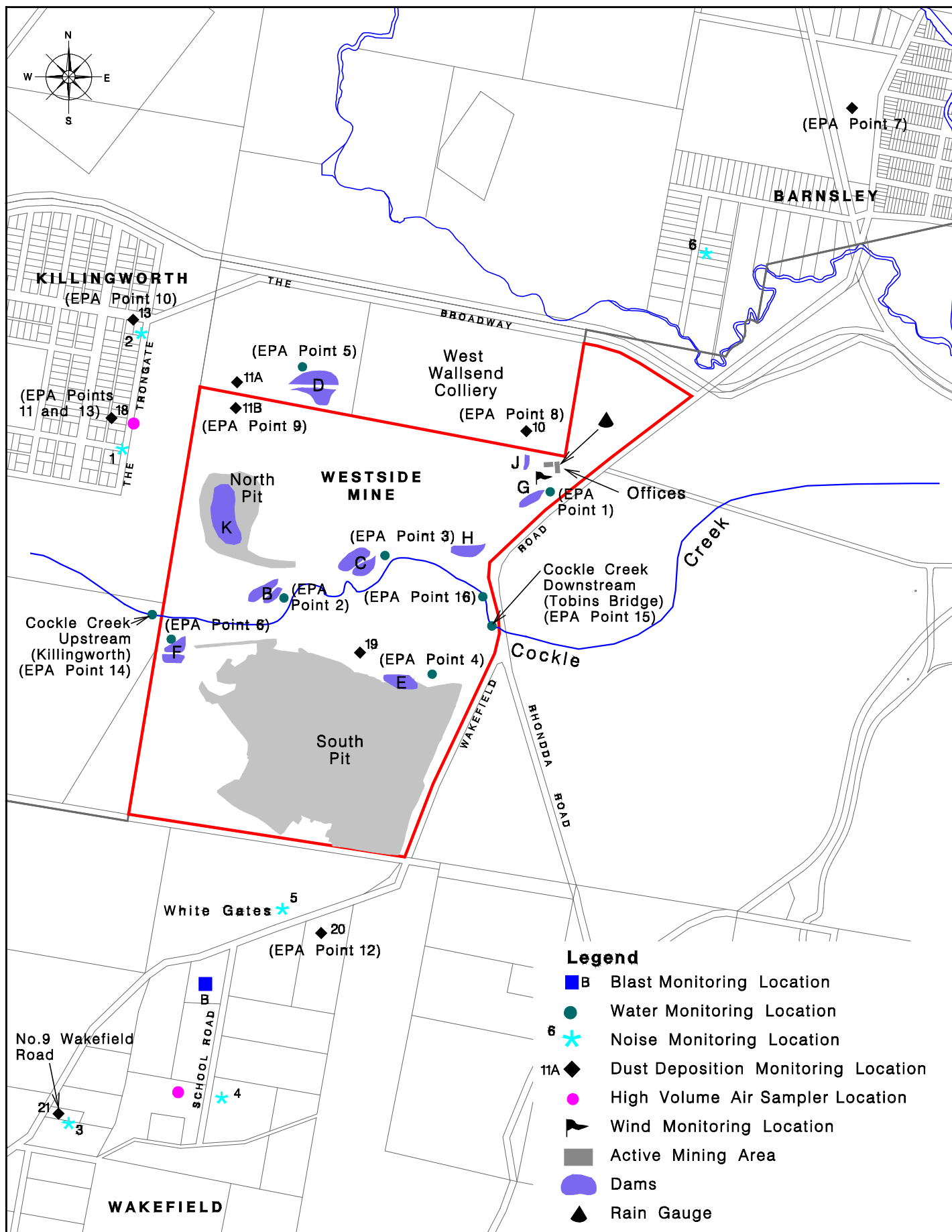
Catch drains divert clean water runoff from around mine pits, non-rehabilitated areas and the haul road while perimeter drains around disturbed areas divert all dirty water runoff to the sedimentation dams. In 2000, an upgrade to the extensive pumping network, which link various dams on site, was completed in order to utilise a large water storage area (Dam K – 15 megalitres) constructed in the void of the north pit. Apart from providing further opportunities to harvest water from the site for dust suppression, the network effectively allows for increased storage and retention time for the treatment of water by using flocculent where necessary, prior to release via the authorised discharge points. All discharges are measured by flowmeters installed on the discharge pipelines. The locations of these water management structures and monitoring points are illustrated on **Figure 3.2**.

In areas where rehabilitation is underway, after overburden emplacement has ceased and the surface has been shaped to final landform, runoff is initially retained by localised bunding with overflows draining to the sedimentation ponds. After successful revegetation, it is intended that rainfall runoff from rehabilitated areas will be diverted to adjacent natural drainage lines.

### 3.6.3 Noise Management

Current noise management practices include:

- Maintenance of plant and equipment in a good working order; and
- Generally restricting mine operations to within 7.00 am to 7.00 pm Monday to Friday (although the development consent permits operation until 10.00 pm including Saturdays).



**FIGURE 3.2**  
Location of Environmental  
Control and Monitoring Points

### **3.6.3.1 Noise Monitoring**

Noise monitoring surveys are conducted quarterly to determine noise levels at nearest residences at Killingworth, Barnsley and Wakefield and the need or otherwise for further noise mitigation measures.

The location of noise monitoring points is shown in **Figure 3.2**.

### **3.6.4 Blast and Vibration Management**

Westside Mine is required to ensure that ground vibration caused by blasting does not exceed a peak particle velocity of 5 mm/s for more than 5% of blasts, and does not exceed 10 mm/s at any time when measured at the nearest non-mine owned residence. Air blast overpressure from blasting operations should not exceed an overpressure level of 115 dB (Linear Peak) for more than 5% of the time and should not exceed a maximum of 120 dB (Linear Peak) at anytime, when measured at the nearest residence.

Westside Mine has developed detailed procedures for blasting activities so that environmental and amenity impacts on nearby residential areas are minimised. All blasts are monitored at the nearest non company owned residence.

### **3.6.5 Air Quality Controls**

#### **3.6.5.1 Dust Suppression**

Control procedures used at the mine to reduce dust generation include frequent watering of all pit haul roads and dumping areas using a water cart, and automatically activated water sprays at the coal crushing plant. The mine plan has also been arranged to minimise the area cleared ahead of the coal extraction face, and facilitate progressive rehabilitation of the spoil heaps placed in the in-pit dump.

#### **3.6.5.2 Dust Monitoring**

Westside Mine operates a comprehensive dust monitoring system comprised of seven dust gauges and two high volume samplers (HVS) (**Figure 3.2**). One HVS, located at Killingworth, measures Total Suspended Particulates (TSP) on a quarterly basis, whilst another HVS is located at Wakefield and monitors PM<sub>10</sub> (fine particles less than 10 microns in diameter) over a 24 hour period every sixth day.

### **3.6.6 Waste Management**

An envirocycle-type plant treats all sewage generated by the small workforce, with the resultant clear effluent being chlorinated and spray irrigated onto a grassed area. Any runoff from the irrigated pasture is collected in a dam along with rainfall runoff from all surface facilities and stored for use in coal crushing plant dust suppression sprays.

Waste fuel and oil and any oil removed from workshop runoff by an oil-water separator are collected and periodically removed by a licensed oil recycling contractor.

General rubbish collected from the offices and workshop is collected by a licensed waste contractor for disposal to an approved Council landfill site.

### **3.6.7 Visual Mitigation**

The nearest urban areas to Westside Mine are Killingworth and Barnsley, located approximately 200 metres to the west and 600 metres to the northeast respectively, of the current operations. Both areas are shielded from Westside Mine by a buffer zone of native

vegetation. In regard to Wakefield residents located to the south of the mine views of the current operations are generally blocked by a natural east-west trending ridge providing a screen and physical barrier between the mine and rural residences.

Westside Mine operations are partially visible from transport routes including various locations along Wakefield Road and Rhondda Road.

Westside has been careful in recent operations to ensure that rehabilitation effort has been focused on areas that are most visually prominent from off-site private residences and/or public roads. Native trees and vegetated bunding provide a screen along Wakefield Road limiting the view of the mine. Additionally, the direct seeding of trees in the overburden emplacement area along Wakefield Road reduces the visual impact of the operation.

### **3.6.8 Land Management and Rehabilitation**

As part of its commitment to environmentally sound mining practices, Westside Mine has a full soil and vegetation restoration program. The aim of the plan is to minimise the disturbance of local flora and fauna due to mining, and to facilitate rapid recovery of habitat values after mining has been completed.

The program includes pre-mining procedures for site preparation to maximise the retention of local seed in stockpiled topsoil and to maximise the potential for quick restoration of habitat values after mining. Rehabilitation is commenced as soon as practicable following the completion of mining within any area and involves re-creation of a diverse native bushland.

## **3.7 ENVIRONMENTAL PERFORMANCE AND COMPLIANCE**

During the 2000/2001 reporting period, there were no community complaints recorded in relation to the operation of Westside Mine, and only one incident of non-compliance with EPA licence conditions.

This non-compliance related to exceedance of a specific water quality criteria. Investigation of this incident indicated that sampling techniques may have caused an erroneous result. Re-sampling indicated that the water met the specific criteria.

The site procedure for sampling has been reviewed as a result of this occurrence.

## **SECTION 4**

### **The Proposed Development**

## 4.0 THE PROPOSED DEVELOPMENT

This section describes the Westside Mine Southern Extension project including the coal resource, conceptual mine plan and associated activities.

### 4.1 MINING TITLES

The MCJV participants already hold mining leases covering various areas and strata within the proposed Westside Mine Southern Extension Area. However, to enable optimum recovery of the remaining coal resource, it is necessary for the MCJV participants to gain mining title to additional areas and strata. With respect to the Westside Mine Southern Extension project, **Figure 2.2** summarises the areas of the MCJV's existing and proposed additional mining titles that extend to the surface, and the area of proposed additional mining title for sub-surface strata only (ie excluding the surface and strata to a depth of 8 metres).

The MCJV participants have submitted a mining lease application (MLA 193) to the DMR in respect of the required additional areas and strata. As explained in **Section 2.2.2.3**, development consent for the use of the land to obtain minerals is required before a mining lease may be granted.

As discussed in **Section 2.1.2**, the majority of surface land within the DA area is owned by the MCJV participants, with the exception of small parts of two privately owned properties and small areas of Crown Land, including roads. Two of the privately owned properties, namely Part Lot 13 DP 775262 (held by the beneficiaries of the Donaldson Estate) and Lot 21 DP 776221, (owned by Peel & Dewez), are included in that part of MLA 193 where the surface is sought to be in the mining lease. As noted in **Section 2.1.2**, the Minister for Mineral Resources has requested OCAL to submit a DA for the project. Consequently, land owners' consent is not required prior to lodgement of the DA.

### 4.2 GEOLOGY AND COAL RESOURCES

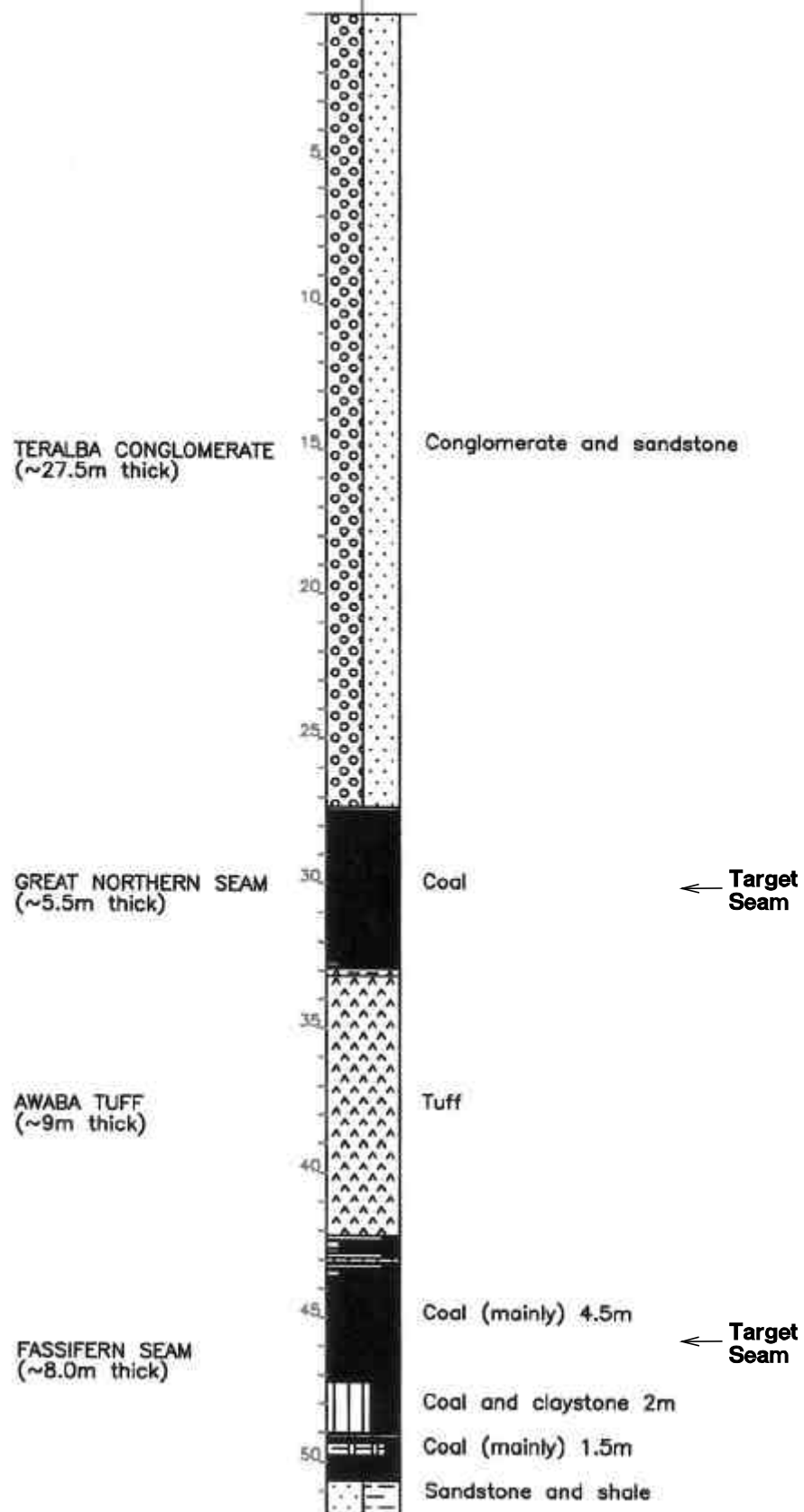
#### 4.2.1 Regional and Local Geology

The proposed Westside Mine Southern Extension is located in the central part of the Newcastle Coalfield, which lies at the northeastern edge of the Sydney Basin. The strata of interest are within the upper portion of the Newcastle Coal Measures, which are of Late Permian geological age. The nomenclature of the coal seams and the associated non-coal units in this part of the coal measure sequence is shown on **Figure 4.1**.

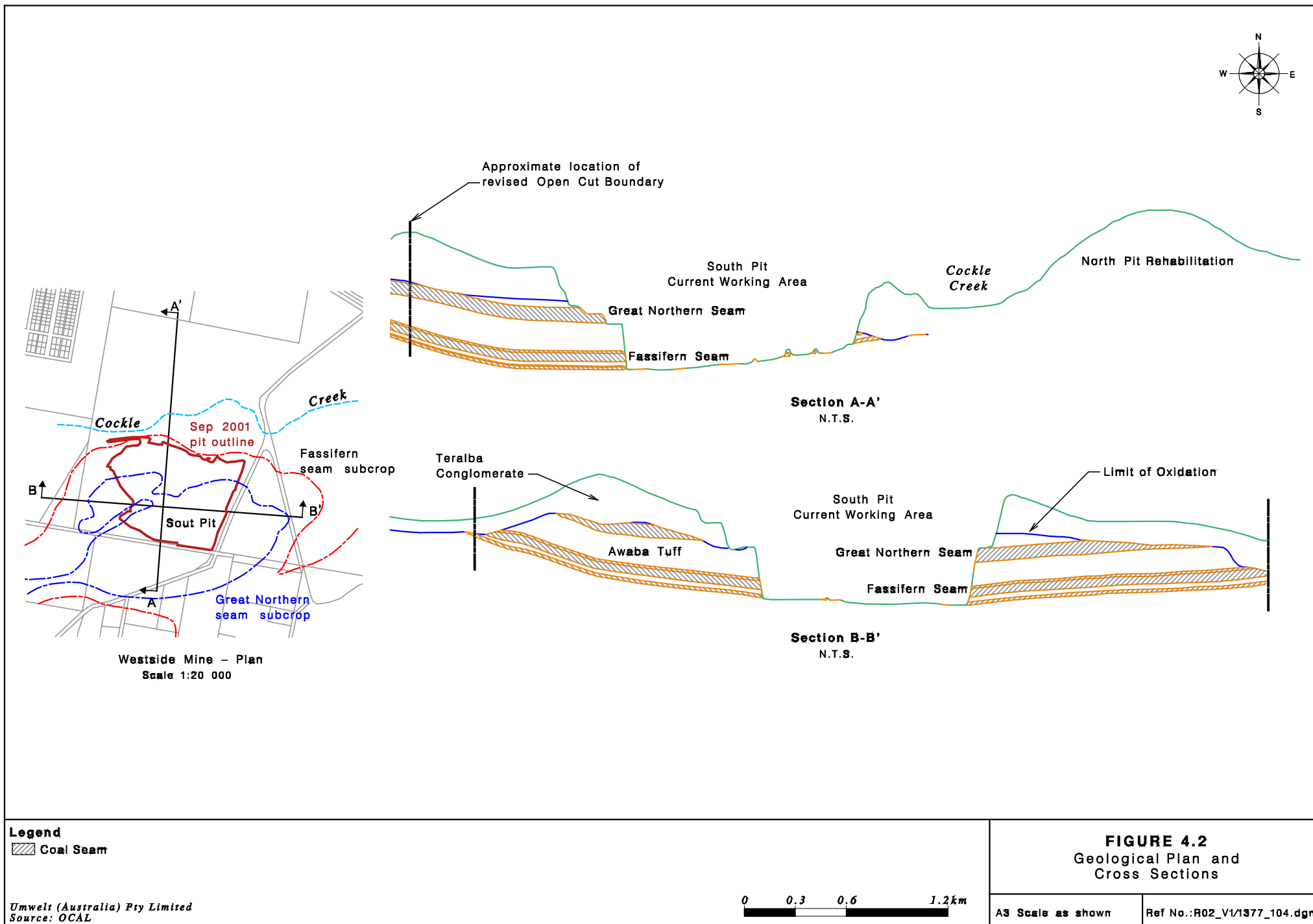
The seams that have been mined to date at Westside Mine, and which are intended to be mined during future operations, are the Great Northern and Fassifern seams. This local deposit is relatively small and occurs as a shallow basin structure with the northern and southern parts located on ridges separated by a flat, barren valley where the coal seams have been eroded. The northern part of the deposit has been mined-out by the North Pit operation of Westside Mine.

In the south, the extent of the deposit is limited by the combined effects of lower topography and the rise of the seams approaching the edges of the basin structure. However, the deposit does extend beyond the boundary of the current South Pit operation and efficient recovery of the resource can best be achieved by an extension of that operation towards the workable limit of the seams. The approximate limits of the seams and the cross sectional characteristics are shown on **Figure 4.2**.

# TYPICAL SECTION



**FIGURE 4.1**  
Coal Seams & Adjacent Strata



The Great Northern seam was worked many years ago by a different company, using underground bord and pillar methods, in the eastern part of the South Pit area and adjoining parts of the proposed extension area. Coal in the remnant pillars can be recovered as the old workings are exposed during the stripping operations to reach the underlying Fassifern seam. The Fassifern seam comprises the majority of the resource in the proposed extension area.

There is only one known geological structure of any significance in the extension area, namely a northwest/southeast trending 4.1 metre thick dyke known from the old underground workings in the Great Northern seam. It has been intersected by the current operation and has proved to be easy to excavate and dispatch to waste overburden. It is not expected to be a constraint that will affect mine design. A possible dyke, of unknown thickness, is projected in the easternmost part of the resource area.

#### **4.2.2 Coal Resources and Reserves**

A significant amount of coal exploration has been undertaken in the subject area over several decades by OCAL and other mining companies. More than 60 surface exploration boreholes have been drilled in the proposed extension area or the immediately adjacent parts of the current operation. Typically, borehole spacing ranges between 30 metres and 300 metres, generally being most closely spaced in the (subcrop) zones of shallow cover, where the seams can be affected by surface weathering and oxidation. Most boreholes have been geophysically logged. For those boreholes that were cored, the recovered coal seams have been subjected to appropriate suites of testing and analysis.

Where unoxidised, the Great Northern seam is generally between 5.5 metres and 6.0 metres thick. The basal 0.4 metre of the seam is typically very shaly and is excavated as part of the interburden rather than as product coal. The remainder of the seam is recovered as product coal where unaffected by oxidation.

The full geological thickness of the Fassifern seam, where unoxidised, is typically 7.5 metres to 8.0 metres. However, this includes several sections of high ash shaly coal and thick claystone bands within the seam that are discarded to waste. The typical aggregate thickness of the selectively mined product coal sections is approximately 5.4 metres.

The washability and other properties of these coal seams demonstrate that the mined products are best suited for use in domestic power stations.

The density of drilling and nature of geological information is such that the open cut resources of the Great Northern and Fassifern seams in the proposed extension area are classified as measured status.

The open cut coal resources are estimated to be 4.89 Mt. There are additional indicated coal resources amounting to approximately 0.58 Mt that may be mined by highwall augering methods, beyond the open cut limit to the south and southwest. Therefore, total coal resources are estimated to be 5.47 Mt.

Recoverable reserves, based on the current open cut conceptual mine plan and a detailed geological model, are estimated to be 4.59 Mt. Recoverable reserves have not been estimated for the resources that may be worked by augering methods.

**Table 4.1 - Summary of Coal Resources and Reserves in  
Proposed Westside Mine Southern Extension Area**

| MINING<br>METHOD | RESOURCES     |                |             | RESERVES         |
|------------------|---------------|----------------|-------------|------------------|
|                  | Measured (Mt) | Indicated (Mt) | Total (Mt)  | Recoverable (Mt) |
| Open Cut         | 4.89          |                | 4.89        | 4.59             |
| Highwall (Auger) |               | 0.58           | 0.58        | Not calculated   |
| <b>Total</b>     | <b>4.89</b>   | <b>0.58</b>    | <b>5.47</b> | <b>4.59</b>      |

### 4.2.3 Constraints affecting Mine Design

There has been a long history of both open cut and underground mining within and in the general vicinity of Westside Mine. Mining within the proposed Southern Extension Area is constrained by a number of factors relating to the geology of the site, the history of previous mining operations and surrounding infrastructure. Apart from the geological constraints discussed in **Section 4.2.1**, the major constraints affecting mine design are:

- proximity of surrounding infrastructure including public utilities, public roads (Wakefield Road and Rhondda Road) and Diega Creek;
- a bordering ridgeline with scenic value to the local community;
- the presence of old underground workings in the Great Northern seam; and
- water contained in and feeding into old underground workings.

#### 4.2.3.1 Proximity of Surrounding Infrastructure

The southern boundary of open cut mining in the South Pit and eastern boundary of mining in the East Pit is the Diega Creek alluvium. As shown on **Figure 4.3**, it is proposed to relocate Wakefield Road around the open cut mining area, closing a portion of Rhondda Road and diverting this traffic onto the new alignment of Wakefield Road. EnergyAustralia and Telstra infrastructure located adjacent Wakefield Road will also be relocated adjacent to the proposed road realignment.

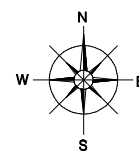
#### 4.2.3.2 Ridgeline with Scenic Value

Despite the presence of economically mineable coal to the south beyond the ridgeline separating the proposed mining area from Wakefield, the visual and scenic aspects of the south-facing slope of this ridge, and the desire of local residents to retain this aspect, have resulted in the proposed pit crest being constrained to the northern slope of the ridge. Any limited coal extraction south of this ridgeline is to be restricted to lower recovery highwall mining where this will not cause further surface subsidence.

#### 4.2.3.3 Preparation for Working Above Old Underground Workings

Part of the proposed mine extension area includes an area where the Great Northern seam has been previously partly mined by underground workings. In proposing to mine from the surface down through these areas to the Fassifern seam below, special mining precautions are needed.

Westside Mine has been successfully open cut mining within an area with old underground workings for the past four years. A full risk assessment was carried out prior to working above old underground workings. Whenever heavy earthmoving equipment is to work at



#### Legend

- Existing Westside Mine Boundary
- Proposed Open Cut Mining Boundary
- Development Application Area
- Proposed Wakefield Road Realignment
- Proposed Coal Haul Road (South / East Pit)

0 200 400 600m

**FIGURE 4.3**  
Aerial View of Westside Mine Southern  
Extension & Surrounds

less than 10 metres cover above the roof of the old workings, the area is drilled and blasted to collapse overburden rock into the goaf and/or roadways.

#### 4.2.3.4 Dewatering of Old Underground Workings

Pre-existing ponded water in the old underground workings in the Great Northern seam has been effectively removed during the operation of the existing open cut, which has already intersected the lowest point of these workings. However subsequent and future rainfall leads to significant rainwater ingress through the many surface subsidence cracks and fall-in holes both within the proposed lease area and also up-dip beyond the proposed pit boundary. This rainwater flows relatively freely through the collapsed underground workings to emerge down-dip in the open cut exposures of these tunnels. This water is collected in in-pit sumps and pumped to onsite Dam E along with other rainfall runoff into the pit and that collected from active overburden dumps.

During periods of high rainfall runoff, excess water (beyond that re-usable for dust control where possible) is pumped through an overland pipeline to the Rhondda mine area for use in fire control. This water can also be treated if necessary and discharged off site via Dam E, into Cockle Creek.

Further water management details are provided in **Section 5.5**.

### 4.3 CONCEPTUAL MINE PLAN

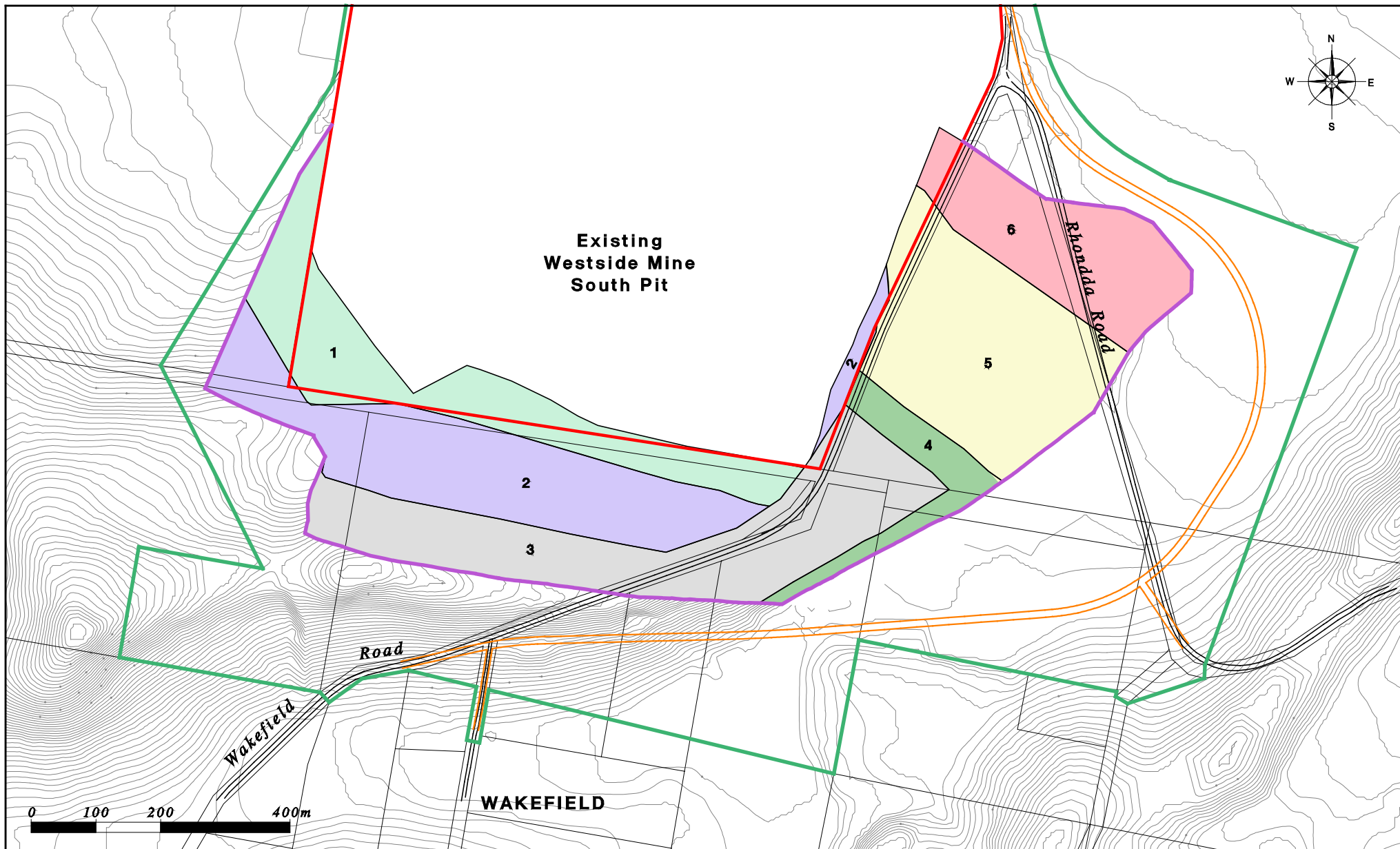
The area covered by the conceptual mine plan is illustrated in **Figure 4.3**. The proposed staging of mining operations and the conceptual Year 3 and Year 6 mine plans are shown in **Figures 4.4, 4.5 and 4.6** respectively. The Year 3 and Year 6 conceptual mine plans represent the worst case scenarios in terms of proximity to Wakefield and maximum production, respectively. Both layouts have been shown with the expected maximum numbers of mobile equipment operating at these stages, and with key equipment in terms of noise and dust emissions, operating high in the pit, close to the natural surface. These worst case scenarios have been used for noise and dust modelling discussed in **Sections 5.7 and 5.8**.

The Year 1 mining operations will essentially involve site preparation, prestrip operations, overburden removal and coal extraction using a truck and shovel operation extending from the existing South Pit, while continuing to mine the lower (Fassifern) seam in the existing South Pit. Mining will progress in a southeasterly direction, over a period of three to four years, before reaching the proposed open cut mining boundary (**Figure 4.4**). During this period it is proposed to realign Wakefield Road to the east of its current alignment, as illustrated in **Figure 4.3** and further discussed in **Section 4.15.1**. Shaping and rehabilitation of overburden will continue in this area after this period (refer to **Figures 4.5 and 4.6**), and upon completion of highwall augering from the base of the conceptual Year 4 and 5 highwalls.

Following open cut mining activities in the South Pit extension area, mining will commence in the new East Pit, on the eastern side of the existing Wakefield Road alignment. Mining in the East Pit will progress in a northeasterly direction, as illustrated in **Figure 4.4**.

Excavations in the South Pit and East Pit will continue to mine through old underground workings.

**Section 4.17** describes the conceptual final landform within the proposed Southern Extension Area.



#### Legend

- |                                                                           |                                                                                                                                    |                                                                                                                                    |
|---------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------|
| <span style="color: red;">—</span> Existing Westside Mine Boundary        | <span style="background-color: #90EE90; border: 1px solid black; display: inline-block; width: 20px; height: 10px;"></span> Year 1 | <span style="background-color: #FFFF00; border: 1px solid black; display: inline-block; width: 20px; height: 10px;"></span> Year 5 |
| <span style="color: purple;">—</span> Proposed Open Cut Mining Boundary   | <span style="background-color: #CCCCFF; border: 1px solid black; display: inline-block; width: 20px; height: 10px;"></span> Year 2 | <span style="background-color: #FFB6C1; border: 1px solid black; display: inline-block; width: 20px; height: 10px;"></span> Year 6 |
| <span style="color: green;">—</span> Development Application Area         | <span style="background-color: #D3D3D3; border: 1px solid black; display: inline-block; width: 20px; height: 10px;"></span> Year 3 |                                                                                                                                    |
| <span style="color: orange;">—</span> Proposed Wakefield Road Realignment | <span style="background-color: #3CB371; border: 1px solid black; display: inline-block; width: 20px; height: 10px;"></span> Year 4 |                                                                                                                                    |

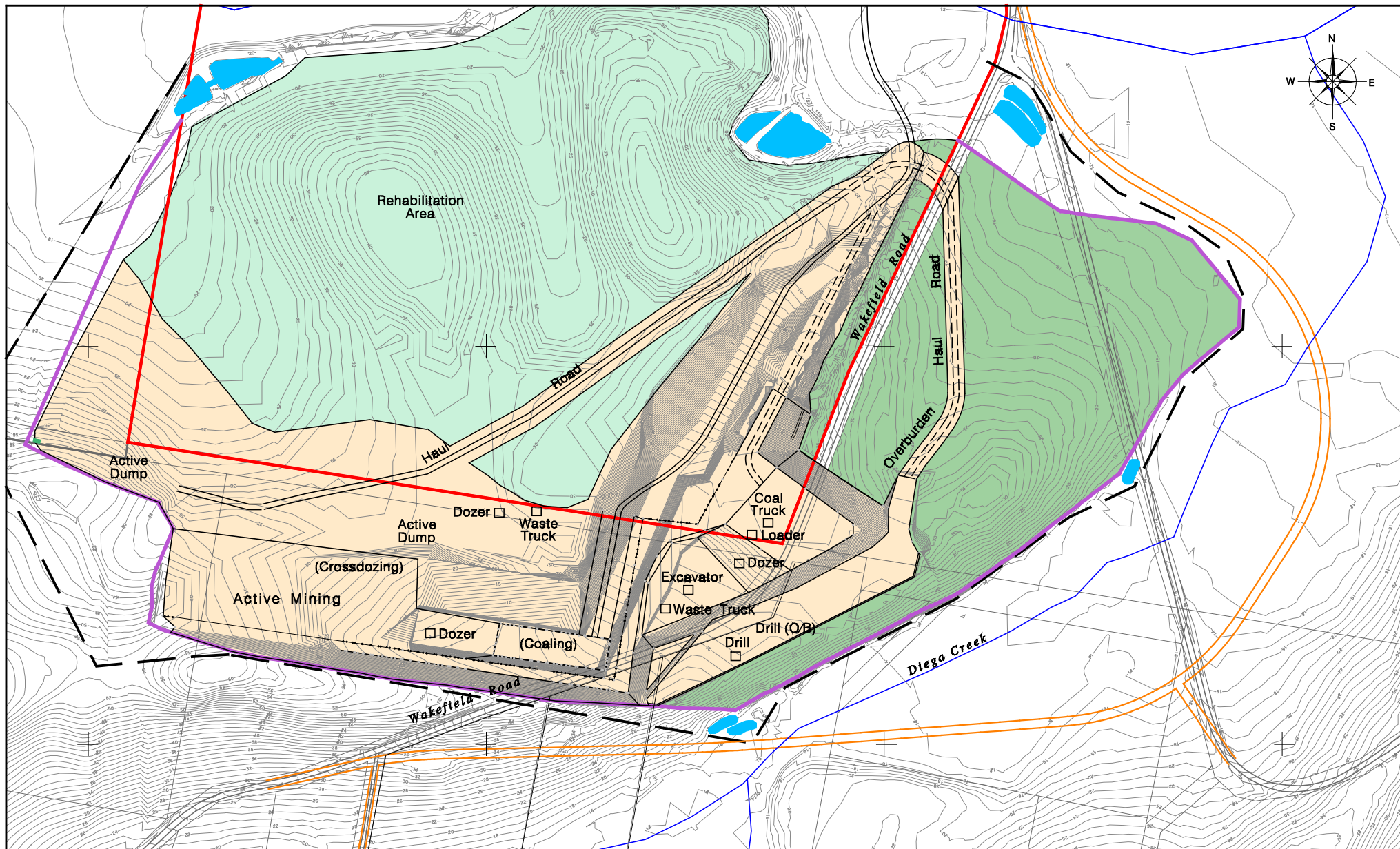
Umwelt (Australia) Pty Limited

#### FIGURE 4.4

Conceptual Mine Stages – at  
commencement of overburden removal  
(Maximum Production Scenario)

A4 Scale 1:8000

Ref No.:R02\_V1/1377\_064.dgn



# Legend

Active Mining  
Rehabilitation Area  
Natural Surface

Proposed Limit of Surface Activity  
Proposed Wakefield Road Realignment  
Proposed Open Cut Boundary  
Existing Westside Mine Boundary

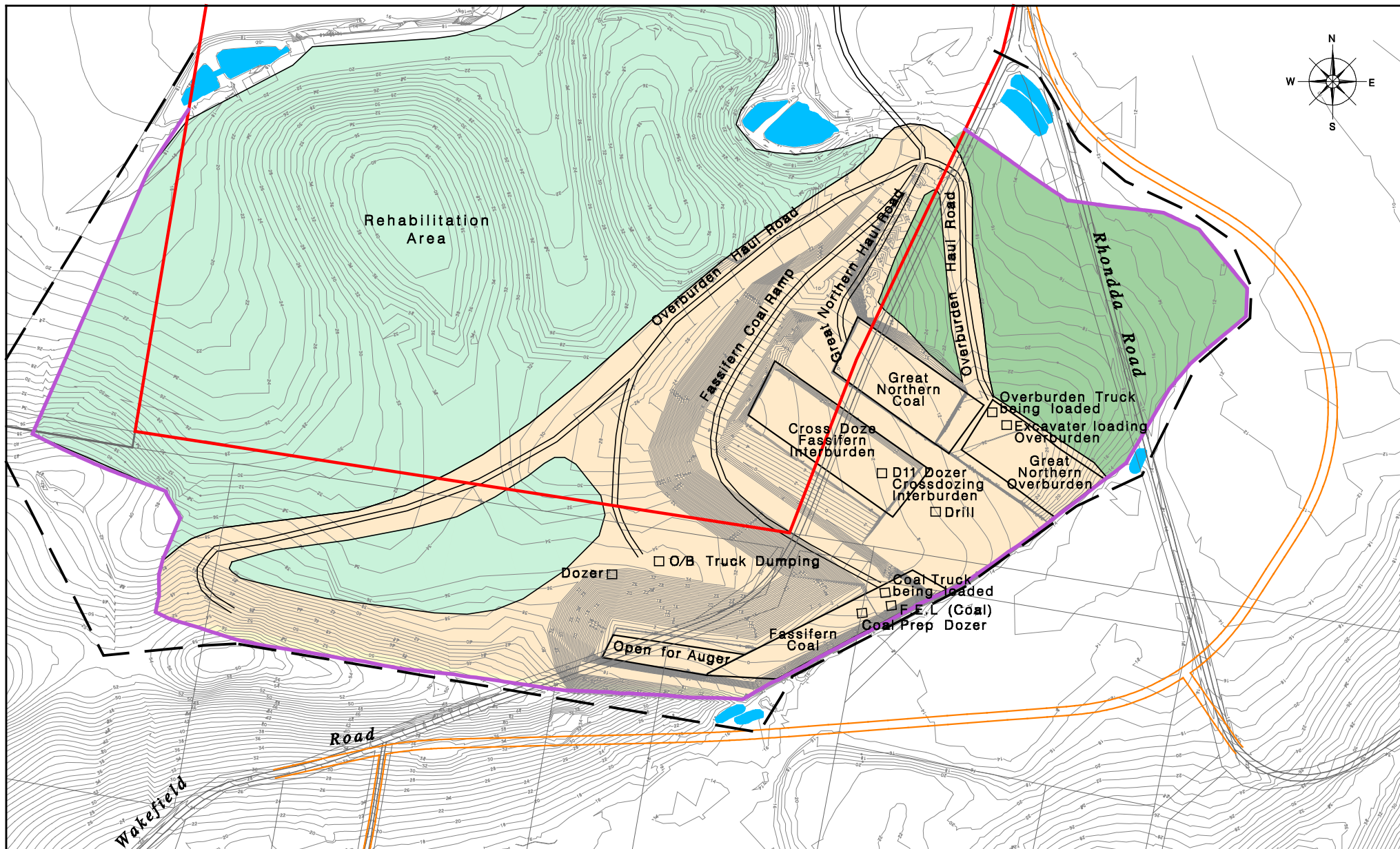
Dams

0 100 200 300m

**FIGURE 4.5**  
Conceptual Pit Layout at Year 3

A4 Scale 1:8500

Ref No.:R02\_V1/1377\_065.dgn



- Legend**
- Existing Westside Mine Boundary
  - Proposed Open Cut Mining Boundary
  - Proposed Wakefield Road Realignment
  - - Proposed Limit of Surface Activities

Umwelt (Australia) Pty Limited  
Source: OCAL

- Natural Surface
- Rehabilitated Area
- Active Mining
- Dams

0 100 200 400m

**FIGURE 4.6**  
Conceptual Pit Layout at Year 6

A4 Scale 1:6500

Ref No.: R02\_V1/1377\_049.dgn

### 4.3.1 Coal Production

In order to increase coal supply to the local power stations and in response to community suggestion, regarding opportunities to minimise the time frame of mining operations, ROM coal production from the mine and through the crushing plant may increase from in the order of 0.6 Mtpa to approximately 1 Mtpa. As there is no reject from the crushing plant, the entire annual ROM production that is processed by the plant is saleable. Depending on coal quality and markets, there may be occasional opportunity for coal to be sold for export. If so, it is envisaged that coal would be transported by private haul road to Macquarie Coal Preparation Plant or to Newstan Colliery for coal preparation and transportation by rail to the Port of Newcastle.

Depending on variations in the production rate, which are controlled by sale contracts, the proposed development is expected to have an additional life of seven to twelve years.

## 4.4 MINING OPERATIONS

It is proposed to continue mining using truck and excavator mining methods for the life of the operation. Limited highwall mining will also be undertaken as described in **Section 4.4.3.2**.

Mining will involve the following sequence:

- prestrip operation;
- overburden removal; and
- coal mining.

Rehabilitation of overburden emplacement areas will be conducted progressively over the life of the mine. The proposed mine rehabilitation strategy, including the final landform and post mining land use is discussed in **Section 4.17**.

### 4.4.1 Prestrip Operation

Prestrip refers to the removal of vegetation and topsoil ahead of the active mining operation. Prior to site disturbance erosion and sediment controls will be established. Vegetation will be cleared and topsoil stripped for re-use (refer to **Section 5.3.2**), for approximately a 75 metre wide mining strip ahead of the active mining operation.

Where possible, topsoil will be stripped when it is in a slightly moist condition. The stripped material will preferably be placed directly onto reshaped overburden and spread immediately. If mining sequences, equipment scheduling and weather conditions do not permit immediate re-use, topsoil will be stockpiled to a maximum stockpile depth of a single truck load height. Stockpiles will be fertilised and sown with a cover crop/pasture as soon as possible. It is anticipated that stockpiled topsoil will be re-used within one year; however, where stockpiles are not used within that period, regular maintenance will be undertaken including weed control, fertilising and reseeded, where necessary.

Once all vegetation and topsoil has been cleared, weathered material may be removed by a bulldozer or excavator and/or front-end loader and trucks, depending on its thickness, hardness and the competency of underlying strata.

#### 4.4.2 Overburden Removal

In some areas, the uppermost overburden rock strata is sufficiently weathered to allow the first bench material to be directly excavated for loading into trucks.

However, once unweathered rock is encountered, the overburden needs to be blasted. This requires using a blast hole drill rig to drill a pattern of holes in the bench. Explosive is then inserted into the drill holes and detonated in a controlled sequence in order to break up the overburden. Existing blasting procedures formulated to address the potential for impacts on close neighbours, as well as to meet particular requirements to ensure safe working conditions for mining personnel and equipment, will continue to be used throughout the life of the mine. Typical blast design details are provided in **Table 4.2**.

**Table 4.2 - Typical Blast Design Details**

| Blast Design Parameter             | Typical Dimension             |
|------------------------------------|-------------------------------|
| Number of holes                    | 100 to 180                    |
| Hole Diameter                      | 89 mm to 127 mm               |
| Burden                             | 3 metres to 5 metres          |
| Spacing                            | 3 metres to 10 metres         |
| Delay timing                       | Nonel (single hole per delay) |
| Column explosive                   | Emulsion                      |
| Maximum Instantaneous Charge (MIC) | 25 to 110 kg                  |

The blasted overburden will primarily be removed by hydraulic excavator loading into 130 tonne rear dump trucks.

For the lower seam overburden, the primary method of waste rock removal will be by bulldozer cross-dozing it into the previous-strip excavation, after blasting unweathered rock where necessary. This may be supplemented by excavator or front-end loader loading into rear dump trucks for a minor proportion of this layer to meet scheduling requirements.

Generally, overburden will be placed directly to meet the final landform requirements with only minimal reshaping then being required prior to topsoil placement and revegetation.

Overburden from the East Pit will be used for the construction of the realignment of Wakefield Road. In addition, overburden from Westside Mine may be used in the future to assist with the rehabilitation of old open cut workings and other areas at Rhondda Colliery.

Selected overburden at Westside Mine has been identified as being suitable for use for tile manufacture purposes. If a contract for supply is established, overburden may be transported off-site for this purpose during future operations, with the initial rate expected to be in the order of 20000 tonnes/annum and the maximum rate up to 50000 tonnes/annum. This material would be transported north from Westside Mine, via Wakefield Road and Northville Drive. Beneficial use of overburden for these purposes alleviates the need for disturbance of new areas in other locations to access suitable material and makes further use of the overburden that is already being handled as part of the mining process. Use of overburden at these relatively low volumes would not substantially change the final landform shape discussed in **Section 4.17**.

### 4.4.3 Coal Seam Mining

#### 4.4.3.1 Truck and Excavator Operations

The proposed future operations will mine the Great Northern and Fassifern seams in a similar manner to current mining operations, as discussed in **Section 3.1** and shown diagrammatically on **Figure 4.7**. Exposed seam-sections will be mined and stockpiled using bulldozers prior to being loaded into 60 tonne capacity rear dump trucks by front-end loader. These trucks will transport coal along internal haul roads to the crushing plant (refer to **Figure 4.3**).

#### 4.4.3.2 Highwall Mining

Limited highwall mining will be undertaken from the base of the highwalls (**Figure 4.8**), accessing areas where open cut mining is not feasible or there is an imposed surface mining limit. Highwall mining involves the use of an auger or a continuous miner (usually associated with underground mining) to extract coal from the base of a highwall (**Figure 4.8**). Existing technology will allow this equipment to be driven into the coal seam for 100-150 metres. The mining equipment is then removed and relocated adjacent to the previous excavation. In order to ensure that the equipment can be recovered, the highwall mining must be configured so as to cause negligible subsidence. A geotechnical assessment will be done on the highwall mining before this work is commenced. Any highwall mining will require further approval from DMR in relation to final design and consequent geotechnical, safety and environmental issues, following development consent and prior to commencement of highwall mining.

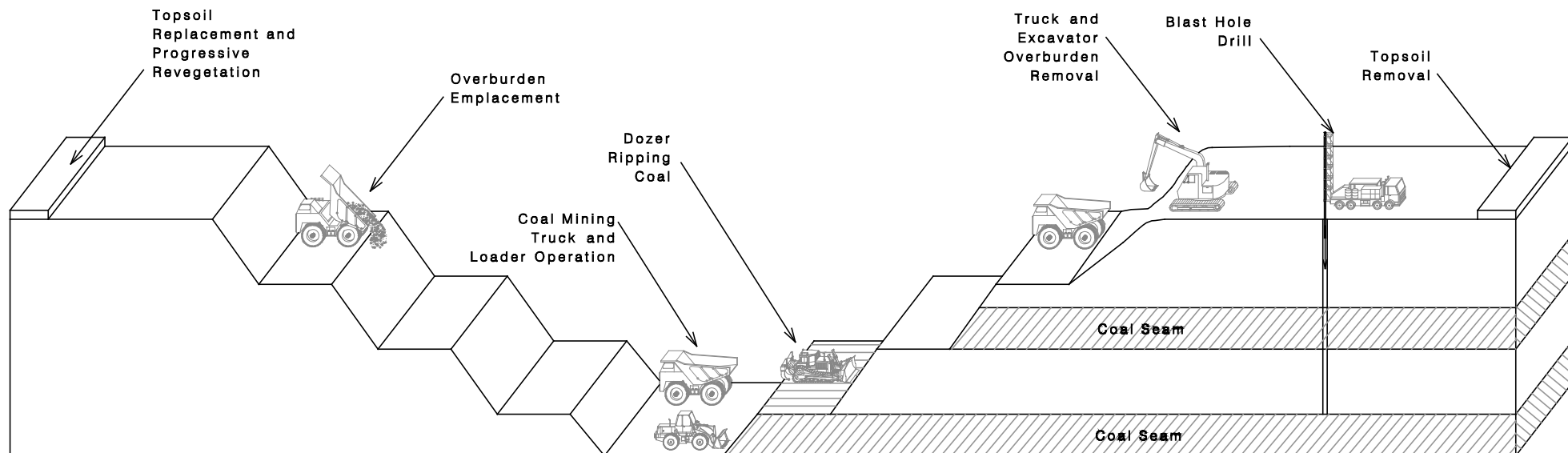
## 4.5 MINING EQUIPMENT

The existing or similar truck and excavator fleet (**Table 4.3**) will be used for the proposed open cut mining operations. In addition, a coal recovery auger will be used for highwall mining operations.

**Table 4.3 – Typical Mining Plant and Equipment**

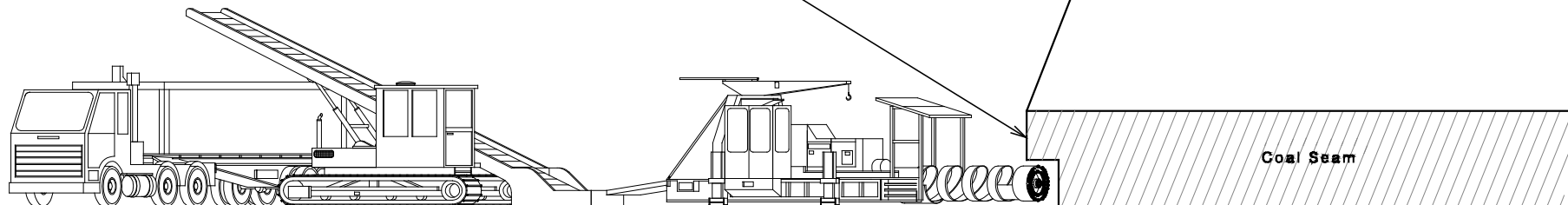
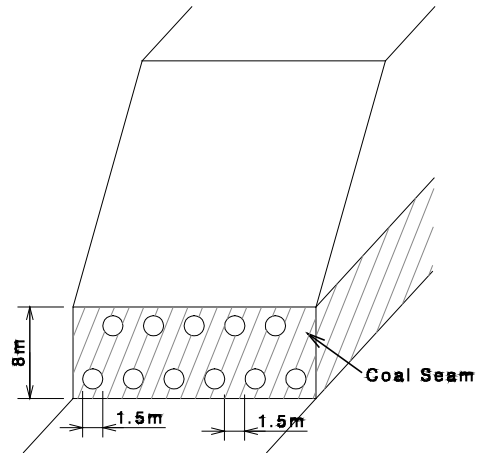
| Item                                             | No. |
|--------------------------------------------------|-----|
| <b>Mining</b>                                    |     |
| Blast Hole Drill                                 | 1   |
| Excavator - Komatsu PC 1600 or similar           | 1   |
| Rear Dump Overburden Trucks - Cat 785 or similar | 2   |
| D11 Dozer                                        | 2   |
| D 10 Dozer                                       | 1   |
| Cat 992C Front-end Loader                        | 1   |
| Rear Dump Coal Trucks - Cat 777 or similar       | 2   |
| BryDet Model 2233-60 Auger                       | 1   |
| <b>Ancillary</b>                                 |     |
| Watercart                                        | 1   |
| Grader – Cat 16G                                 | 1   |
| Lighting Plants                                  | 3   |
| In-pit Pumps                                     | 3   |

*Note: If equipment is replaced, new equipment will be selected with similar or lower sound power levels*



**FIGURE 4.7**  
Schematic of Truck and Excavator  
Mining Operations

**Schematic Section of Coal Seam  
showing Typical Configuration of Auger Holes**



**FIGURE 4.8**  
Schematic of Highwall  
Augering Operations

## 4.6 ROM COAL TRANSPORT

ROM coal will continue to be transported to the on-site crushing plant by 60 tonne capacity rear dump trucks along internal haul roads, as outlined in **Section 3.2**. However, as a result of proposed increased extraction rate, internal haulage of coal could increase from an average rate of 4000 tonnes per day, to an average of approximately 5000 tonnes per day. The peak capacity of the internal haulage system would be in the order of 8000 tonnes per day and haulage at this rate would only be expected to occur very occasionally and with concurrently reduced overburden removal rates on those days.

## 4.7 PRODUCT COAL TRANSPORT

Once crushed, the product coal will be transported in 27 tonne capacity on-highway type semi-trailers to Eraring Power Station via OCAL's private haul road (refer to **Figure 1.1**) that connects to Newstan Colliery's haul road to Eraring Power Station. A very minor portion (estimated 50000 tonnes per annum) may also be transported to Vales Point Power Station via the private haul road to Awaba Road, to the F3 Freeway, and then south on the Freeway to access the power station via Wyee Road and Rutleys Road. Additional truck movements, over a six day week, may be utilised for the proposed increase in production rates.

As discussed in **Section 4.3.1**, there may be an occasional opportunity for sale of coal for export purposes. If so, this coal would be transported by either the OCAL private haul road to Macquarie Coal Preparation Plant, or the OCAL private haul road to Newstan Colliery, for coal preparation and rail loading for transport by train to the Port.

## 4.8 INTERNAL COAL HAUL ROAD

It is proposed to construct a new internal coal haul road from the South/East Pit to the coal crushing plant (refer to **Figure 4.3**). It is currently anticipated that construction of this infrastructure will be completed in the first year of the mine extension. This will significantly reduce coal haulage distances for some of the South Pit coal, and for all of the East Pit coal.

Establishment of the new haul road will involve the construction of a multi-pipe culvert over Cockle Creek with the culvert being located approximately 300 metres downstream of the existing internal haul road. Further details regarding culvert sizing are provided in **Section 5.5**.

The proposed new haul road will shorten the return haul distance between South Pit and the coal crusher and stockpile area by approximately 1.2 kilometres and will allow for the early rehabilitation of the western part of South Pit.

## 4.9 CONTINUED USE OF EXISTING FACILITIES

### 4.9.1 Coal Crushing

There is no change planned to the existing capacity or operation of the coal handling and crushing preparation infrastructure, as discussed in **Section 3.2**. The coal crushing plant has an average capacity of 450 tonnes per hour (tph) to produce minus 50 mm product. In high production periods, 600 tph is achievable which is sufficient for the proposed production rate.

#### **4.9.2 Office and Amenities**

The existing offices and amenities located near the mine entrance beside the haul road at the eastern end of the north pit will continue to be used.

#### **4.10 WORKFORCE AND HOURS OF OPERATIONS**

As stated in **Section 3.5**, Westside Mine currently provides direct full-time employment for 18 mine workers. In order to meet the demand associated with increased production Westside may employ up to five additional full time employees.

Westside Mine currently has approval for hours of operation of 7.00 am to 10.00 pm, Monday to Saturday with no mining or coal crushing on Sundays, although only very rarely is mining conducted beyond 7.00 pm. Plant and equipment maintenance activities and operation of diesel-powered in-pit dewatering pumps occur up to 24 hours per day, 7 days per week. It is proposed to retain the same operating hours during future operations, with the intention being to cease most mining operations by 7.00 pm Monday to Saturday, particularly when working in the southern section of the future mining area, closest to the Wakefield community. Flexibility is sought to enable mining up to 10.00 pm Monday to Saturday, for the occasional times that longer operating hours may be required to meet particular coal supply needs.

#### **4.11 SPONTANEOUS COMBUSTION**

The nature of the coal resource that is being mined at Westside Mine means there is a low risk of spontaneous combustion. Since the mine commenced operations in 1992 there have not been any instances of spontaneous combustion occurring at the mine. To further reduce the risk of spontaneous combustion, oxidised coal and partings materials are deeply buried and compacted to exclude oxygen.

OCAL has an excellent safety and spontaneous combustion control record. The principal method used to control spontaneous combustion in ROM and product coal stockpiles is to ensure that coal is transferred to the power stations on a regular basis or otherwise compacted. If there is an increase to the spontaneous combustion potential during future mining, OCAL will prepare a specific Spontaneous Combustion Management Plan, in consultation with DMR.

#### **4.12 MINE LIGHTING**

The existing fixed and mobile lighting will continue to be used. Fixed lights are provided at the administration area, workshop and crushing plant. The existing or similar mobile lighting plants will be used in the new working areas as required. These mobile plants will be arranged to provide sufficient lighting for night-time mining to be conducted under safe working conditions. All mobile plant is fitted with shields to reduce glare and will, where practicable, be directed away from nearby residences and public roads.

Further details of lighting impacts and management is provided in **Section 5.10**.

#### **4.13 WATER MANAGEMENT**

Water management will continue to be a key issue in the operation of Westside Mine. A detailed assessment of the proposed future water management is provided in **Section 5.5**.

The objectives of the water management system are to:

- provide a suitable supply of water for use in dust suppression on the site;
- provide suitable treatment and control facilities for wastewater from the site and for fuels and chemicals stored or used on site;
- ensure that the existing and proposed developments do not adversely impact on channel stability or the flooding regime of Cockle Creek and Diega Creek drainage systems;
- ensure that mining does not adversely impact on groundwater resources or groundwater dependent ecosystems in the vicinity of the mine site; and
- ensure that approved discharges from the site are consistent with the protection of the health of aquatic ecosystems in Cockle Creek.

Strategies for maintaining water quality in downstream drainage systems will include:

- restricting clearing to the minimum area necessary for the mining operation;
- rapid restoration of ground cover vegetation after mining;
- diversion of clean runoff away from disturbed areas;
- interception of runoff from disturbed areas in a series of sedimentation basins;
- maximising re-use of mine water for dust suppression, rehabilitation and fire control in the old Rhondda Mine workings; and
- treatment of water with flocculent, when necessary, prior to release.

## **4.14 WASTE MANAGEMENT**

### **4.14.1 Sewage Treatment and Disposal**

As with existing operations, an envirocycle-type plant will treat all sewage generated by the small workforce, with the resultant clear effluent being chlorinated and spray irrigated onto a grassed area. Any runoff from the irrigated pasture will be collected in a dam along with rainfall runoff from all surface facilities and stored for use in coal crushing plant dust suppression sprays.

### **4.14.2 Fuel, Oil and Grease Containment**

All fuel and oil storage will continue to be contained within an appropriately sized bunded area. An oil/water separator will collect all rainfall that accumulates within the bund, as well as runoff from the refuelling pad and the wash-down pad adjacent to the workshop.

As with existing operations, rainfall runoff from the fuel and oil dispensing areas and the workshop washdown area will be reticulated via grit traps to a first flush holding tank prior to controlled flow through an oil/water separator. Excess runoff after the first flush will pass directly to the crushing plant dam, as with existing operations.

The waste oil collected by this separator, plus used engine oil from machine oil changes, is removed from the site by a waste oil contractor for re-refining/reuse.

#### **4.14.3 Rubbish Disposal**

General rubbish collected from the offices and coal crushing plant will continue to be placed in dumpsters for removal by licensed waste contractors.

### **4.15 PUBLIC UTILITIES AND SERVICE INFRASTRUCTURE**

#### **4.15.1 Wakefield Road Realignment and Intersection Details**

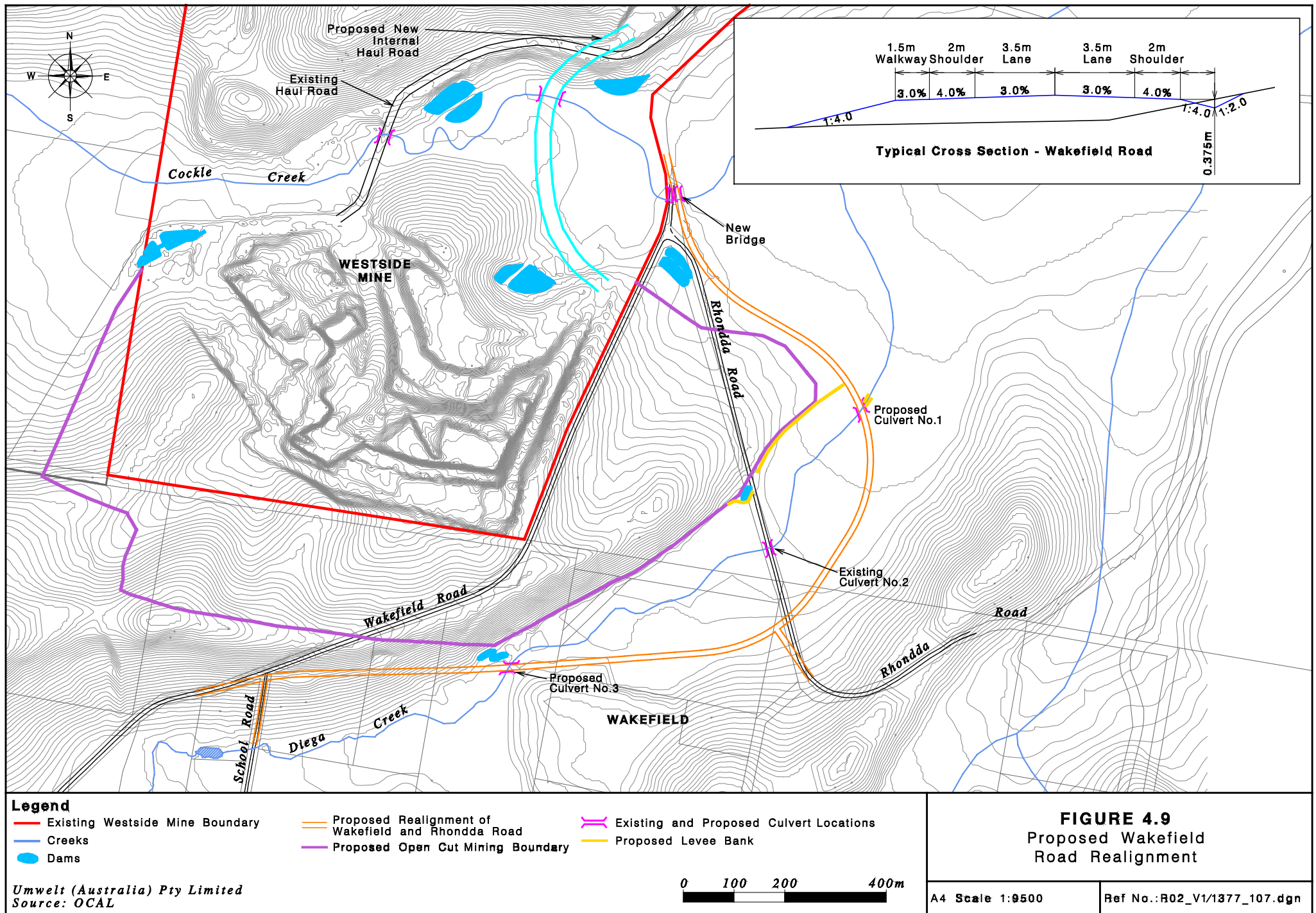
The proposed Southern Extension Area includes approximately 0.9 kilometres of Wakefield Road and 0.3 kilometres of Rhondda Road. Prior to mining in the new East Pit, it is proposed to realign Wakefield Road to the east of its current location, around the proposed southern extension boundary (refer to **Figure 4.3** and **Figure 4.9**). The conceptual design of the road realignment has been prepared in consultation with LMCC, to meet their requirements for public road construction. As shown in the typical cross section on **Figure 4.9**, the road will have two sealed lanes, each of 3.5 metres width, with a 2 metre shoulder. In addition, a 1.5 metre walkway will be incorporated into the road design in order to accommodate the Great North Walk, as discussed in **Section 4.15.2**.

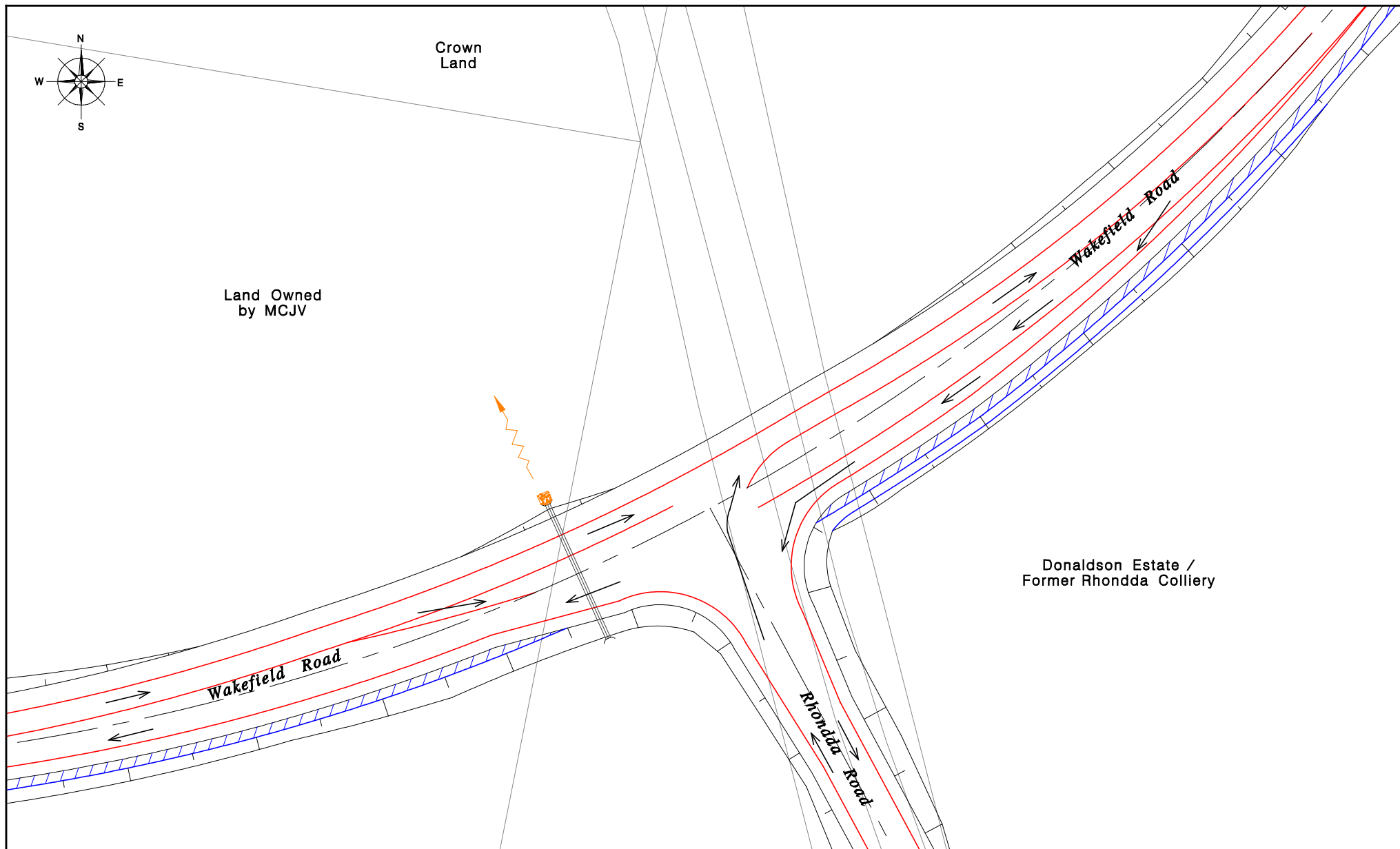
Construction of the road realignment will incorporate two culvert crossings of Diega Creek and a new bridge over Cockle Creek, as shown on **Figure 4.9**. The proposed culverts have been conceptually designed to accommodate Diega Creek high flows, as discussed in detail in **Section 5.5**. The new bridge over Cockle Creek is necessary as the current super elevation of the existing bridge would not allow safe access onto the proposed Wakefield Road realignment. The proposed bridge will be constructed to meet Council's design standards and is anticipated to be of similar design to the current bridge, that being of two lane width, with appropriate safety guard rails.

Traffic along Rhondda Road will be diverted onto the realigned section of Wakefield Road via a new intersection, designed to improve traffic safety by increasing the line of sight for turning traffic (refer to **Figure 4.10**). A turning bay will be provided for traffic travelling north on Wakefield Road and turning into Rhondda Road, in addition to a turning lane for Wakefield Road southbound traffic turning into Rhondda Road.

Realignment of Wakefield Road and continued provision of an intersection with School Road will necessitate re-construction of the Wakefield Road/School Road intersection in order to meet current standards for safe intersection design. The proposed intersection design is shown on **Figure 4.11** and incorporates a turning lane for traffic turning right into School Road from Wakefield Road. In order to provide appropriate sight distances for traffic turning from School Road onto Wakefield Road, the elevation of School Road must be increased by a maximum of 3 metres on the approach to Wakefield Road. This will require road works on School Road for in the order of 150 metres from the existing intersection with Wakefield Road. The Wakefield Road/School Road intersection works will encroach onto current private land on the western side of School Road, as shown on **Figure 4.11**. OCAL is currently negotiating to either reach an appropriate compensation agreement with these landowners, or to acquire the property.

During community consultation for this project, a number of Wakefield residents have raised concern regarding the potential for the gradient on the proposed Wakefield Road realignment, in the vicinity of the School Road intersection, to increase noise levels at their property and to restrict the potential for substantial noise screening in terms of bund construction. Consequently, a potential alternative Wakefield Road alignment has been





- Legend**
- Existing Wakefield / Rhondda Road (Cadastral Boundary)
  - Proposed Wakefield Road Realignment
  - ▨ Walkway

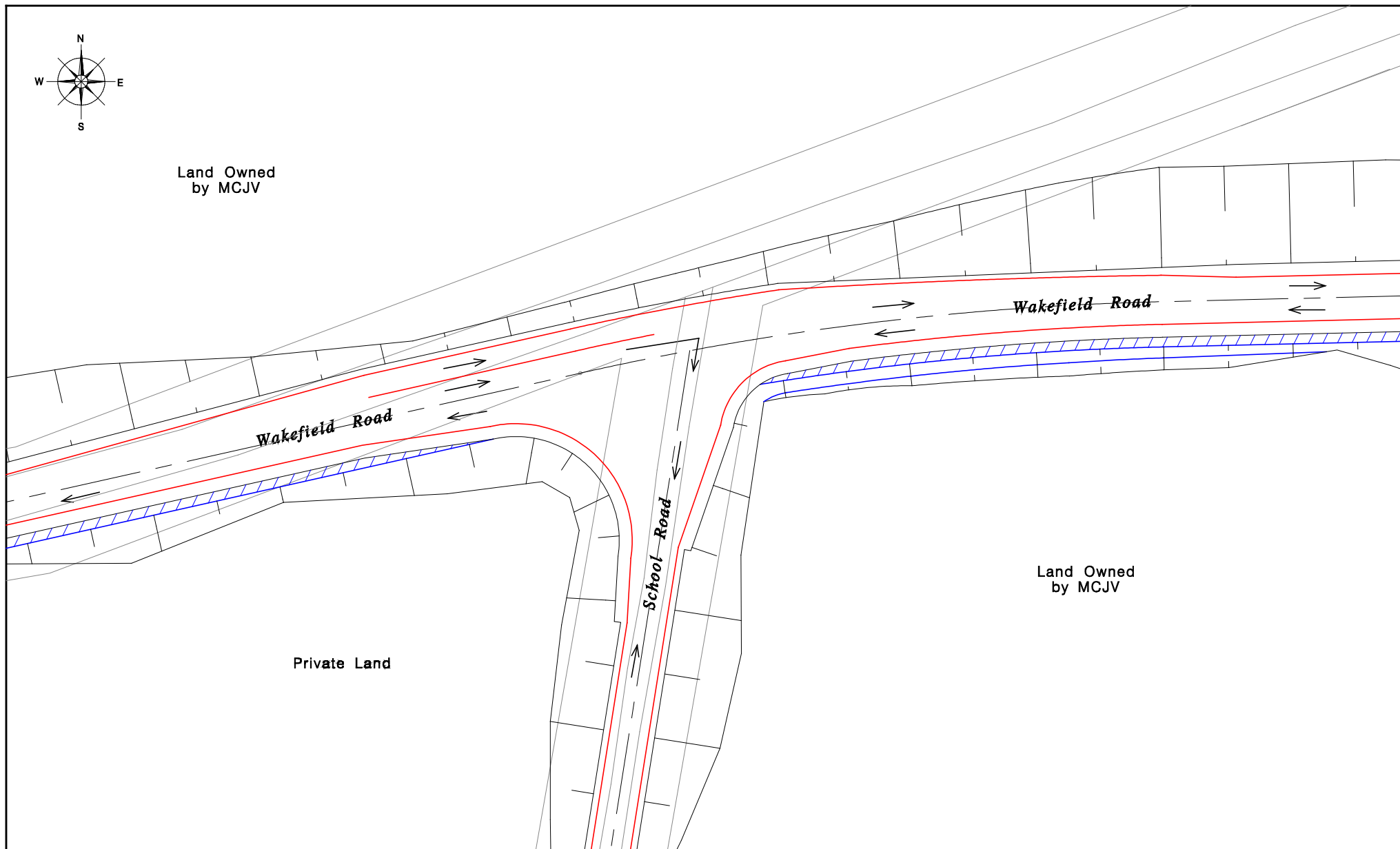
Umwelt (Australia) Pty Limited  
Source: OCAL

0 10 20 40m

**FIGURE 4.10**  
Intersection of Rhondda Road  
and Wakefield Road

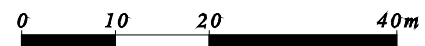
A4 Scale 1:8000

Ref No.: R02\_V1/1377\_136.dgn



- Legend**
- Existing Wakefield /School Road (Cadastral Boundary)
  - Proposed Wakefield Road Realignment
  - ▨ Walkway

Umwelt (Australia) Pty Limited  
Source: OCAL



**FIGURE 4.11**  
Intersection of School Road  
and Wakefield Road

A4 Scale 1:?? 000

Ref No.:B02\_V1/1377\_135.dgn

formulated as shown on **Figure 4.12**. This option lowers the elevation and therefore gradient of Wakefield Road and provides additional opportunity for noise screening but does result in the road being up to 20 metres closer to the nearest residences. Such an option would only be appropriate with agreement of the owners of the two nearest private properties, with whom OCAL are currently negotiating compensation and/or purchase agreements.

In addition, a number of residents on School Road have indicated a preference for establishment of a cul de sac at the Wakefield Road end of School Road, rather than an upgraded intersection. The residents believe that this would be advantageous in terms of limiting unnecessary through traffic on School Road, and combined with the upgrading of a sharp turn on School Road, would greatly improve safety for regular users of this road. OCAL has discussed this option with LMCC who have indicated the intention to conduct a traffic management study in the Wakefield area towards the end of 2002. Council will await the outcomes of this study before making any decision on these School Road options. The Wakefield Road realignment is scheduled for construction in Year 3 of the proposed operations, and will require Council's approval of the final road design as part of a Section 138 application under the Roads Act. Consequently, the outcomes of the abovementioned traffic management study and Council's decision on School Road treatment, can be taken into account by OCAL in this final design and approval process.

Roads and traffic management is further discussed in **Section 5.11**.

#### **4.15.2 Great North Walk**

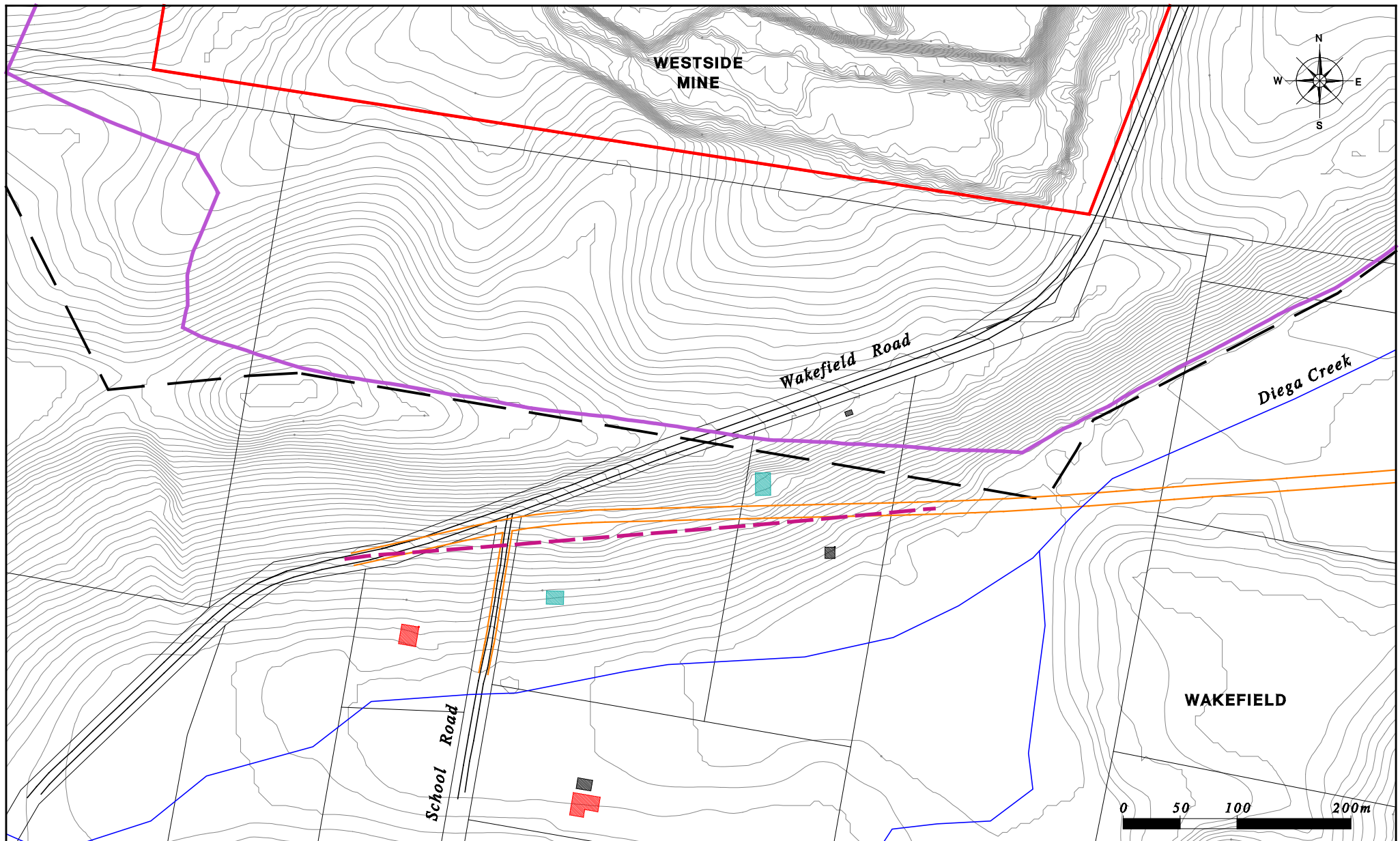
The Great North Walk is currently located adjacent to Wakefield Road, accessing Rhondda Road via the current Wakefield Road/Rhondda Road intersection. There is currently no designated walkway adjacent to these sections of the roads. The realignment of Wakefield Road will incorporate a designated 1.5 metre walkway adjacent to the entire section of realigned road, as shown on the typical road cross section on **Figure 4.9**. Those travelling the Great North Walk will be able to continue their journey from Wakefield Road to Rhondda Road via the new intersection for the junction of these roads. In addition, local residents will be able to safely use this walkway for horse riding and walking purposes.

#### **4.15.3 Electricity and Telephone Cables**

The proposed mining operations will require the relocation of a number of 11 kV electricity lines that currently run adjacent to Wakefield Road and also cross through the proposed East Pit mining area. Telephone cables are also located alongside Wakefield Road. The infrastructure will be relocated to a service corridor adjacent the proposed alignment of Wakefield Road (refer to **Figure 4.13**). Public utility impacts and management are discussed further in **Section 5.12**.

### **4.16 TEMPORARY ROAD CLOSURES**

As with existing operations, Wakefield Road will be temporarily closed whenever blasting is carried out within 300 metres of the road. Wakefield Road was closed for this purpose on 12 occasions during the 2000/2001 reporting period. These closures are typically for a period of 5 minutes and generally less than 10 minutes. Designated mine personnel who have been trained by LMCC as traffic controllers, manage traffic flow during these closures.



# Legend

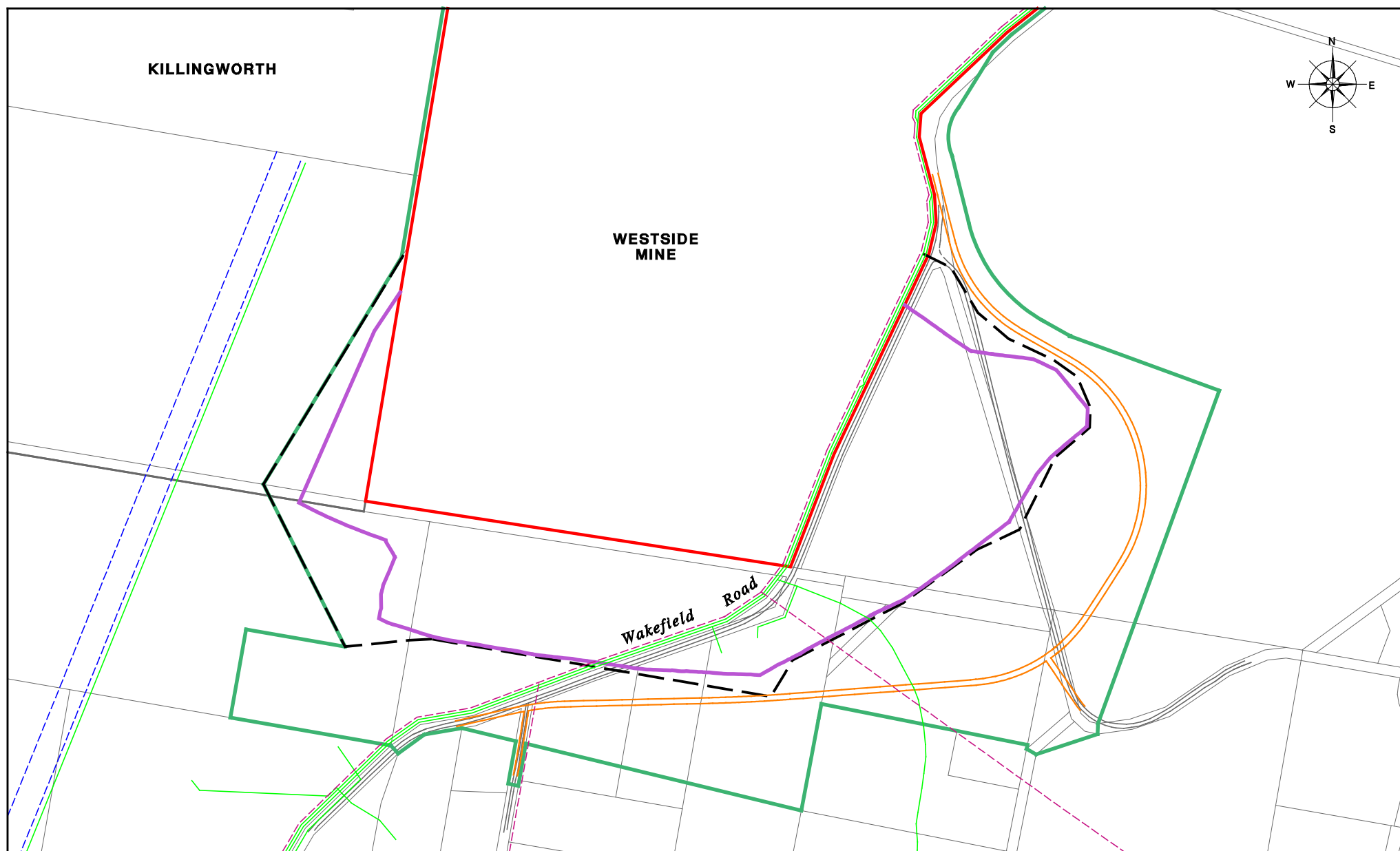
- |                                                                           |                                                                                |                                                     |
|---------------------------------------------------------------------------|--------------------------------------------------------------------------------|-----------------------------------------------------|
| <span style="color: red;">—</span> Existing Westside Mine Boundary        | <span style="color: black;">- - -</span> Proposed Limit of Surface Activity    | <span style="color: red;">◆</span> Residences       |
| <span style="color: orange;">—</span> Proposed Wakefield Road Realignment | <span style="color: pink;">- - -</span> Alternative Wakefield Road Realignment | <span style="color: black;">■</span> Buildings      |
| <span style="color: purple;">—</span> Proposed Open Cut Boundary          |                                                                                | <span style="color: teal;">◆</span> MCJV Residences |

Umwelt (Australia) Pty Limited  
Source: OCAL

**FIGURE 4.12**  
Alternative Wakefield  
Road Realignment

A4 Scale 1:4500

Ref No.: R02\_V1/1377\_147.dgn



**Legend**

- |                                                                           |                                                                   |
|---------------------------------------------------------------------------|-------------------------------------------------------------------|
| <span style="color: red;">—</span> Existing Westside Mine Boundary        | <span style="color: lightgreen;">—</span> Telstra (Buried Cables) |
| <span style="color: purple;">—</span> Proposed Open Cut Mining Boundary   | <span style="color: magenta;">- - -</span> energyAustralia (11kv) |
| <span style="color: green;">—</span> Development Application Area         | <span style="color: blue;">- - -</span> energy Australia (132kv)  |
| <span style="color: orange;">—</span> Proposed Wakefield Road Realignment |                                                                   |

Umwelt (Australia) Pty Limited

0 100 200 400m

**FIGURE 4.13**  
Public Infrastructure

A4 Scale 1:10 000

Ref No.: R02\_V1/1377\_078.dgn

## 4.17 REHABILITATION AND DECOMMISSIONING

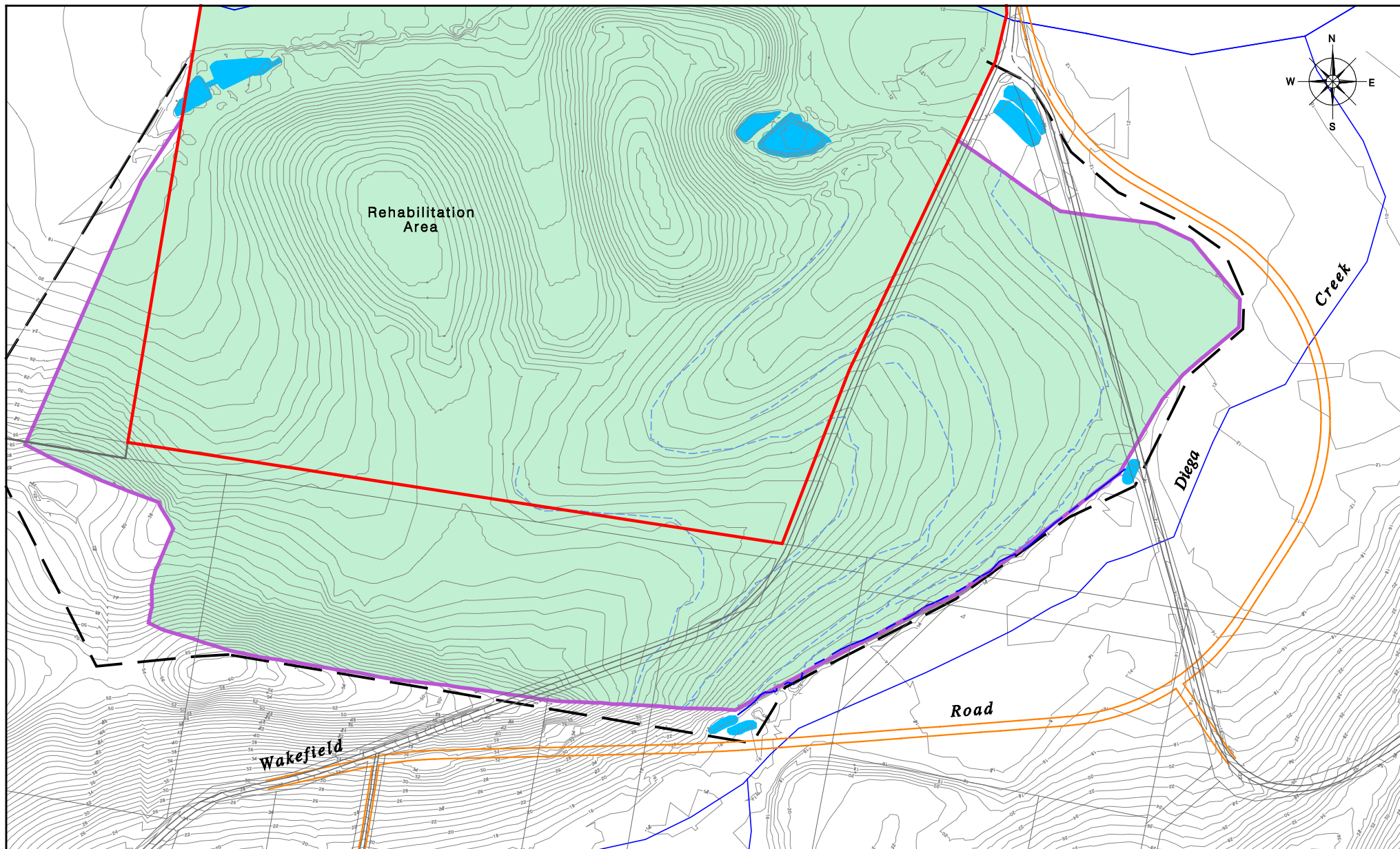
After mining, it is proposed that the area be progressively returned to open bushland, with terrain similar to that which occurs naturally on site. Existing methods of rehabilitation at Westside Mine have proved to be successful. Rehabilitation methods and progress are reported to the DMR and other agencies in the AEMRs. Rehabilitation of overburden emplacement areas will be undertaken progressively over the life of the operation, as shown on **Figures 4.5 - 4.6**.

The proposed final landform for Westside Mine is shown in **Figure 4.14**. The proposed landscape design and rehabilitation strategy minimises the visual impact of the mine on surrounding residences and road traffic along the realigned Wakefield Road. Elements such as ridgelines, contour drains, drainage paths and emplacements will be shaped in undulating profiles in keeping with natural landforms of the surrounding environment. Detailed design of the final landform will be documented in the Mining Operation Plans which are required to be submitted to the DMR periodically. The mine staging ensures that completion of mining occurs within an area where the coal seam is relatively shallow, therefore minimising the potential final void size. In addition, OCAL propose that coarse reject from their Macquarie Coal Preparation Plant will be used to backfill the final void, in order to achieve the contoured final landform shown on **Figure 4.14**. The Macquarie Coal Preparation Plant and the existing Westside development consent allows for use of coarse reject for this purpose, as it has been envisaged since commencement of Westside Mine, that the final void will be managed in this way. Haulage of this material will be via the existing private haul road and internal coal haul road. A final void management plan will be prepared prior to mine closure and provided to the DMR.

Overburden emplacement areas will be shaped using bulldozers to produce slopes with profiles that are compatible with the proposed future land use and not prone to an unacceptable rate of erosion. In general, varying slope angles of no more than 14 degrees will be constructed.

The final landform will include a drainage pattern capable of conveying runoff from newly created subcatchments whilst minimising the risk of erosion and sedimentation. Drainage characteristics for the site will be developed in accordance with the *Draft Guidelines for Designing Stable Drainage Lines on Rehabilitated Mine Sites* (DLWC, 1999).

Further details of rehabilitation are provided in **Section 6.10**.



**Legend**

- |                                                           |                                                                             |
|-----------------------------------------------------------|-----------------------------------------------------------------------------|
| <span style="color: blue;">---</span> Rehabilitated Drain | <span style="color: black;">---</span> Proposed Limit of Surface Activity   |
| <span style="color: green;">■</span> Rehabilitated Area   | <span style="color: orange;">---</span> Proposed Wakefield Road Realignment |
| <span style="color: blue;">■</span> Dam                   | <span style="color: purple;">---</span> Proposed Open Cut Boundary          |
|                                                           | <span style="color: red;">---</span> Existing Westside Mine Boundary        |

0 100 200 300m

**FIGURE 4.14**  
Final Landform Contours

## **SECTION 5**

# **Environmental Impacts and Mitigation**

## 5.0 ENVIRONMENTAL IMPACTS AND MITIGATION

This section details the environmental features of the site and provides a comprehensive analysis and assessment of the environmental impacts associated with the proposed development, including cumulative impacts. Management procedures to mitigate these impacts are also discussed in this section.

### 5.1 IDENTIFICATION AND PRIORITISATION OF ENVIRONMENTAL ISSUES

Environmental and social issues affecting the proposed development area have been identified and prioritised based on consideration of the general features of the site, community and authority consultation conducted during EIS preparation, review of previous investigations conducted in the area and environmental studies completed as part of preparation of this EIS. On this basis, key environmental issues for this development that have been addressed in detail as part of the environmental assessment process are potentially:

- noise, blasting and dust impacts associated with the extension of operations up to 250 metres closer to Wakefield;
- visual impacts, particularly for landowners of rural residential properties in Wakefield and users of the proposed Wakefield Road realignment;
- traffic impacts associated with the proposed realignment of Wakefield Road and diversion of Rhondda Road;
- water management implications; and
- flora and fauna impacts.

These key issues and other relevant environmental issues, are addressed in the following sections. Impact analysis and assessment are detailed in this section, including specific environmental mitigation measures. A summary of management measures, including ongoing monitoring and reporting, is provided in **Section 6**.

### 5.2 METEOROLOGICAL CHARACTERISTICS

Relevant climatic data is outlined in the following sections. Data has been collected from the closest long-term Bureau of Meteorology stations including Cockle Creek (4.5 kilometres east of the site), Newcastle (18 kilometres east of the site) and Maryville (18.5 kilometres east of the site). In addition wind speed and directional data has been obtained from Newstan Colliery, located approximately 3.2 kilometres to the south.

#### 5.2.1 Rainfall

Rainfall data has been collected at Cockle Creek (Station 061011) since 1990 and at Maryville (Station 061223) between 1964 to 1993. As shown in **Table 5.1**, the annual average rainfall recorded at Cockle Creek and Maryville is 1127.2 mm and 1111.7 mm respectively. The highest rainfall levels were recorded during late summer and autumn, with February recording the highest monthly mean of 158 mm at Cockle Creek.

**Table 5.1 – Rainfall Data**

| <b>Month</b>  | <b>Mean Rainfall Cockle Creek (mm)</b> | <b>Mean Rainfall Maryville (mm)</b> |
|---------------|----------------------------------------|-------------------------------------|
| January       | 86.4                                   | 113.1                               |
| February      | 158.8                                  | 115.3                               |
| March         | 132.6                                  | 129.3                               |
| April         | 92.5                                   | 111.2                               |
| May           | 130.0                                  | 98.2                                |
| June          | 108.7                                  | 125.6                               |
| July          | 74.6                                   | 51.3                                |
| August        | 72.3                                   | 57.4                                |
| September     | 70.5                                   | 53.9                                |
| October       | 49.1                                   | 85.1                                |
| November      | 83.5                                   | 81.4                                |
| December      | 78.1                                   | 90.0                                |
| <b>Annual</b> | <b>1127.2</b>                          | <b>1111.7</b>                       |

*Source: Bureau of Meteorology, August 2001*

## 5.2.2 Temperature

Maximum and minimum daily temperatures have been recorded at the Newcastle meteorology station (061055) from 1990 to 2001 and at the Maryville meteorology station (061223) from 1964 to 1993. The mean daily maximum temperatures at Newcastle range from 17.7°C in July to 25.2°C in January, and at Maryville from 17.4°C in July to 27.6°C in January. The mean daily minimum temperatures at Newcastle range from 9.2°C in July to 19.9°C in February and at Maryville from 7.7°C in July to 19.6°C in February.

## 5.2.3 Evaporation

Evaporation rates for Maryville vary from a low mean daily pan evaporation of 2.0 mm in June to a high of 6.3 mm in December (**Table 5.2**). The annual average evaporation for Maryville is 4.1 mm per day.

**Table 5.2 – Maryville Evaporation Data**

| <b>Month</b> | <b>Mean Daily Pan Evaporation (mm/day)</b> | <b>Month</b>  | <b>Mean Daily Pan Evaporation (mm/day)</b> |
|--------------|--------------------------------------------|---------------|--------------------------------------------|
| January      | 6.0                                        | July          | 2.3                                        |
| February     | 5.5                                        | August        | 2.9                                        |
| March        | 4.6                                        | September     | 3.9                                        |
| April        | 3.5                                        | October       | 4.8                                        |
| May          | 2.4                                        | November      | 5.5                                        |
| June         | 2.0                                        | December      | 6.3                                        |
|              |                                            | <b>Annual</b> | <b>4.1</b>                                 |

*Source: Bureau of Meteorology, August 2001*

## 5.2.4 Fog Days

Temperature inversion refers to the situation when temperature increases with height above the ground. Neither the Newcastle nor Maryville meteorological stations record temperature inversion data; however, both stations record the number of fog days per year. Fog days are often used as an indicator of the number of temperature inversions that occur.

The annual number of fog days has been recorded at Newcastle from 1990 to present and at Maryville from 1964 to 1993. Records for Newcastle show that the average annual number of fog days per year is 8.7, with a mean monthly low of 0.1 in November and a mean monthly high of 1.4 in July. In Maryville, records show an annual average of 3.5 fog days per year, with a mean monthly low of 0 (for 5 months) and a mean monthly high of 1.2 in May.

Temperature inversions occur predominantly at night during the winter months and when they occur, have the ability to increase noise levels by focusing sound waves. Westside Mine does not intend to operate after 10.00 pm as part of this proposal and therefore the effects of temperature inversions are not relevant to this assessment (refer to **Section 5.8**).

## 5.2.5 Wind Speed and Direction

Wind speed and directional data has been collected at Maryville between 1969 and 1993. Dominant winds are from the east, southeast to south, and southwest, west to northwest. Winds from the east, southeast and south dominate the summer months. During the winter period the dominant winds are from the southwest, west and northwest, although southerly winds are also common.

Wind speed and directional data collected at Newstan Colliery, located approximately 3.2 kilometres south of Westside Mine, has been used for the air quality assessment in **Section 5.7**. The data collected from Newstan Colliery was considered to be representative of the conditions associated with Westside Mine due to the close proximity of the two mines.

Information regarding the effects of wind on potential air quality impacts is provided in **Section 5.7**.

## 5.3 SOILS AND LAND CAPABILITY

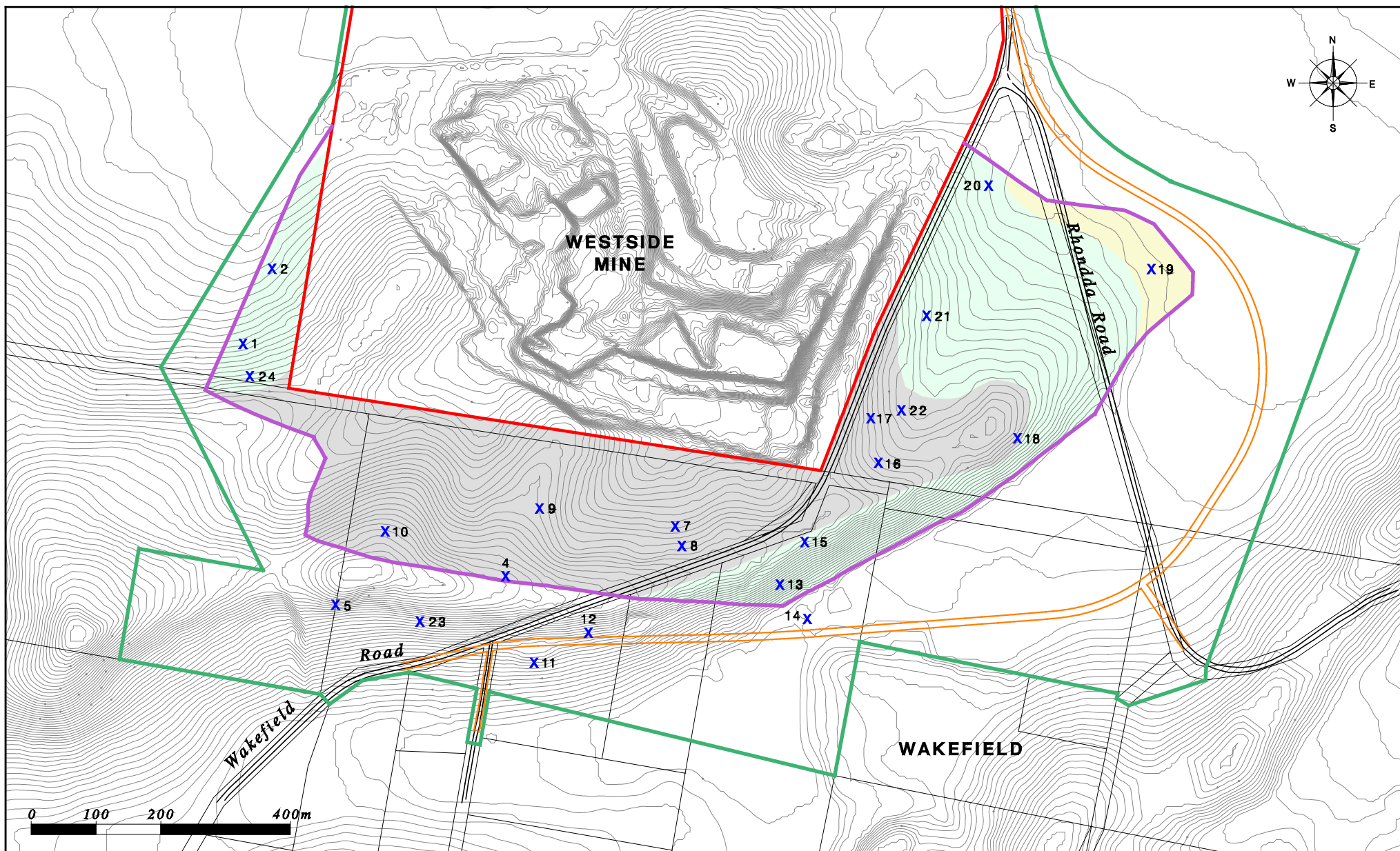
### 5.3.1 Soil Characteristics

A soil survey was undertaken of the proposed extension area and realignment of Wakefield Road as detailed in **Appendix 4**. Soils within the area form part of the Killingworth Soil Landscape as mapped on the Newcastle 1:100000 Soil Landscape Map (Matthei 1995).

Three soil types were identified within the survey area. Those being:

- **Yellow Duplex Soils** - Yellow Duplex Soils occur on moderate slopes on the proposed extension area (**Figure 5.1**). The soils are characterised by a strong texture contrast between the topsoil (A horizons) and underlying subsoil (B horizon).

Duplex soils in the proposed extension area have topsoils with generally weak pedality, weak to moderate coherence, no mottling, weak to moderate force to disrupt peds, texture ranging from sandy loam to sandy clay loam, gravel content generally 2 – 10% and occasionally up to 20%, pH between 5.0 and 6.0, and negligible salinity. Analyses indicates that both topsoil and subsoil have high to moderate dispersibility and high erodibility. Most of the duplex topsoils meet the criteria for topdressing suitability



#### Legend

- Existing Westside Mine Boundary
- Proposed Open Cut Mining Boundary
- Development Application Area

- Proposed Wakefield Road Realignment
- X11 Soil Survey Site

- Alluvial Soil
- Skeletal Soil
- Yellow Duplex Soil

**FIGURE 5.1**  
Soil Types in Westside Mine  
Southern Extension Area

because of structure and water holding potential. The remainder, due to the fact that it contains a natural seed source, could be used for topdressing on gentle slopes which have less erosion potential.

Duplex topsoils on the western side of the proposed extension area are generally 0.40 metre thick and are considered suitable for use in topdressing. The stripping depth in this area is approximately 0.40 metre. Grey topsoil should be stripped to the top of the brown, clayey subsoil.

Duplex topsoils on the eastern side of the proposed extension area are thinner than on the western side, being approximately 0.20 metre thick. The stripping depth in this area will be approximately 0.20 metre.

None of the duplex subsoils is suitable for topdressing purposes because of mottling.

- **Skeletal Soils** - Skeletal Soils (or lithosols) occur on moderate upper slopes south and east of the present Westside Mine as well as on the ridge crest at the southern limit of the proposed extension area. Skeletal Soils have developed on lithic sandstone or conglomerate substrates and generally consist of sandy loam. There is generally no B horizon, with the A2 horizon resting directly on weathered bedrock. Topsoils range from 0.23 metre to 0.59 metre thick, and average approximately 0.40 metre thick. These soils have weak to moderate pedality, generally moderate coherence, no mottling, generally moderate force to disrupt peds, variable gravel content ranging from <2% to 40%, pH between 4.5 and 6.0, and negligible salinity. Although these topsoils are not ideal for topdressing because of their coarse texture, they do contain a seed store which will assist in regenerating native vegetation over the rehabilitated mine site. Therefore, it is recommended that these topsoils be stripped for subsequent re-use.
- **Alluvial Soils** - Alluvial Soils occur on gentle lower slopes on the northeastern extremity of the proposed East Pit (**Figure 5.1**), along the proposed new alignment for Wakefield Road where it traverses Diega Creek floodplain and along the alignment of the proposed new haul road where it traverses Cockle Creek floodplain.

Alluvial soils within the proposed extension area range from fine sandy loam to sandy clay. The soils are mottled, apedal or have moderate pedality, generally moderate coherence, have pH of 5.3 to 5.5 and contain no gravel. Analytical results indicate negligible salinity. The mottled nature of these topsoils indicates poor drainage conditions and is considered to indicate material which is not suitable for use in revegetation (Elliot and Veness 1981).

The alluvial soils along the proposed realignment of Wakefield Road and the new haul road typically have a clay loam topsoils (A horizon) that are approximately 0.15 to 0.4 metre thick overlying a mottled clay B Horizon. The topsoil material is considered suitable for topdressing purposes. The mottled nature of the B horizon material indicates that it is not suitable for use in topdressing. Topsoil from the proposed realignment of Wakefield Road and from the new haul road should be stockpiled for future use in rehabilitation.

### 5.3.2 Soil Handling

As with the existing mining operation, timber and vegetation will generally be cleared up to 75 metres in advance of mining. Overburden will then be removed as described in **Section 4.4.2** and used directly to create the final landform of mined areas.

Any suitable topsoil will be stripped and where possible immediately reused to topdress sections of previously mined areas that have been reshaped to final landform. Where

immediate reuse is not possible, topsoil will be temporarily stockpiled within the perimeter of the area serviced by the surface water management system at the mine. Material that is to be stockpiled for more than six weeks will be seeded with pasture species and a cover crop (Japanese Millet) to minimise erosion potential and increase organic matter content.

Similarly with construction of the proposed new haul road, timber and vegetation from along the alignment of the haul road will be cleared and either windrowed along the edge of the haul road alignment or buried in-pit as in the current situation. The proposed alignment of the new haul road will predominantly traverse alluvial soils adjacent to Cockle Creek. Topsoil from this area will be stripped with sufficient material to topdress the batters of the road being stockpiled adjacent to the alignment of the haul road on an area that will be subject to future mining. The remainder of the topsoil will be used for topdressing areas that have been reshaped to final landform. Based on an average stripping depth of 200 mm, it is estimated that approximately 4200 m<sup>3</sup> of topsoil will be stripped from the new haul road alignment with approximately 1000 m<sup>3</sup> of this material being required for topdressing haul road batters. The remaining approximately 3200 m<sup>3</sup> of topsoil will be used directly to topdress previously mined areas that have been reshaped to final landform. Depending on site conditions it may be necessary to remove additional material from the alignment of the road that is not sufficiently structurally sound to form the base for the proposed earthworks. Any unsuitable material that is removed will be placed within areas that are being reshaped for future rehabilitation.

The proposed realignment of Wakefield Road will predominantly traverse alluvial soil on Diega Creek floodplain. Vegetation and timber along the new alignment of Wakefield Road will be cleared and chipped with the resultant mulch being subsequently used in rehabilitation of the site.

Topsoil will then be stripped from the area of proposed earthworks and stockpiled either for subsequent use to topdress road batters or for future use in topdressing areas of East Pit that have been reshaped to final landform. It is estimated that approximately 6300 m<sup>3</sup> of topsoil will be stripped from the proposed road alignment. Approximately 1000 m<sup>3</sup> of this will be used to topdress the road batters with the remaining 5300 m<sup>3</sup> being available for topdressing reshaped mining areas. This material will be stockpiled for use at the end of the mine life, with the stockpiles used to form embankments adjacent to sedimentation dams and a levee bank that are proposed to be constructed adjacent to the southeastern boundary of East Pit as detailed in **Section 5.5**. All long term stockpiles will be seeded with suitable pasture species to provide a stable vegetative cover. As with the new haul road, any unsuitable material from within the road footprint will be removed. It is proposed that this material will be stockpiled at the northeastern end of East Pit adjacent to the existing junction of Rhondda Road and Wakefield Road.

The realigned section of Wakefield Road will be built up above existing ground level to provide satisfactory drainage and base for road pavement and to elevate the road above the 1 in 100 year flood level. To achieve this it is estimated that approximately 30000 m<sup>3</sup> of suitable fill material will be required to construct the road realignment as proposed. It is proposed to win this material from a borrow pit that will be located within the proposed East Pit boundary. The material to be excavated from the borrow pit will be suitable overburden material that would have otherwise been removed as part of the open-cut mining operation. The borrow pit will be approximately 0.7 hectares in area and will be approximately 5 metres deep.

### 5.3.3 Land Capability and Agricultural Suitability

Land capability is defined as “the ability of land to accept a type and intensity of use permanently, or for specified periods under specific management, without permanent damage” (Houghton and Charman 1986). The Soil Conservation Service of NSW has

developed an eight-class system for classifying rural land, based on the biophysical characteristics of the land, the soil erosion hazards and the extent to which these will limit a particular type of land use. Each class outlines the types of land uses appropriate for a particular area of land and the types of land management practices needed to prevent soil erosion and maintain the productivity of the land.

Agricultural suitability is an assessment of the potential agricultural productivity of the land and is a five-class system developed by NSW Agriculture (Riddler 1990). It is based on consideration of limitations such as climatic factors, soil physical characteristics, soil chemical characteristics, erosion potential, drainage, stoniness, shallow soils, and topography.

#### **5.3.3.1 Existing Land Capability**

Land capability of the proposed extension area has been mapped by the DLWC at a scale of 1:100000, based on interpretation of aerial photographs. Two land capability classes, Class IV and Class VI, occur within the project area (**Figure 5.2**). Definitions of these classes (after Emery, undated) are provided below.

Class IV land is suitable for grazing and occasional cultivation. Soil conservation practices such as pasture improvement, stock control, application of fertiliser and minimal cultivation for the establishment or re-establishment of permanent pasture are necessary.

Class VI land is suitable for grazing but not suitable for cultivation. Soil conservation practices include limiting stock, broadcasting seed and fertiliser, preventing fire and destroying vermin. Some isolated structural works may be required.

The proposed extension area has been mapped as suitable only for grazing, with stock limited in the area immediately south of the existing mining lease boundary. The proposed extension area is unsuitable for regular cultivation.

#### **5.3.3.2 Land Capability Impact Assessment**

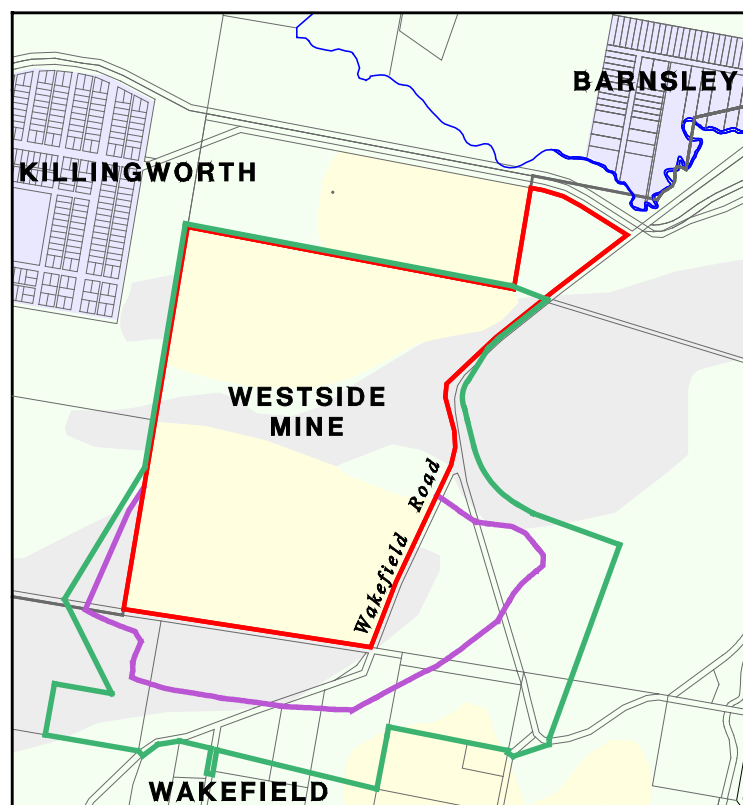
Although the proposed mining area has been mapped as suitable for grazing, only a small portion has been cleared for grazing - the remainder is timbered (**Figure 4.3**). Parts of the proposed mining area are affected by subsidence into old shallow underground mine workings and are unsuitable for grazing in their present state.

Rehabilitation of the proposed mining area will involve restoring the topography and revegetating the land with a mixture of native species in order to regenerate native forest. The end result will be land that is capable of being grazed provided stock is limited. Consequently the land capability of the proposed mining area after mining will be similar to that already mapped, with significant improvement to the present irregular, subsidence-affected surface.

#### **5.3.3.3 Existing Agricultural Suitability**

Using aerial photo interpretation and field observations, NSW Agriculture has mapped the agricultural suitability of the proposed mining area at a scale of 1:50000.

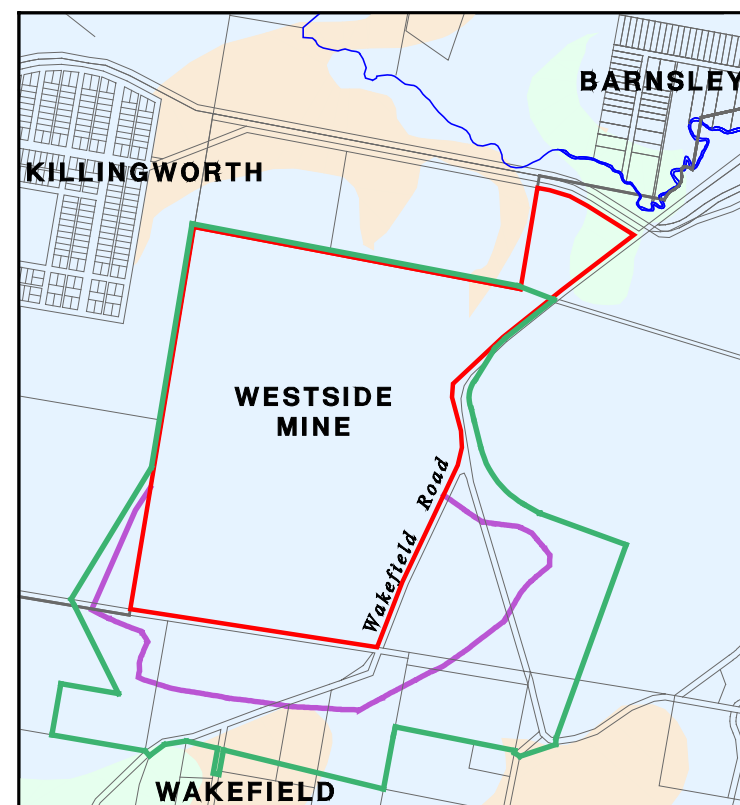
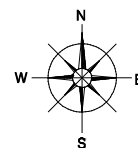
All the proposed extension area has been mapped as Class 5 land, which is unsuitable for agriculture (**Figure 5.3**). The timbered nature of much of the land is the principal constraint to agriculture.



**FIGURE 5.2**  
Land Capability

**Legend**

- Existing Westside Mine Boundary
- Development Application Area
- Proposed Open Cut Mining Boundary
- Class IV – Land suitable for grazing and occasional cultivation with soil conservation practices
- Class VI – Land suitable only for grazing providing stock is limited
- Mining Activity
- Urban Areas

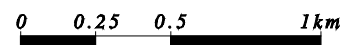


**FIGURE 5.3**  
Agricultural Suitability

**Legend**

- Existing Westside Mine Boundary
- Development Application Area
- Proposed Open Cut Mining Boundary
- Class 3 – Suitable for Grazing and Pasture Improvement
- Class 4 – Marginally Suitable for Grazing
- Class 5 – Unsuitable for Agriculture

**FIGURES 5.2 & 5.3**  
Land Capability and  
Agricultural Suitability



Although the land has been mapped by DLWC as capable of being grazed, it is considered to be of relatively low suitability for this purpose, largely because of the timbered nature of much of the area.

Some areas to the north and south of Westside Mine have been mapped as marginally suitable for grazing (Class 4) while other areas have been mapped as suitable for grazing (Class 3) (**Figure 5.3**).

#### **5.3.3.4 Agricultural Suitability Impact Assessment**

The entire proposed mining area has been mapped as unsuitable for agriculture (**Figure 5.3**). Rehabilitation of the mined area will result in regeneration of native forest on topography similar to the existing topography. The agricultural suitability of the land will not be adversely affected by the proposed mining.

## **5.4 LAND USE**

### **5.4.1 The Site**

A small portion of the proposed mining area has been cleared as part of previous mining activities and/or grazing. The remainder of the site is forested. Parts of the proposed mining area are affected by subsidence into old shallow underground mine workings and are unsuitable for grazing in their present state.

Rehabilitation of the proposed mining area will involve restoring the topography and revegetating the land with a mixture of native species in order to regenerate native forest. The end result will be land that is capable of being grazed provided stock is limited. Consequently the land capability of the proposed mining area after mining will be similar to that already mapped, with significant improvement to the present irregular, subsidence-affected surface.

### **5.4.2 Surrounding Area**

**Figure 2.1** shows the existing land use in the area surrounding the site. The predominant land uses of the surrounding area include coal mining, rural-residential holdings and residential development, emulating the typical land use pattern exhibited throughout much of the lower Hunter Valley.

#### **5.4.2.1 Residential / Rural Residential**

The nearest urban centre to the project area is Newcastle, which is approximately 7 kilometres east and had a population of 133686 people in 1996 (ABS 1996 Census, ABS Website).

Killingworth and Barnsley are the closest residential areas to Westside Mine containing approximately 210 and 670 allotments respectively. Killingworth is located approximately 900 metres to the northwest and Barnsley is located approximately 1.5 kilometres northeast of the proposed development area (**Figure 2.1**). Westside Mine has undertaken open cut operations to within 220 metres of the urban area of Killingworth during previous mining of the North Pit.

Rural residential land uses dominate the area to the south and southwest of Westside Mine, in the vicinity of Wakefield, a small rural residential community. Fifteen private residences are located within 1 kilometre of the proposed open cut mining boundary, to the south of

current operations (refer to **Figure 2.1**). OCAL is currently seeking agreements and or purchase for two of these potentially affected residences and one additional landholding.

A Department of Education training facility is also located in Wakefield (refer to **Figure 2.1**). It is understood that this facility will soon be operated as the Wakefield School, providing high school education for a relatively low number of special needs pupils from the surrounding region.

#### **5.4.2.2 Extractive Industries and Power Distribution**

Westside Mine is one of a number of coal mining facilities located within Lake Macquarie LGA. The surface facilities of the existing West Wallsend Colliery adjoin the northern boundary of Westside Mine. Newstan Colliery is located approximately 3.25 kilometres to the south and the former Rhondda Colliery is located immediately to the southeast. The current Teralba Quarry is located 1.75 kilometres to the southeast and the Macquarie Coal Preparation Plant is located 3 kilometres to the east (**Figures 1.3 and 2.1**).

Other mines located within the Lake Macquarie LGA include Teralba, Awaba, Myuna, Cooranbong, Wallarah, Moonee and Mandalong. The total coal production from the Newcastle coal fields in 1998-99 was approximately 19.07 Mt (DMR 2000).

As discussed in **Section 5.18**, cumulative impact assessment has considered the interaction of the project with surrounding mines and no significant cumulative impacts are predicted. The Westside Mine Southern Extension will not constrain the operations of surrounding mines.

#### **5.4.2.3 Forestry and Environment Protection Areas**

Yengo National Park is located approximately 50 kilometres west of Westside Mine, providing important habitat for a range of native flora and fauna. It is effectively linked to the remnant vegetation of the study area and surrounds via a series of State Forests.

Heaton and Awaba State Forests are located approximately 4 kilometres and 5 kilometres west and southwest respectively, of the Westside Mine surface facilities. They are two of several State Forests scattered throughout the region, effectively linking with the Watagan, Olney and Wyong State Forests to the southwest. Although State Forests cannot be considered to be conservation reserves, they do generally play an important role in providing habitat for a range of fauna species.

### **5.4.3 Potential Land Use Impacts and Mitigation Measures**

The proposed extension to mining will involve progressive disturbance and rehabilitation of 42 hectares of land. The land that has been and is proposed to be mined, comprises open forest areas and areas affected by previous open cut and underground mining. In sections of the proposed mine extension area, surface subsidence and pot holing exists as a result of earlier underground mining. In these areas the current landform poses a potential safety risk.

The current and proposed mining areas are bounded by forest to the west, east and northeast, residential development (Killingworth) to the northwest, coal mine (West Wallsend Colliery) to the immediate north and rural residential development (Wakefield) to south. The extent of mining has been limited in the south to the northern side of the crest of the ridge that separates the proposed mining area from rural residential residences at Wakefield. This has been done to minimise impacts of the proposed mining operation on the amenity of the area. As discussed in **Section 5.5**, the proposed realignment of Wakefield Road has also been designed to minimise any potential flooding impacts on upstream and downstream properties located on Diega Creek.

In addition to these mitigation measures, to assist in minimising impacts of the proposed development on surrounding land uses, rehabilitation of mined areas will be undertaken on an ongoing basis. Proposed ongoing rehabilitation will result in the total area that is disturbed and not rehabilitated decreasing from approximately 42 hectares as of Year 1 to approximately 35 hectares by Year 7 with the total site being shaped to final landform and revegetated within two years of completion of mining.

As described in **Section 4.17**, at the completion of mining it is proposed that the mined area will be vegetated with native open forest, providing a contiguous link with existing open forest areas to the east and west of the site and forming part of a larger habitat corridor with the final landform having similar agricultural suitability and land capability to its pre-mining condition.

Potential off-site land use impacts in relation to air quality, noise and visual impacts are addressed in **Sections 5.7, 5.8 and 5.10**, respectively.

## **5.5 WATER RESOURCES AND MANAGEMENT**

### **5.5.1 Surface and Groundwater Characteristics**

Westside Mine is located in the catchment of Cockle Creek which is located on the eastern footslopes of the Sugarloaf Range. Cockle Creek is a tributary of Lake Macquarie. Approximately 2.5 kilometres east of Westside Mine, flow in Cockle Creek is controlled by the James Street weir. This weir prevents upstream incursion of saline water from the estuarine section of Cockle Creek and Lake Macquarie. The mine site is approximately 9 kilometres upstream from Lake Macquarie.

The catchment ranges in elevation from approximately 10 mAHD at the eastern (downstream) boundary of the current mining lease to approximately 72 mAHD at the western catchment boundary. Natural side slopes of Cockle Creek catchment within the current mining area are typically 5° to 6°.

The catchment area upstream from the western boundary of the mining lease is approximately 960 hectares increasing to approximately 1062 hectares at Wakefield Road, being the downstream boundary of the current lease area. The current Westside Mine water management system controls runoff from approximately 85 hectares or 8% of this part of Cockle Creek catchment. Cockle Creek conveys clean runoff from the upper catchment through the centre of the current mining between North Pit and South Pit.

Cockle Creek is joined by Diega Creek approximately 300 metres downstream of Wakefield Road. At this point both Cockle Creek and Diega Creek have catchment areas of approximately 1100 hectares.

In the vicinity of Westside Mine, both Cockle Creek and Diega Creek are intermittent watercourses and generally flow in an easterly direction (see **Figure 1.1**). Average annual catchment yield for Cockle Creek immediately downstream of its confluence with Diega Creek is estimated to be approximately 7190 ML with each creek system contributing approximately 50% of this yield.

There are three potential sources of groundwater within the existing and proposed mining area. Those are:

- groundwater within Cockle Creek and Diega Creek alluvium;
- groundwater within the Fassifern and Great Northern coal seams; and
- groundwater stored within the old underground workings within the Great Northern seam.

Prior to commencing mining within South Pit which included a section of the Cockle Creek alluvium, four bore holes were augered into the alluvium to assess the hydrogeological characteristics. The bore holes identified that the alluvium comprised silty clay material with low permeability and potentially low stability. A dewatering program was established to minimise the potential instability of side walls during the excavation of alluvium from South Pit. The dewatering program comprised a trench with strip drains at the toe of the trench to convey groundwater to a pump well. The pump well was excavated to the base of the alluvium.

Following excavation of the initial trench and commencement of mining in South Pit, it was found that side walls of the excavation had sufficient stability not to warrant advanced dewatering. In addition inflow rates were low and constant dewatering was not required demonstrating that the permeability of Cockle Creek alluvium is very low. Based on field inspections of exposed sections of the alluvium on Diega Creek floodplain, it is considered that the alluvium would also have low permeability.

As described in **Section 4.2**, the Fassifern and Great Northern coal seams in South Pit occur in a shallow and localised basin structure. Mining in South Pit has extended beyond the deepest part of the shallow basin and as a consequence significant dewatering has occurred of the coal seams and old underground workings that are proposed to be mined. It is estimated that with mining at its deepest point, groundwater make into the pit from the old workings, coal seams and Cockle Creek alluvium is approximately 4 ML/week.

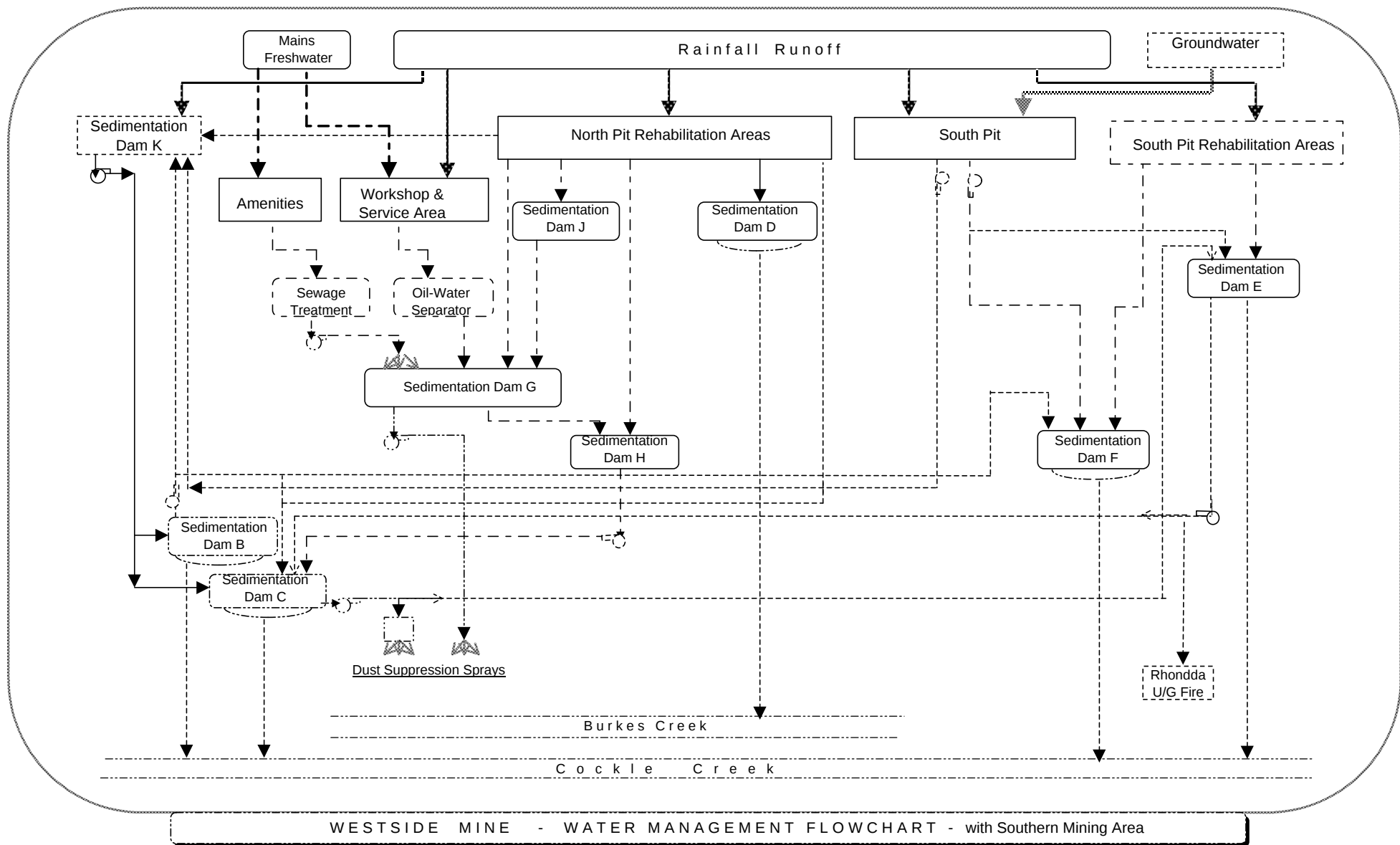
## 5.5.2 Existing Mine Water Management System

The existing Westside water management system services approximately 42.5 hectares of area currently disturbed for open cut mining and approximately 38 hectares of land that has been revegetated after mining. The system comprises a series of catch drains, diversion drains, interconnected dams and sumps that allow for the storage, transfer, treatment and discharge of water from the site. Location of the surface water management infrastructure servicing the mine site is shown on **Figure 3.2**. A schematic diagram depicting the current water management system is shown on **Figure 5.4**.

The water management system collects and treats mine water from South Pit, surface runoff from reshaped and rehabilitated areas of North Pit and South Pit and surface runoff from the coal crushing and stockpiling areas that are located immediately west of the office and workshop. The existing sedimentation dams (including Dam K which has a storage capacity of approximately 15 ML) have a combined storage capacity of in excess of 80 ML.

Runoff that is conveyed to these dams is treated as necessary with a flocculent (Magna Flocc) to reduce the Total Suspended Solids concentration to less than 50 mg/L prior to being discharged from the site. Discharges are via a series of licensed discharge points within Burkes Creek and Cockle Creek catchments as shown on **Figure 3.2**. Treated water from the mine site is discharged to Cockle Creek and Burkes Creek under an EPA licence. In total there are five licensed discharge points on the site.

In the 2000/2001 reporting year 952 mm of rain was recorded at Westside which is approximately 85% of the average annual rainfall for the site of 1127 mm. Rain fell on 121



**Figure 5.4**  
**Westside Mine**  
**Water Management Flowchart**

days of the year with approximately 60% of the recorded rainfall falling in February, March and May 2001.

During 2000/2001 approximately 300 ML of water was discharged from the mine water management system via the composite EPA Monitoring Point 16. This was approximately 25% of the maximum permissible licensed discharge value. Approximately 14 ML was discharged over the same period from the remaining discharge points on site. Over the same period less than 1580 kg of Total Suspended Solid (TSS) was discharged via EPA Monitoring Point 16 with an average concentration of less than 5 mg/L compared to the licence limit of 50 mg/L. Total Suspended Solids load discharged at EPA Monitoring Point 16 is approximately 16% of the licensed maximum limit (Umwelt, November 2001).

These results demonstrate that the operation of the water management system at the mine readily complies with EPA Licence conditions.

### 5.5.3 Water Management System for Proposed Extension Area

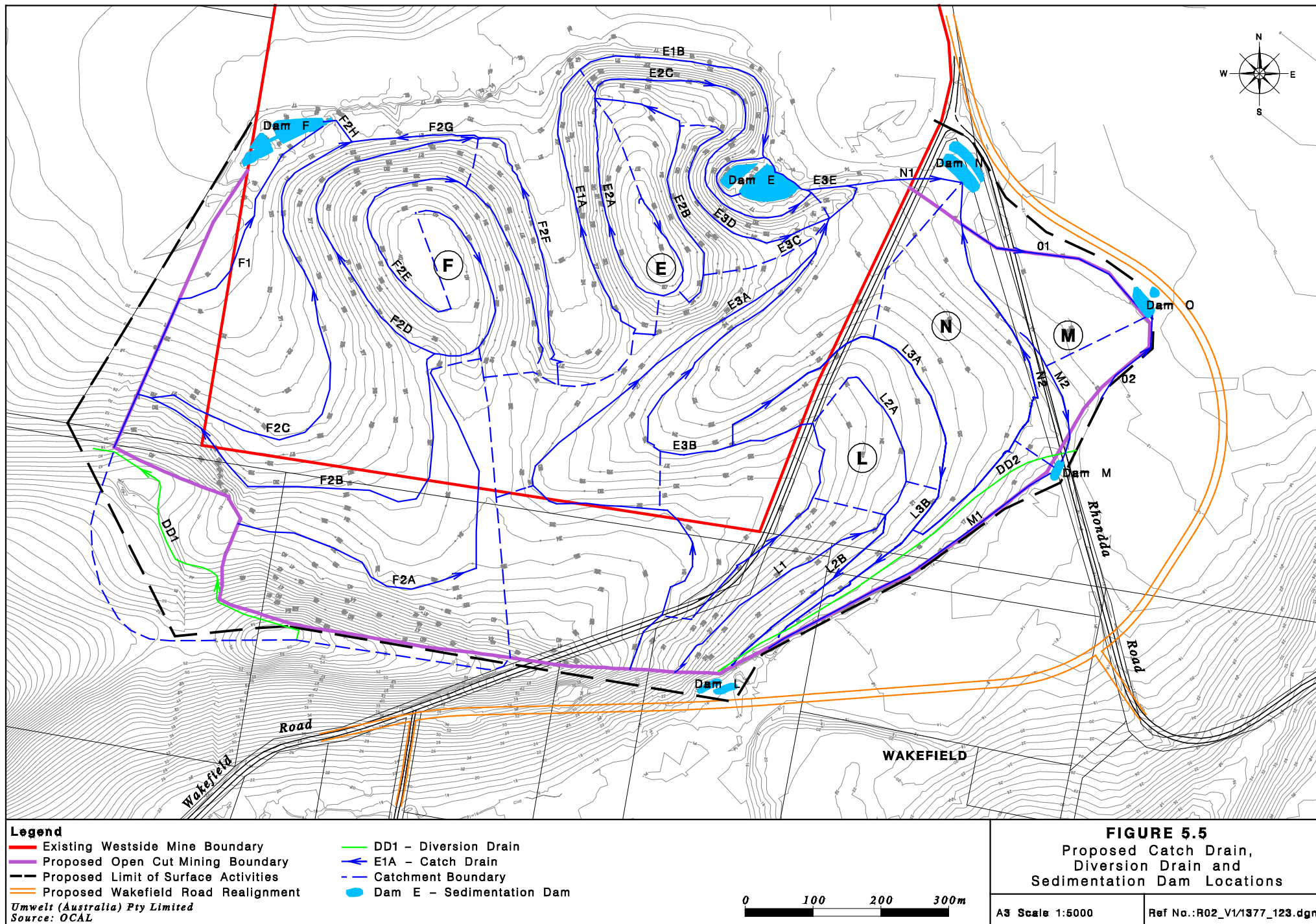
The existing water management system will continue to be utilised to control and treat runoff from the site with all pit water being directed to the current water management system.

The proposed extension area will include a ridge that forms the divide between Cockle Creek and Diega Creek catchments. Approximately 20 hectares of this area is in Diega Creek catchment. The ridge that is proposed to be mined slopes at 13° to 16° to Diega Creek floodplain. The eastern extent of the proposed East Pit has been confined to the footslopes adjacent to Diega Creek floodplain and does not extend into Diega Creek alluvium. To determine the extent of flooding adjacent to the proposed East Pit, a one-dimensional, steady state flood model of Diega Creek was developed using HECRAS. Details of the HECRAS model developed for Diega Creek are provided in **Appendix 5**.

The limit of mining along the edge of the floodplain has been established to ensure that a minimum of 1 metre of freeboard above the estimated 1 in 100 year ARI flood in Diega Creek is provided (see **Section 5.5.4**). Modelling also indicates that to prevent flows entering East Pit during a 1 in 100 year flood event and provide adequate freeboard, it will be necessary to limit the extent of open-cut mining to the line shown on **Figure 4.9** and to construct a small levee bank immediately upstream of Rhondda Road and along the southeastern boundary of East Pit between Rhondda Road and the realigned Wakefield Road near Culvert 1. Modelling also indicates that it will be necessary to ensure that Wakefield Road has a minimum crest level at the junction of the road and the levee bank of 12.8 mAHD to prevent flows along Rhondda Road and back into East Pit.

As shown on **Figure 4.4**, it is proposed that mining in the extension area will commence in the southwestern corner of South Pit and progress in a southerly direction until the end of Year 3 when mining will extend into the East Pit. By this time, the proposed realignment of Wakefield Road will need to be constructed. By approximately mid Year 4, water management infrastructure to service the southwestern corner of East Pit will need to be established, and by the start of Year 6, water management infrastructure to service the northern half of East Pit will be required.

A series of diversion drains will be established to convey clean runoff away from sedimentation dams and disturbed areas and a series of catch drains will be established to convey runoff from disturbed areas to sedimentation dams. Both catch drains and diversion drains will be designed to convey peak discharges from critical duration 1 in 20 year ARI storm events and will provide a minimum of 0.5 metres freeboard. Conceptual layout for the catch drains and diversion drains is provided on **Figure 5.5**. Diversion drain and catch drain design specifications are provided in **Appendix 5**.



Diversion drains and catch drains will be constructed with 3H:1V side batters and grassed channels with base widths varying between 2 metres and 4 metres. Analysis indicates that during a 1 in 20 Year ARI critical duration storm event, maximum flow depths of 0.042 metres to 0.242 metres are predicted with corresponding peak velocities ranging from 0.45 m/s to 1.64 m/s.

All catchments serviced by the catch drains and diversion drains are small and as a consequence flow durations as a result of a critical storm event will be short and typically less than 30 minutes. Given the predicted flow depths, flow durations and peak velocities as detailed in **Appendix 5**, it is considered that potential for significant scour or erosion in diversion drains and catch drains will be low, with the establishment of grass cover further reducing this potential.

The proposed extension to mining operations will effectively extend the existing South Pit approximately 250 metres further to the south. This will increase the mining area within Cockle Creek catchment by approximately 20 hectares. Proposed mining will also extend to the east into the proposed East Pit and will include approximately 24 hectares of Diega Creek catchment.

An additional four sedimentation dams are proposed to service surface runoff from the East Pit. The proposed dams have been sized in accordance with the requirements of “Managing Urban Stormwater – Soils and Construction 1998” based on topsoil and overburden characteristics of the proposed mining area and the final landform catchment area of each dam. The location and layout of these dams and the relevant catchments are shown on **Figure 5.5**.

These dams will principally collect runoff from areas disturbed during mining and from the land surface once the landform has been progressively reshaped. Catchment areas and required storage volumes for each of the dams proposed to service runoff from the final landform are provided in **Table 5.3**. Dams have been sized using 75th Percentile, 5 day rainfall event for Newcastle of 23.9 mm and a typical soil erodibility factor of 0.036 (Killingworth Soil Landscape – Newcastle 1:100000 Soil Landscape Map).

**Table 5.3 – Design Sedimentation Dam Capacity**

| Catchment Name | Catchment Area (Ha) | Estimated Soil Loss (tonnes/Ha/yr) | Settling Zone Volume (m <sup>3</sup> ) | Sediment Storage Zone (m <sup>3</sup> ) <sup>1</sup> | Total Design Volume (m <sup>3</sup> ) | Surface Area (m <sup>2</sup> ) |
|----------------|---------------------|------------------------------------|----------------------------------------|------------------------------------------------------|---------------------------------------|--------------------------------|
| E <sup>2</sup> | 27                  | 111                                | 3227                                   | 1613                                                 | 4840                                  | Existing                       |
| F <sup>2</sup> | 34.6                | 111                                | 4135                                   | 2067                                                 | 6202                                  | Existing                       |
| L              | 9.3                 | 111                                | 1111                                   | 558                                                  | 1667                                  | 1200                           |
| M              | 2.6                 | 111                                | 311                                    | 155                                                  | 466                                   | 500                            |
| N              | 10.6                | 111                                | 1267                                   | 633                                                  | 1900                                  | 1400                           |
| O              | 3.8                 | 111                                | 454                                    | 227                                                  | 681                                   | 400                            |
| <b>Total</b>   | <b>87.9</b>         | -                                  | -                                      | -                                                    | <b>15756</b>                          |                                |

<sup>1</sup> Based on 50% of Settling Zone Volume

<sup>2</sup> Existing Sedimentation Dams

Dam E and Dam F currently exist and service runoff and mine water from South Pit. Both dams are twin cell dams that enable water to be treated and then discharged in a controlled manner once suitable water quality is achieved. The existing capacity of Dams E and F is in excess of design requirements as set out in **Table 5.3**, with the dams having 10300 m<sup>3</sup> and

6600 m<sup>3</sup> of storage capacity respectively which is greater than the total design requirement for South Pit and the proposed extension area as detailed in **Table 5.3**.

Each dam will comprise two cells and will be equipped with a flocculation system to ensure that discharges do not exceed a TSS concentration of 50 mg/L in accordance with the EPA licence. Based on the current mine plan, Dams M, L and N will need to be operational by the start of Years 4, 6 and 7, respectively, and Dam O will be required following reshaping of the final landform in the northeastern corner of East Pit.

Dam N will discharge to Cockle Creek upstream of EPA Point 15 (see **Figures 3.2** and **5.5**) and Dams M, L and O will discharge to the Diego Creek. Modification to the EPA licence will be required for these three new dams.

It is intended that mine water from the South and East Pits will be pumped to either Dam E (existing) or Dam N (proposed). Overflow from these dams will only be via Cockle Creek. It is not intended that mine water from the pit will be pumped to Dams M, L and O. These dams will handle surface runoff only.

As the depth of mining in the last stages of the mining in the East Pit is shallow, it is possible to shape the final landform to avoid the need for a final void by minimal backfilling with washery rejects via the internal haul roads from the company's Macquarie Coal Preparation Plant, such that the site can be left with a free draining surface. As a consequence there will be no long term management requirements for the site once the final landform has been vegetated and satisfactorily stabilised.

Open cut mining in South Pit included mining within the alluvium of Cockle Creek and mining within areas that had been subject to previous underground mining. Both the alluvium and area of previous underground mining were sources of groundwater inflow into South Pit. Current workings within South Pit are at the deepest part of the coal seam with proposed future mining areas up dip and further removed from Cockle Creek alluvium than previous workings in South Pit. Groundwater make into South Pit from coal seams, old workings and alluvium is approximately 4 ML/week (0.57 ML/day) and is expected to reduce as mining progresses upslope and the contribution from old workings decreases.

#### **5.5.4 Construction Of New Internal Haul Road Over Cockle Creek**

As discussed in **Section 4.8** and shown on **Figure 4.3**, it is proposed to construct a new haul road to connect South Pit and East Pit to the coal crushing and stockpiling area. The haul road will cross Cockle Creek approximately 300 metres downstream of the existing haul road that connects South Pit to North Pit. The existing haul road will remain in use for the life of the operation to provide access for ongoing coal haulage and rehabilitation works.

The existing haul road crossing over Cockle Creek has a catchment area of approximately 1023 hectares. The culvert at Cockle Creek comprises a series of four pipes with diameters of 2400 mm, 2700 mm, 3200 mm and 3600 mm and was designed to convey the 1 in 100 year ARI flood.

The crest of the haul road is in excess of 1 metre above the top of the pipes. Peak discharge during a 1 in 100 year ARI flood event at this location is estimated to be approximately 81.5 m<sup>3</sup>/s. Under these conditions modelling, using HECRAS, indicates that the haul road acts as a large detention basin backing water up in Cockle Creek with the immediate upstream water level approximately 0.2 metres above the top of the pipes and at least 0.8 metres below the crest of the haul road. Modelling indicates that the existing haul road culvert has adequate capacity to convey the 1 in 100 year ARI flood without the haul road overtopping.

Immediately upstream of the proposed new haul road, Cockle Creek has a catchment area of approximately 1050 hectares. Estimated peak discharge during a 1 in 100 year ARI storm event at this location is approximately 83.0 m<sup>3</sup>/s. Modelling of the new haul road and culvert using HECRAS (see **Appendix 5**) indicates that the haul road will have sufficient capacity and freeboard to convey the estimated 1 in 100 year flood if it is constructed with a minimum crest level of 14.0 mAHD and a culvert consisting of four 3 metre diameter pipes. The culvert has been designed with an upstream invert level of 10.7 mAHD and a downstream invert of 10.6 mAHD. Modelling indicates during a 1 in 100 year ARI flood event, flows exiting the culvert will have high velocities and in-channel scour protection works will be required for 10 to 20 metres downstream of the culvert.

To minimise the potential for erosion, the culvert will be constructed with 3 horizontal to 1 vertical side batters and will have either stone pitching or concrete headwalls at the upstream and downstream ends.

As with the existing haul road between North Pit and South Pit, the proposed new haul road will also act as a detention basin during significant flows in Cockle Creek.

Catch drains will be constructed along the sides of the section of the new haul road that crosses Cockle Creek, to divert 'first flush' runoff from the road for treatment in small sedimentation sumps constructed adjacent to the road, outside of the creek alignment.

### 5.5.5 Realignment of Wakefield Road

The proposed Wakefield Road realignment will require the construction of approximately 2.3 kilometres of new road, part of which will be constructed over the Diega Creek floodplain and two new crossings over Diega Creek. On Diega Creek floodplain, the crest of the road will typically be 1.6 metres to 2.2 metres above natural ground level.

Along the upstream section of the proposed road realignment, the channel of Diega Creek is poorly defined and the area is covered with dense growth of Swamp Mahogany, Paper Bark and undergrowth. The creek channel becomes more defined, being approximately 10 to 20 metres wide and approximately 1 metre deep, in the section of Diega Creek from 200 metres upstream of Rhondda Road, downstream to the northern limit of the site.

Construction of the road will include the construction of two multi-cell culverts over Diega Creek. Culvert 1 at the downstream section of the proposed road diversion will comprise seven 3000 mm wide by 1800 mm deep reinforced concrete box culverts while Culvert 3 at the upstream end of the road diversion will consist of six 3000 mm wide by 1800 mm deep reinforced concrete box culverts (refer to **Figure 4.9** for culvert locations).

The proposed new section of road will cross Diega Creek at locations approximately 440 metres and approximately 1300 metres upstream of the confluence of Diega Creek and Cockle Creek. The catchment areas at these crossings are 1001 hectares and 960 hectares respectively. Estimated 1 in 100 Year Average Recurrence Interval (ARI) peak flows at these crossings are 80.7 m<sup>3</sup>/s and 78.2 m<sup>3</sup>/s respectively for a critical storm duration of approximately 1.8 hours.

To assess the potential impact on 1 in 100 year ARI flood levels of constructing the new section of road a one dimensional, steady state hydraulic model of Diega Creek was developed using HECRAS and available topographic information. The model developed represents the channel geometry and hydraulic properties of Diega Creek using a series of cross sections, the locations of which are shown in **Appendix 5**. Hydraulic properties of the modelled section of Diega Creek have been derived from aerial photography coupled with field inspections of vegetation cover, channel characteristics and hydraulic roughness characteristics. Details of each of the cross-sections, channel properties and hydraulic

characteristics are provided in **Appendix 5**. The model was initially developed for the existing situation and subsequently modified to take into account the proposed diversion of Wakefield Road and associated construction road and culverts that have the potential to impede flows in Diega Creek.

Results obtained for the HECRAS models for the existing situation and following construction of the new section of road during 1 in 50 year ARI and 1 in 100 year ARI flood events are provided in **Tables 5.4** and **5.5** respectively.

Modelling indicates that limited clearing will be required along the creek channel for approximately 30 metres upstream of proposed Culvert 3 and scour protection in the form of parallel 1 metre high grassed embankments either side of the Diega Creek will be required for approximately 10 to 20 metres downstream of proposed Culvert 1. Modelling has assumed that Rhondda Road and the associated culvert over Diega Creek (Culvert 2) remains in its current form.

**Table 5.4 – Predicted 1 in 50 Year ARI Flood Levels for Diega Creek**

| Cross-Section No. | 1 in 50 Year ARI Peak Discharge (m <sup>3</sup> /s) | Existing Situation          |                        | Post Road Diversion         |                        |
|-------------------|-----------------------------------------------------|-----------------------------|------------------------|-----------------------------|------------------------|
|                   |                                                     | Peak Water Elevation (mAHD) | Channel Velocity (m/s) | Peak Water Elevation (mAHD) | Channel Velocity (m/s) |
| 15                | 62.8                                                | 16.73                       | 0.17                   | 16.62                       | 0.18                   |
| 14                | 62.8                                                | 16.25                       | 1.80                   | 16.10                       | 1.80                   |
| 13                | 63.1                                                | 16.09                       | 1.62                   | 15.95                       | 2.02                   |
| 12                | 63.1                                                | -                           | -                      | 15.83                       | 1.74                   |
| 11                | Culvert 3                                           |                             |                        |                             |                        |
| 10                | 63.1                                                | 15.81                       | 1.04                   | 15.66                       | 1.36                   |
| 9                 | 63.4                                                | 14.70                       | 0.66                   | 14.66                       | 1.14                   |
| 8                 | 63.7                                                | 14.05                       | 0.59                   | 14.06                       | 0.58                   |
| 7                 | 64.0                                                | 13.93                       | 0.87                   | 13.93                       | 0.75                   |
| 6                 | Culvert 2                                           |                             |                        |                             |                        |
| 5                 | 64.3                                                | 13.36                       | 1.69                   | 13.34                       | 1.73                   |
| 4                 | 64.7                                                | 12.67                       | 2.27                   | 12.65                       | 1.80                   |
| 3.5               | 64.9                                                | 11.99                       | 2.02                   | 12.55                       | 0.69                   |
| 3                 | 65.1                                                | 11.50                       | 0.96                   | 12.51                       | 0.50                   |
| 2.5               | 65.1                                                | -                           | -                      | 12.49                       | 0.67                   |
| 2                 | Culvert 1                                           |                             |                        |                             |                        |
| 1.5               | 65.1                                                | -                           | -                      | 11.65                       | 1.86                   |
| 1                 | 65.1                                                | 11.29                       | 0.92                   | 11.28                       | 0.94                   |
| 0.5               | 65.1                                                | 10.75                       | 1.30                   | 10.75                       | 1.30                   |

As shown in **Table 5.4**, modelling indicates that during a 1 in 50 year ARI flood event, construction of the proposed road and associated works will result in a slight lowering of flood levels at the upstream boundary from approximately 16.73 mAHD to 16.62 mAHD. Modelling also indicates that flood levels at Rhondda Road will be unaltered by the realignment of the road.

Following construction of the road realignment modelling indicates that flood levels immediately upstream of Culvert 1 will increase by approximately 1 metre but remain unaltered downstream of the culvert. Results indicate that realignment of the road as

proposed will elevate flood levels for approximately 140 metres upstream of Culvert 1. There are no dwellings or other infrastructure that may be damaged by increased flooding depths in this area.

Modelling indicates that during a 1 in 50 year ARI flood event, channel velocities in this section of the existing Diega Creek system range from approximately 0.17 m/s to 2.27 m/s with post construction channel velocities being similar ranging from 0.18 m/s to 2.02 m/s. On this basis, apart from the works to be undertaken upstream of Culvert 3 and downstream of Culvert 1 as discussed, no additional works will be required to maintain channel stability.

**Table 5.5 – Predicted 1 in 100 Year ARI flood Levels for Diega Creek**

| Cross-Section No. | 1 in 100 Year ARI Peak Discharge (m <sup>3</sup> /s) | Peak Water Elevation (mAHD) | Channel Velocity (m/s) | Peak Water Elevation (mAHD) | Channel Velocity (m/s) |
|-------------------|------------------------------------------------------|-----------------------------|------------------------|-----------------------------|------------------------|
| 15                | 77.70                                                | 16.88                       | 0.19                   | 16.83                       | 0.20                   |
| 14                | 77.70                                                | 16.41                       | 1.81                   | 16.38                       | 1.69                   |
| 13                | 78.20                                                | 16.25                       | 1.68                   | 16.23                       | 2.07                   |
| 12                | 78.20                                                | -                           | -                      | 16.13                       | 1.85                   |
| 11                | Culvert 3                                            |                             |                        |                             |                        |
| 10                | 78.20                                                | 15.95                       | 1.15                   | 15.84                       | 1.44                   |
| 9                 | 78.70                                                | 14.80                       | 0.71                   | 14.78                       | 1.22                   |
| 8                 | 79.20                                                | 14.21                       | 0.62                   | 14.23                       | 0.61                   |
| 7                 | 79.70                                                | 14.10                       | 0.93                   | 14.09                       | 0.78                   |
| 6                 | Culvert 2                                            |                             |                        |                             |                        |
| 5                 | 79.70                                                | 13.46                       | 1.83                   | 13.45                       | 1.86                   |
| 4                 | 80.20                                                | 12.75                       | 2.44                   | 12.85                       | 1.51                   |
| 3.5               | 80.50                                                | 12.05                       | 2.09                   | 12.80                       | 0.67                   |
| 3                 | 80.70                                                | 11.56                       | 1.05                   | 12.77                       | 0.53                   |
| 2.5               | 80.70                                                | -                           | -                      | 12.75                       | 0.71                   |
| 2                 | Culvert 1                                            |                             |                        |                             |                        |
| 1.5               | 80.70                                                | -                           | -                      | 11.77                       | 2.02                   |
| 1                 | 80.70                                                | 11.35                       | 0.95                   | 11.34                       | 0.98                   |
| 0.5               | 80.70                                                | 10.82                       | 1.38                   | 10.82                       | 1.38                   |

As can be seen from **Table 5.5**, modelling indicates that diversion of Wakefield Road as proposed will not adversely impact on upstream water levels during a 1 in 100 Year Average Recurrence Interval flood event with predicted upstream water levels at Cross-section 15 decreasing slightly from 16.88 mAHD to 16.83 mAHD.

Modelling also indicates that flood levels at Rhondda Road will be not be significantly altered by the realignment of the road. The HECRAS model was modified to simulate removal of the section of Rhondda Road on the eastern side of the culvert. Modelling indicated that removal of this section of Rhondda Road would lower flood levels immediately upstream by approximately 0.4 metres with the effect of removal of this section of the road becoming insignificant by approximately 200 metres upstream.

Following construction of the road realignment, modelling indicates that flood levels immediately upstream of Culvert 1 will increase by approximately 1.2 metres with the effect of this extending almost back to Rhondda Road. There are no dwellings or other

infrastructure, that may be damaged by increased flooding depths in this area. Results indicate that downstream of the culvert, flood levels will remain unaltered.

Modelling indicates that during a 1 in 100 year ARI flood event, channel velocities in this section of the existing Diega Creek system range from approximately 0.19 m/s to 2.44 m/s with post construction channel velocities being similar ranging from 0.20 m/s to 2.07 m/s. On this basis, apart from the works to be undertaken upstream of Culvert 3 and downstream of Culvert 1 as discussed, no additional works will be required to maintain channel stability.

Based on the above discussion it is considered that Wakefield Road can be realigned as proposed without adversely impacting on flood levels within Diega Creek or on the stability of the channel system.

As part of the realignment of Wakefield Road, as shown on **Figure 4.3**, it is proposed to construct a new bridge over Cockle Creek, immediately adjacent to the existing bridge. It is proposed that the new bridge will have similar hydraulic capacity and properties to the existing bridge to ensure that the current flooding situation is not worsened. As discussed in **Section 5.5.4**, construction of the proposed new internal haul road which will cross Cockle Creek approximately 300 metres upstream of this bridge will form a detention basin and attenuate flows in Cockle Creek assisting to reduce the extent and magnitude of flooding on this section of Wakefield Road.

## 5.5.6 Water Balance

Water usage at the existing mine is predominantly for dust suppression and is typically in the order of 0.75 ML/week (30 to 40 ML/year) during dry weather. Potable water is drawn from Hunter Water Corporation's reticulated water supply system with on average 6000 L per week (0.3 ML/year) being used for drinking and bathhouse purposes. Water from the bathhouse is treated at an on-site wastewater treatment plant with treated effluent being spray irrigated on rehabilitated areas on site.

In addition to water being used for dust suppression, some mine water is pumped to Rhondda Colliery underground mine where it is used to assist in control of a fire in the coal seams. Generally water is only pumped to Rhondda Colliery when the volume of water on site exceeds the capacity of the on-site water management. Water is pumped at a rate of approximately 1 ML per day and typically 20 ML to 30 ML may be pumped in a year. In 2000/2001, which was a drier than average year, no water was pumped to Rhondda Colliery.

As discussed in **Section 5.5.2**, approximately 314 ML of water was discharged from Westside during 2000/2001 with the site receiving 958 mm of rainfall (ie. approximately 85% of average annual rainfall) during the reporting period. As stated in **Section 5.5.2**, current on-site storage capacity excluding South Pit is approximately 80 ML. As the South and East Pit develop, an additional 10 ML of storage capacity will be provided.

During a wet year, based on annual rainfall of 1400 mm, it is estimated that water make for the mine site could increase to approximately 560 ML being comprised of approximately 210 ML (ie. 4 ML/week) of groundwater inflow from alluvium, coal seams and old workings and 350 ML from surface runoff that is collected by the mine water management system. Of this 560 ML, it is estimated that approximately 30 ML would be used on site for dust suppression and up to 30 ML may be pumped to Rhondda Colliery with the remaining 500 ML being discharged to the Cockle Creek / Diega Creek drainage system. Based on the above assumptions, it is estimated that during a wet year, discharges from the proposed mining operation may increase runoff to the Cockle Creek / Diega Creek system by approximately 2% with the majority of this additional runoff occurring as controlled low flow discharges from water stored in on-site dams. As previously addressed, groundwater

make and surface runoff to the mine water management system will decrease, reducing the additional contribution to catchment yield to less than 2%.

The catchment area serviced by the mine water management system will reduce over time as areas become satisfactorily rehabilitated, enabling surface runoff to be conveyed directly to the natural drainage system. In addition, as mining progresses up dip and the contributing area of previous underground workings decreases, groundwater make will reduce from the current situation. As a consequence it is considered that the proposed water management system which is an extension of the existing system, will have adequate capacity to ensure that EPA licence conditions are met.

## 5.6 FLORA AND FAUNA

A comprehensive flora and fauna assessment has been completed by Ecotone Ecological Consultants with surveys conducted between October 1997 and November 2001. The complete flora and fauna assessment is provided in **Appendix 6**, with an outline of the main findings provided in this section.

### 5.6.1 Vegetation Communities

Four broad vegetation types occur within the subject site, namely dry sclerophyll open forest/ woodland; swamp forest; modified grassland; and regenerating shrubland. These associations are further divided into communities based on the dominant flora species in the upper strata. A total of five naturally-occurring vegetation communities, or regenerating derivatives of such, occur within the study site, as shown in **Figure 5.6**.

Brief descriptions of the vegetation communities of the site are presented below:

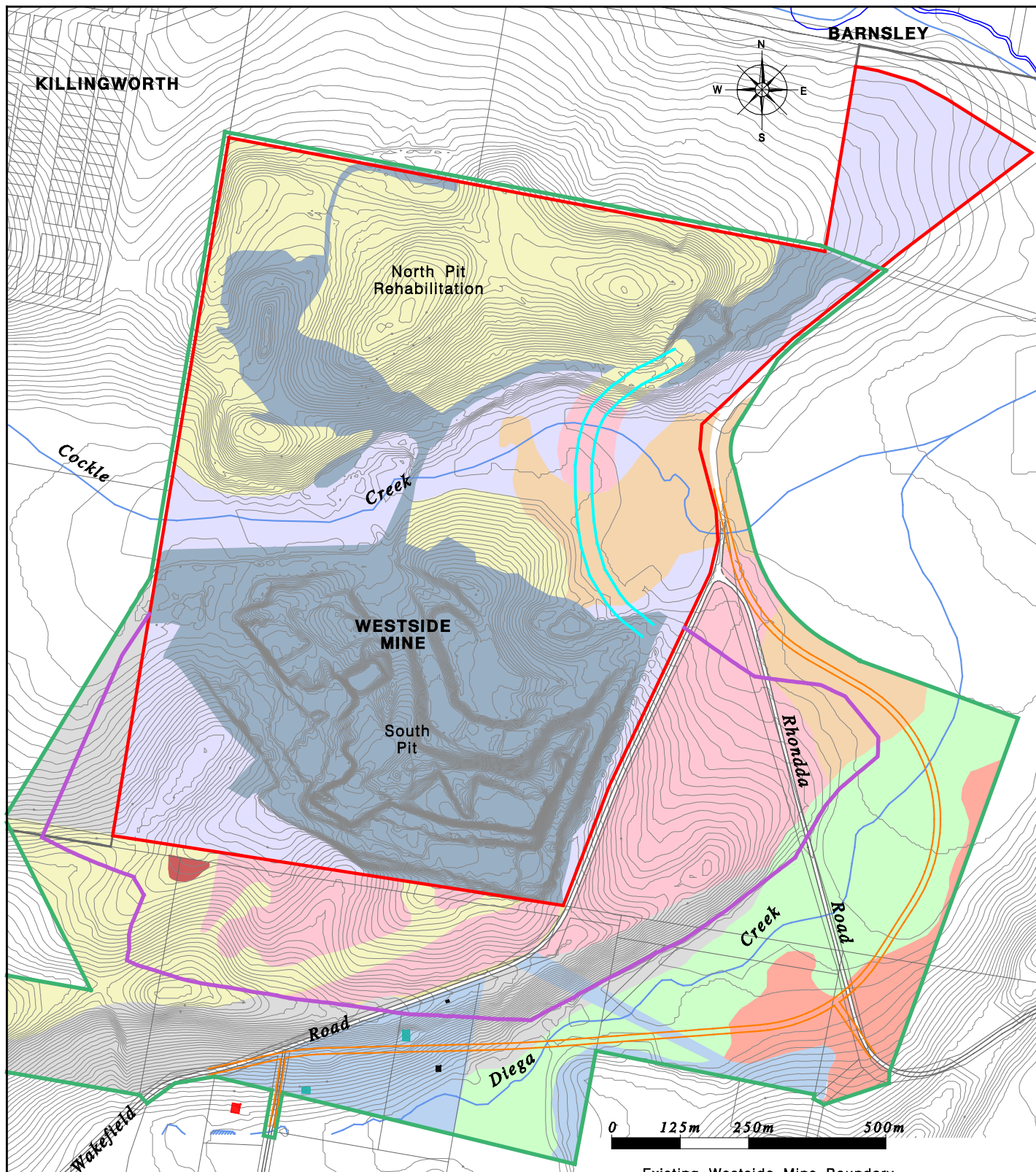
#### **Community 1      OPEN FOREST** **Smooth-barked Apple / Red Bloodwood / Mahogany Association**

Generally located in areas of the site with a south to southeastern aspect, this community was dominated by Smooth-barked Apple (*Angophora costata*), Red Bloodwood (*Corymbia gummifera*) and Broad-leaved White Mahogany (*Eucalyptus umbra*). Other tree species present, but in lower concentrations include Red Mahogany (*Eucalyptus resinifera* subsp. *resinifera*), Sydney Peppermint (*Eucalyptus piperita*), Turpentine (*Syncarpia glomulifera*) and at areas of overlap with Community 2, Brown Stringybark (*Eucalyptus capitellata*). Canopy height varies from 12 metres to 20 metres with a few larger scattered individuals, usually Smooth-barked Apple.

A sub-tree layer consists of Forest Oak (*Allocasuarina torulosa*). Few individuals of Forest Oak were mature specimens and generally individuals only reach heights of 3 - 5 metres.

The shrub layer is generally patchy, but in some areas quite dense, with an overall cover of approximately 50%. The most common species include Myrtle Wattle (*Acacia myrtifolia*), Native Holly (*Oxylobium ilicifolium*), Sydney Golden Wattle (*Acacia longifolia*), Paperbark Tea-tree (*Leptospermum trinervium*), Egg & Bacon Pea (*Dillwynia retorta*) and Large-leaf Hopbush (*Dodonaea triquetra*).

The ground-cover vegetation is dominated by grasses particularly Kangaroo Grass (*Themeda australis*) and Blady Grass (*Imperata cylindrica* var. *major*), with Bordered and Wiry Panic (*Entolasia stricta* and *E. marginata*), both well represented. Other common species within the lower strata included the Gynea Lily (*Doryanthes excelsa*) and the threatened plant Black-eyed Susan (*Tetratheca juncea*).



#### Legend

- Smooth Barked Apple/Red Bloodwood/Mahogany Association
- Scribbly Gum Stringy Bark Smooth Barked Apple Association
- Swamp Mahogany/Paperbark Association
- Swamp Mahogany/Cabbage Gum/Paperbark Association
- Sydney Peppermint Stringybark Association
- Moist Soak
- Modified Grassland Pastures Disturbed
- Mined Regenerated Area
- Areas Disturbed by Current Mine Activities
- Natural Vegetation

- Existing Westside Mine Boundary
- Proposed Open Cut Mining Boundary
- Development Application Area
- Proposed Wakefield Road Realignment
- Proposed Coal Haul Road (South /East Pit)
- Creek
- Contour 1m Interval
- Residences
- Buildings
- MCJV Residences

**FIGURE 5.6**  
Vegetation Communities

The community was of good quality with introduced plant species generally absent.

**Community 2      OPEN FOREST / WOODLAND**  
**Scribbly Gum / Stringybark / Smooth-barked Apple Association**

This community is located in the centre and in the eastern part of the site. It is dominated by two species of Scribbly Gum, *Eucalyptus signata* in the east portion and *Eucalyptus racemosa* (possibly a hybrid, x *E. haemastoma*), centrally. Co-dominant tree species include Thin-leaved Stringybark (*Eucalyptus eugenioides*), Brown Stringybark, Red Mahogany and Broad-leaved White Mahogany. Other tree species present were Red Bloodwood and Smooth-barked Apple.

The sub-tree layer comprises saplings of the tree species within the community, and species of Paperbark such as *Melaleuca nodosa* and *M. sieberi*.

The shrub layer is generally sparse to very sparse, although some areas contain patches of heath-like vegetation. Common species were Tea-tree (*Leptospermum trinervium* and *L. polygalifolium*), Banksia (*Banksia oblongifolia* and *B. spinulosa* var. *collina*) and Mountain Devils (*Lambertia formosa*).

Groundcover is similar to that present in Community 1, although with higher concentrations of grass species and the absence of the Black-eyed Susan.

The community was of good quality with introduced plant species generally absent, except along the roadside verges.

**Community 3      OPEN FOREST / WOODLAND**  
**Sydney Peppermint / Stringybark Association**

This community mainly occurs in sheltered locations on slopes at the southeastern end of the site, and on either side of the southern section of Rhondda Road. The community also occurs in the vicinity of the proposed internal coal haul road in the northern part of the site.

The canopy of the community is dominated by Sydney Peppermint (*Eucalyptus piperita*) which is locally abundant in some parts of the community and the White Stringybark (*E. globoidea*). Other less common canopy species include Red Mahogany (*Eucalyptus resinifera* subsp. *resinifera*), Smooth-barked Apple (*Angophora costata*), Rough-barked Apple (*Angophora floribunda*), Scribbly Gum (*Eucalyptus signata*) and Red Bloodwood (*Corymbia gummifera*). The tree layer reaches a maximum height of 25 metres.

The sub-canopy/tall shrub layer of about 10 metres height and 10 - 20% cover is dominated by Blackthorn (*Bursaria spinosa*), Green Wattle (*Acacia irrorata* subsp. *irrorata*), Forest Oak (*Allocasuarina torulosa*) and juvenile eucalypts. The low shrub layer of 1.5 to 3 metres height and varying from 5 - 40% cover is dominated by Paperbark Tea-tree (*Leptospermum trinervium*), Lemon-scented Tea-tree (*L. polygalifolium* subsp. *polygalifolium*), *Acacia brownii*, Bush Pea (*Pultenaea villosa*), Stiff Bottlebrush (*Callistemon rigidus*), Hill Banksia (*Banksia spinulosa* subsp. *collina*) and Grass Tree (*Xanthorrhoea* sp.).

The herb/ground layer of less than 1 metre in height and 20 - 30% cover is dominated by Bracken (*Pteridium esculentum*), Kangaroo Grass (*Themeda australis*), Wombat Berry (*Eustrephus latifolius*), Yellow Rush-lily (*Tricoryne simplex*), Maidenhair Fern (*Adiantum aethiopicum*) *Pomax umbellata*, NSW Coral Heath (*Epacris pulchella*), Blue Flax Lily (*Dianella caerulea* var. *producta*) and Fish Bones (*Lomandra obliqua*).

Most parts of the community were in a good and undisturbed condition with few weeds except around edge areas. Some areas of major disturbance occurred throughout the

community in the form of tracks and clearings, which have attracted dumped rubbish including car bodies.

**Community 4      SWAMP OPEN FOREST**  
**Swamp Mahogany / Paperbark Association**

The canopy of this Swamp Forest Community is entirely dominated by the regionally significant species, Swamp Mahogany (*Eucalyptus robusta*), with a sub-tree layer of evenly distributed Willow Bottlebrush (*Callistemon salignus*) and Snow-in-summer (*Melaleuca linariifolia*). The community is located in swampy land along Diega Creek in the south of the site. The canopy is 12 - 15 metres in height and the sub-tree layer approximately 8 – 10 metres. Generally the majority of trees are young, with few mature trees present, possibly due to past timber removal and severe fires.

Shrubs are limited to a few scattered individuals of the Green Wattle (*Acacia irrorata* subsp. *irrorata*) and Native Peach (*Trema aspera*). Due to the presence of water the lower strata is generally dominated by Sedges such as *Gahnia clarkei*, *Carex appressa* and *C. longebrachiata* and Grasses such as Creeping Beard Grass (*Oplismenus imbecillis*). Several species of fern are also present including Soft Bracken (*Calochlaena dubia*), Common Maidenhair Fern (*Adiantum aethiopicum*) and the Swamp Water Fern (*Blechnum indicum*).

Weed species are sparsely distributed and not present in high concentrations, although their presence may in future detract from the overall high quality of this community. Invasive introduced species included Lantana (*Lantana camara*) Wandering Jew (*Tradescantia albiflora*) and the noxious plant Crofton Weed (*Ageratina adenophora*).

This is one of two communities on the study site that conform with the definition of the Endangered Ecological Community Sydney Coastal Estuary Swamp Forest Complex (NSW Scientific Committee 2000).

**Community 5      SWAMP OPEN FOREST**  
**Swamp Mahogany / Cabbage Gum / Paperbark Association**

This vegetative unit, located to the east of Rhondda Road and in the northern section to the west of Wakefield Road (adjacent to Cockle Creek), occurs in low-lying areas prone to periodic inundation.

The dominant tree species is Swamp Mahogany (*Eucalyptus robusta*) although stands of Cabbage Gum (*Eucalyptus amplifolia*) intermixed with the Swamp Mahogany are also present in parts. Canopy height is generally to 20 metres. The sub-tree layer consists of *Melaleuca nodosa*, *M. armillaris* and Willow Bottlebrush.

The lower strata is dominated by sedges and grasses to a height of 1 metre. Only one shrub of note is present and it is sparsely distributed, namely the Green Wattle. *Carex appressa*, Blady Grass, *Gahnia clarkei* and Ditch Millet (*Paspalum orbicular*) are the dominant groundcover species, as were several species of Knotweed (*Persicaria* sp.). Introduced species are present but generally restricted to the vehicular tracks, although invasive species such as Crofton Weed, which is declared noxious, is distributed more widely.

This is the other of the two communities on the study site that conform with the definition of the Endangered Ecological Community Sydney Coastal Estuary Swamp Forest Complex (NSW Scientific Committee 2000).

### **Community 6      *MOIST SOAK / CREEKLINE RIPARIAN ASSOCIATION***

A Moist Soak area is located within the regeneration area, this small soak is completely dominated by the densely growing Native Bulrush / Cumbungi (*Typha* sp.), along with Frogsmouth (*Philydrum lanuginosum*). No other species of note were common, although the Rush *Juncus mollis* and the Sedge *Cyperus polystachyos* are present in small numbers.

Several moist and wet areas are present through the study site, including portions of two watercourses (Cockle Creek and Diega Creek) and associated drainage lines and riparian vegetation, and a small number of natural and artificial soak / dam areas. In particular, the creeklines are relatively well-vegetated with swamp and/or aquatic vegetation. Common creekline and riparian or aquatic species include Lemon-scented Tea-tree (*Leptospermum polygalifolium*), Club-rush (*Schoenoplectus validus*), Swamp Lily (*Ottelia ovalifolia*), Pondweed (*Potamogeton* sp.) and Kidney Weed (*Dichondra repens*).

### **Community 7      *MODIFIED GRASSLAND / PASTURE***

Located to the south of Wakefield Road and west of Rhondda Road, this area consists of grassland/ pasture with few scattered young and mature trees present. It also includes the slashed powerline easement extending from the bend in Wakefield Road in a southeasterly direction. Introduced grass species present include Kikuyu, Couch and Buffalo.

### **Community 8      *REGENERATION AREA - Previously Mined***

Situated within an area north of Wakefield Road and south of the existing Westside Mine, this community comprises a dense cover of shrub species, (2 - 4 metres), almost exclusively with species of *Acacia*, in particular Sydney Golden Wattle, Sunshine Wattle, Silver-stemmed Wattle and the Myrtle Wattle. Young Smooth-barked Apple (4 - 5 metres) are sparsely distributed within the regeneration area. Groundcovers are generally introduced species including Rhodes Grass, South African Pigeon Grass, Whisky Grass, Fleabane and Purple Top. Also present is the noxious species Pampas Grass (*Cortaderia selloana*).

Floristic diversity is poor due to *Acacia* species growing more quickly than other native species and dominating the regeneration area.

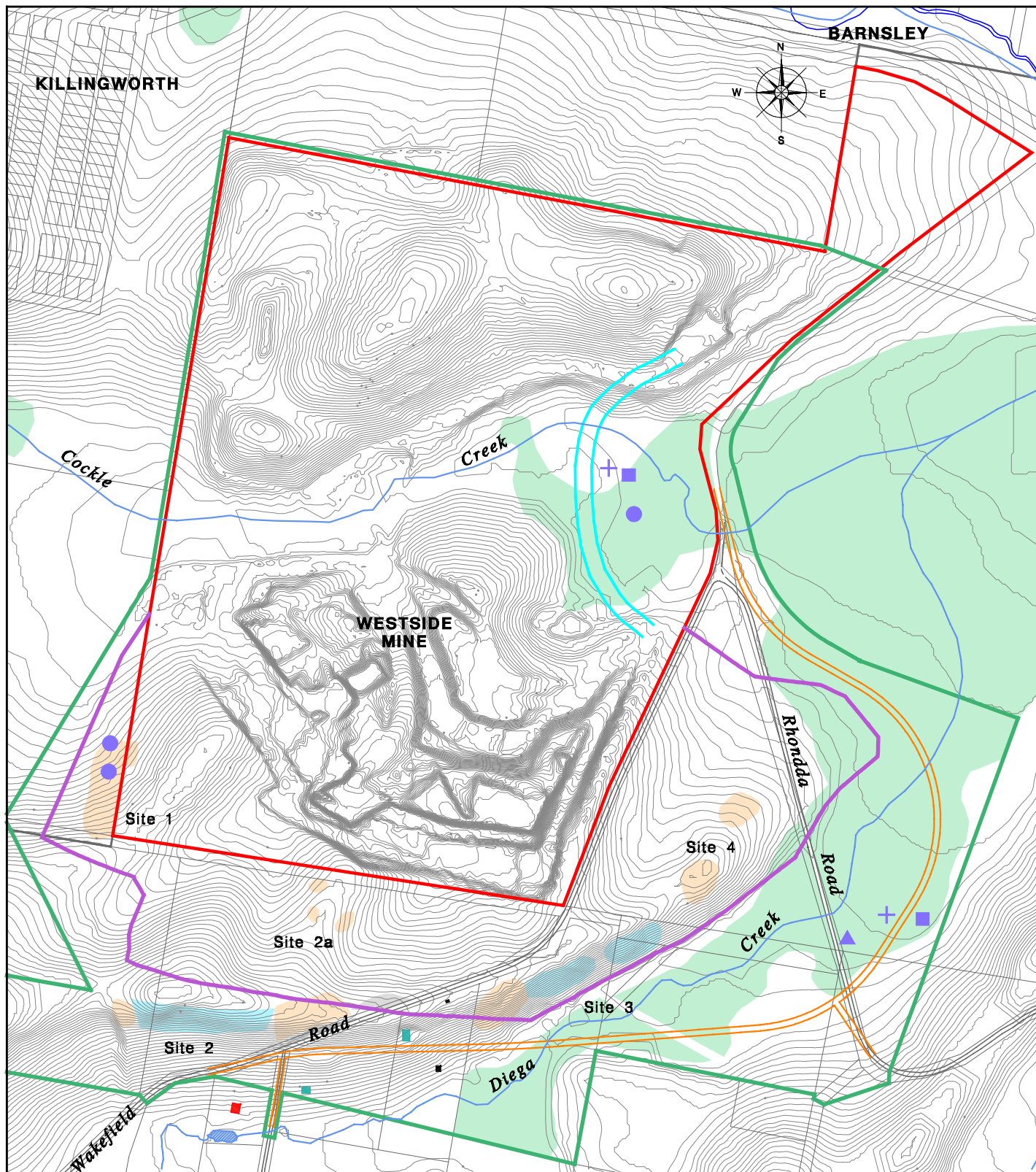
#### **5.6.1.1    Threatened Flora Species and Endangered Ecological Communities**

One flora species currently listed on Schedule 2 of the TSC Act was recorded within the study area, namely *Tetratheca juncea*. The location of the *Tetratheca juncea* is shown on **Figure 5.7**. A profile of the species is provided in **Appendix 6**. Additionally, the Swamp Mahogany (*Eucalyptus robusta*) dominated forest recorded within specific portions of the site is listed as an Endangered Ecological Community on Part 3 of Schedule 1 of the TSC Act (Sydney Coastal Estuary Swamp Forest Complex). A profile of this community is also provided in **Appendix 6**. No other flora species regarded as Threatened in the TSC Act were recorded within the subject site during the field surveys.

## **5.6.2    Fauna Habitats of the Study Site**

Four general fauna habitats are present within the proposed extension area and surrounds, including:

- Open forest / woodland habitat;
- Swamp forest habitat;



#### Legend

- Existing Westside Mine Boundary
- Proposed Open Cut Mining Boundary
- Development Application Area
- Proposed Wakefield Road Realignment
- Proposed Coal Haul Road (South / East Pit)
- Creek
- Contour 1m Interval
- Private Residences
- Buildings
- MCJV Residences
- Scattered *Tetradlea juncea* Plants
- Dense Aggregation of *Tetradlea juncea* Plants

0 125m 250m 500m

- *E.robusta* Swamp Forest
- ▲ Masked Owl
- + Little Bentwing-bat
- Squirrel Glider
- Common Bentwing-bat

**FIGURE 5.7**  
Threatened Species and  
Endangered Ecological Communities

- Watercourse / wetland / riparian habitat; and
- Regenerating shrubland or grassland habitat.

The forested lands comprise a remnant of the original vegetation of the locality, and specific portions within the study area, contain attributes of significance to local fauna species, including tree hollows, foraging and breeding areas, refuges during environmental cycles and movement links between remnant bushland. Mature forest is generally limited to lands in the western part of the study area with vegetation in the eastern portions exhibiting varying degrees of successional growth resulting from a frequent fire history. The swamp forest and creek areas as well as soaks and small dams provide specific habitats for dependent species, especially frogs, some reptiles and several common wader and semi-aquatic birds. Some of these values are replicated on the forested land outside of the proposed extension area. The shrubland/grassland areas provide reduced values for native fauna species, although these areas may be grazed by macropods and utilised by some birds, frogs and reptiles, as well as dispersing individuals of some species.

There are no extensive rock outcrops, caves or crevices known from within the study area and faunal species dependent on this micro-habitat for foraging or roosting would be poorly represented.

The presence of understorey shrubs and groundcovers occur within a mosaic of cover types and densities across the study site and wider area, varying according to the fire history and disturbance regime of particular areas. These features provide important microhabitat in the form of protection and security, as well as movement and foraging habitat for specific fauna species. Such microhabitat is particularly favoured by groups of small passerine birds and ground-dwelling fauna such as reptiles and small to medium-sized mammals. As with plant cover, the density of other ground cover features, such as logs, rocks, leaf litter, and other debris varies throughout the site, depending upon land use and fire history.

Therefore, it is evident that the study area comprises a diversity of modified habitats for fauna, resulting from previous land management practices. However, within a heavily-fragmented locality, the wet areas and forested portions of the site also contain value as habitat for indigenous native fauna species. A range of native fauna occupy the habitats of the study area for foraging and breeding as well as other life cycle purposes.

### 5.6.3 Fauna Survey Results

The fauna field surveys which have been undertaken on the subject lands have identified the presence of eleven native non-flying mammal species, eight flying mammal species, nine reptile species, nine frog species and forty nine species of birds.

The subject site contains a well-developed terrestrial mammal fauna. The Brown Antechinus was common and widespread within a number of different habitats, but populations of this species would be high as juveniles had become independent prior to the field surveys. Bush Rats occurred in areas of relatively dry sparse cover, and the ecotones between dry forest and the riparian habitat. Swamp Rats appeared restricted to the areas of the site which supported a dense ground cover, both within swamp and slope habitats. The Northern Brown Bandicoot was identified from hair samples and characteristic diggings throughout the subject site. The species is apparently common and abundant on the site. Macropods were also present in good numbers on the subject site, within both the forested, and cleared or regenerating portions.

While the subject site contained a reasonable diversity of arboreal mammals, those species present (i.e. Common Brushtail Possum, Common Ringtail Possum, Sugar Glider, Squirrel Glider) were generally not represented in good abundance. The subject site was found to contain habitat utilised by the threatened Squirrel Glider.

The site also contains good quality habitat for flying mammals, and eight species of insectivorous bats were recorded on the site. Six of the eight species recorded are predominantly tree-roosting species, utilising hollows as diurnal shelters, and the presence of these hollows is a significant habitat feature within the proposed development area. The remaining two species are considered to be cave roosting.

Nine species of reptile and nine species of amphibians were recorded, with additional species likely to be present. Two snakes were recorded on the subject site. The Red-bellied Black Snake is a known predator principally of frogs, but also takes small mammals and reptiles. The Eastern Brown Snake feeds primarily on small mammals and reptiles. The presence of these snakes in apparently good abundance tends to indicate that the subject site supports good densities of small mammals, frogs and reptiles.

A total of fifty-four (54) bird species have been recorded on the subject site and adjacent land to the north. An analysis of the regional status of the bird species recorded on the subject site and adjacent land to the north (according to Hunter Bird Observers Club 1997), indicates that:

- 27 species recorded are regarded as Common Residents;
- 12 species recorded are regarded as Usual Residents;
- 5 species recorded are regarded as Residents;
- 9 species recorded are regarded as Summer Migrants/ Usual Summer Migrants; and
- 1 species is regarded as rare or uncommon (ie. Masked Owl).

#### 5.6.4 Threatened Fauna Species

Four threatened fauna species were recorded in the study area, in the locations shown on **Figure 5.7**. These species are discussed below.

##### 5.6.4.1 Squirrel Glider

The Squirrel Glider was positively recorded in two locations within the study site during the field surveys, firstly from the southwestern corner in the small triangle of land adjacent to the southern mining area and secondly to the east of the existing northern pit, adjacent to the proposed internal haul road.

##### 5.6.4.2 Threatened Cave-roosting Bats

Two species are referred to in this assessment, including the Common Bentwing-bat *Miniopterus schreibersii* and Little Bentwing-bat *Miniopterus australis*. The Little Bentwing-bat was positively identified via 'Anabat' bat detection and the Common Bentwing-bat was tentatively identified.

##### 5.6.4.3 Masked Owl

A dead individual identified as a species of *Tyto* owl was recorded near Rhondda Road. The state of decomposition precluded a formal identification of this individual. It is likely that the bird is a Barn Owl or the more restricted and threatened Masked Owl.

#### 5.6.5 Potential Flora and Fauna Impacts

The proposed southern mining area is a staged development, extending from west to east over a seven to twelve year period, and involving the progressive clearing of up to 42 hectares of dry sclerophyll forest, swamp forest and regenerating mined land during that period. The proposal also includes progressive vegetation rehabilitation.

Associated project components including Wakefield Road realignment and the internal coal haul road involve an additional clearing of approximately 6-7 hectares of dry sclerophyll forest and swamp forest, including a crossing of Cockle Creek (haul road) and Diega Creek (Wakefield Road). Sediment dams and diversion drains have been proposed for controlling sediment runoff from entering the creek systems.

In general, the impact with the greatest potential significance which may arise from the proposal would be direct loss of identified threatened plant species and overall habitat loss. The extension of coal mining activities (open-cut) within the native bushland habitats could be associated with long term displacement of native vegetation and fauna. It has the potential to affect local biodiversity and threatened species in the study area, through the direct removal or modification of actual and potential foraging habitat, loss of actual and potential tree hollows, a reduction in prey abundance, increased reduction in tree cover and subsequent interference in local movement corridors, and by allowing increased points of access to native bushland for introduced predators.

#### 5.6.5.1 Impact on Threatened Species

The significance of these potential threats on threatened species as they relate to the study site for the proposed open-cut extension has been addressed via specific assessment under Section 5A of the EP&A Act (the 8 Part Test) (refer to **Appendix 6**). The results of the 8 Part Test indicate that there will be no significant impact on threatened flora, fauna and Endangered Ecological Communities recorded in the study area, with specific impact amelioration measures outlined in **Section 5.6.6** reducing the impact on these species and communities.

### 5.6.6 Management Recommendations

#### 5.6.6.1 Threatened Species and Endangered Ecological Communities

With regard to minimising disturbance to the endangered ecological community SCESFC, a range of measures and design considerations have been incorporated into the proposal. The extent of disturbance limit has been defined by the alignment of a catch drain that is to be constructed at the eastern edge of the Eastern Pit. The catch drain corresponds with the approximate edge of the endangered community and as discussed in **Appendix 6**, specific measures will be incorporated into the project to minimise clearing in this area.

As discussed in **Section 5.5**, measures are designed to avoid major hydrological changes resulting from the mine and road diversion that could otherwise have significant impacts on the endangered ecological community in the vicinity of the works.

Identified sub-populations of *Tetratheca juncea* within the survey area, outside the proposed limit of surface disturbance, and located on land owned by OCAAL will be managed to ensure no impact from this proposal in order to minimise the impact of disturbance on the population of *Tetratheca juncea*.

Impacts on the natural habitats of the mine holdings outside of the actual extension area and associated roadworks areas will be minimised.

All indirect surface disturbance impacts associated with open cut mining will be minimised by measures such as the provision of fencing, adoption of water quality controls and sediment control structures, rehabilitation plantings, implementation of an appropriate fire management plan, and other general land management actions. These measures include feral animal controls, and prohibition of firewood and timber collection and dead tree removal.

### 5.6.6.2 Rehabilitation and Revegetation

Rehabilitation will aim to re-instate habitat of a similar diversity and type to that which exists in the naturally forested portions of the locality. The rehabilitation works will utilise a range of locally indigenous species from all vegetative strata. Plantings should occur at a suitable natural density. Locally indigenous plant species suitable for revegetation works are noted within the flora species list produced during the field survey work (**Appendix 6**). Marked species include plants from all strata levels. The rehabilitation plan will include provisions for annual follow-up work including thinning of wattles and planting of eucalypts and shrub species to avoid a monoculture of wattle species. Remedial works will encourage the use of recycled cleared vegetation as mulch and brush matting to allow natural seed germination, thereby conserving genetic diversity.

Koala food trees will be used within the rehabilitation plantings, where appropriate. This will include plantings of Swamp Mahogany and Scribbly Gum in suitable topographic positions, as these are known Koala food trees. The use of Swamp Mahogany is also important for the Squirrel Glider, and the shrub *Acacia irrorata* is a known Squirrel Glider feed tree (the Wattle is incised for Gum). This species will also be a component of the regeneration plantings.

In order to provide an offset to the area of swamp forest lost due to the project, two currently utilised utility easements that are expected to be decommissioned as a result of the project will be revegetated with swamp forest, as described in **Appendix 6**. Firstly, a portion of Rhondda Road will be closed to make way for the mine. This road will be used for access to sedimentation dams during mining but on completion of these activities, vegetation will be allowed to regenerate in this area, with periodic monitoring and weed control. Supplementary plantings of appropriate species from locally collected propagules will be used to expedite this process, where necessary. The remaining swamp-forest community on land owned by OCAL will be managed to prevent damage, disturbance and degradation. This might include (but not necessarily be limited to) measures such as fencing to prevent public access and rubbish dumping, weed control and bush regeneration programs, and fire management.

### 5.6.6.3 Maintenance of Habitat

Significant habitat features such as, hollow-bearing trees will be retained in their natural state within the development context, where possible. All hollows which can be salvaged from felled trees will be re-erected and secured in trees in retained portions of the subject site, or re-erected in the regenerating habitat of old workings so that no net loss of hollows occurs as a result of the proposed development. Habitat trees recorded within the area proposed for the internal haul road will be plotted on a map and avoided where possible in the final planning of the road location. The alignment will aim to reserve the majority of these trees where possible.

Suitable nest boxes for Squirrel Gliders and other arboreal fauna and bats will be erected in the habitats that will not be disturbed by mining and regeneration areas to compensate for any overall loss of hollows which may result from the proposal. Nest boxes will be erected prior to habitat removal from within the proposed extension area, in order to provide immediate nest site compensation for any displaced animals.

### 5.6.6.4 Pre-clearance surveys

Pre-clearing surveys will be carried out to reduce the impacts on fauna associated with the removal of habitat trees. General procedures for pre-clearing surveys will be adopted which involve the marking of habitat trees prior to vegetation clearing. All trees with habitat features present (ie. crevices, hollows, perforated termitaria, nests, decorticated bark,

epiphytes) within the mine extension area will be flagged and specific procedures implemented to minimise fauna impacts, as discussed in **Appendix 6**.

#### **5.6.6.5 Flora and Fauna Management Plan**

A Flora and Fauna Management Plan will be prepared to document management responses and actions for mitigation. The plan will address specific measures to prevent impacts on threatened flora and fauna species and ecological communities identified on the site and reduce threats. Specific measures include:

- identification and management of proposed reserved habitats;
- provisions for the protection and management of hollow-bearing tree resources;
- the approach to vegetation clearing on the site such that the welfare of concerned fauna is considered;
- feedback mechanisms so that land management can adapt to changing site and environmental conditions; and
- a monitoring strategy for threatened flora and fauna species during and following mining activities to assess the success of the ameliorative measures.

### **5.6.7 Aquatic Habitat Assessment**

#### **5.6.7.1 Regional Aquatic Habitats**

Westside Mine is located in the Cockle Creek catchment. Cockle Creek, ephemeral in the vicinity of the proposed development, flows into the northwest corner of Lake Macquarie, the largest saltwater lake in coastal NSW. Minor tributaries of Cockle Creek are ephemeral, flowing only after heavy rainfall and generally contracting to pools following these intermittent flow events. Cockle Creek provides habitat for a variety of freshwater and estuarine species, however diadromous migrations (migrations between freshwater and the sea) have been severely restricted due to construction of a weir at Barnsley, approximately 2.5 kilometres downstream of the proposed development area.

In the vicinity of the proposed development area Cockle Creek is freshwater, with mine water discharges, from Westside Mine and West Wallsend Colliery, contributing to the base flow or maintenance of pools, during extended dry weather periods. Downstream of the study area, below the weir, Cockle Creek is a permanent estuarine watercourse, under the tidal influence of Lake Macquarie.

#### **5.6.7.2 Aquatic Habitats of the Proposed Extension Area**

The proposed development area will include a ridge that forms a divide between Cockle Creek and Diega Creek catchments. Approximately 20 hectares of this area is in the Diega Creek catchment, a tributary of Cockle Creek. Aquatic habitats present within the proposed development area include portions of these two watercourses (Cockle Creek and Diega Creek), associated drainage lines and a small number of natural and artificial soak and dam areas.

In particular, the creeklines are relatively well-vegetated with swamp and/or aquatic vegetation. Such areas provide medium to high quality habitat for fauna such as small fish, invertebrates and semi-aquatic bird species. The dams (soaks) which are present on the subject site are well-vegetated with rushes, spike-rushes and reeds. The wet areas represented also provide specific habitat for a large diversity of invertebrate species, in turn

providing a significant prey base for dependent fauna such as insectivorous bats, as well as many bird and mammal species.

#### **5.6.7.3 Threatened Species Provisions of the Fisheries Management Act 1994**

No threatened freshwater species, populations or ecological communities listed in the Threatened Species Schedules have a natural distribution range incorporating the Lake Macquarie catchment and are therefore not expected to occur in the proposed development area. Marine and estuarine species listed in the Threatened Species Schedules have been excluded from this assessment due to the freshwater nature of the watercourses (Cockle Creek and Diega Creek) in the vicinity of the development area and the presence of a weir restricting migratory movements of diadromous species.

The Fisheries Scientific Committee has made a preliminary determination to list the 'installation and operation of in-stream structures that modify flow' and has listed 'removal of large woody debris', 'degradation of native riparian vegetation along New South Wales waterways' and 'introduction of fish to fresh waters within a river catchment outside their natural range' as key threatening processes in Schedule 6 of the *Fisheries Management Act 1994*.

The proposed construction of the new Wakefield Road alignment across Cockle Creek and Diega Creek and internal coal haul road across Cockle Creek, will be undertaken in accordance with the NSW Fisheries 'Policy and Guidelines for Bridges, Roads, Causeways, Culverts and Similar Structures' (1999), ensuring that the natural flow regime of the creek and fish passage is maintained.

Riparian habitat will remain unaffected under the proposal and there will be no removal of large woody debris or introduction/translocation of fish in Cockle or Diega Creeks.

#### **5.6.7.4 Regional Stream Classification**

Based on available information on the aquatic ecology of the region and a site inspection conducted in February 2001, Cockle Creek must be considered a Class 2 stream and Diega Creek must be considered a Class 3 stream (in the vicinity of the proposed development area), under the NSW Fisheries' classification scheme (Fisheries, 1999).

The construction of the Wakefield Road realignment and internal coal haul road will be undertaken in accordance with the minimum preferred engineering solutions as outlined in the NSW Fisheries 'Policy and Guidelines for Bridges, Roads, Causeways, Culverts and Similar Structures' (1999), ensuring that hydraulic capacity of the existing watercourse is maintained, fish passage is not impeded and loss of aquatic habitat is minimised.

#### **5.6.7.5 Impact Assessment**

The proposal to extend open cut mining operations to the south and east of existing operations will result in the removal of several small drainage lines, dams and soaks. The drainage lines, dams and soaks to be affected are similar in character to other aquatic habitats in the region and the floral and faunal communities supported by these areas are not considered to be significant. Many of these aquatic habitats are degraded and have been affected by past mining and clearing activities. The removal of these habitats will be adequately compensated by the construction of sediment control dams. Consequently the loss of these habitats as a result of mining will not be significant on fisheries values of the region.

There will be no mining of Diega Creek or Cockle Creek as part of the proposed operations. Disturbance of Diega Creek and Cockle Creek will be limited to construction of three culvert

crossings and one bridge crossing, associated with the proposed realignment of Wakefield Road and construction of a new coal haul road. One bridge and one culvert crossing will be established over Cockle Creek, the remaining culvert crossings will be established over Diega Creek. The proposed development will be undertaken in accordance with the NSW Fisheries 'Policy and Guidelines for Bridges, Roads, Causeways, Culverts and Similar Structures' (1999) and will not impact upon the hydraulic capacity of either creek or fish passage.

It is not expected that the proposed development will have a significant impact on the availability and access of fauna species to areas of aquatic habitat, with significant areas of aquatic habitat to be constructed in order to replace the loss of existing habitat areas.

## 5.7 AIR QUALITY

Holmes Air Sciences completed a comprehensive assessment of air quality impacts, which is provided in **Appendix 7** and summarised in this section.

### 5.7.1 Air Quality Goals

The EPA specifies two classes of air quality goal relevant to coal mining activities. These relate to dust deposition and dust concentration levels. Dust deposition levels refer to the quantity of dust particles that settle out from the air, as measured in grams per square metre per month ( $\text{g/m}^2/\text{month}$ ) at a particular location. Dust concentration refers to airborne dust and is measured in micrograms per cubic metre ( $\mu\text{g/m}^3$ ).

#### 5.7.1.1 Dust Deposition

The EPA expresses dust deposition criteria in terms of an acceptable increase in dust deposition over the existing background deposition levels. These EPA goals are summarised in **Table 5.6**. For example, in residential areas with annual average dust deposition levels of between 0 and 2  $\text{g/m}^2/\text{month}$  an increase of up to 2  $\text{g/m}^2/\text{month}$  would be permitted before it would be considered that a significant degradation of air quality had occurred.

**Table 5.6 - EPA Goals for Dust Deposition (Insoluble Solids)**

| Existing dust fallout level<br>( $\text{g/m}^2/\text{month}$ ) | Maximum acceptable increase over existing<br>fallout levels ( $\text{g/m}^2/\text{month}$ ) |       |
|----------------------------------------------------------------|---------------------------------------------------------------------------------------------|-------|
|                                                                | Residential                                                                                 | Other |
| 2                                                              | 2                                                                                           | 2     |
| 3                                                              | 1                                                                                           | 2     |
| 4                                                              | 0                                                                                           | 1     |

#### 5.7.1.2 Dust Concentration

Relevant EPA criteria for dust concentration are defined in terms of two classes: total suspended particulate matter (TSP) and  $\text{PM}_{10}$ . TSP relates to all suspended particles which are usually in the size range of zero to 50 micrometres ( $\mu\text{m}$ ). Particle sizes larger than 50  $\mu\text{m}$  are measured in dust deposition levels.  $\text{PM}_{10}$  refers to particulate matter with a diameter less than 10  $\mu\text{m}$ . TSP measurements include  $\text{PM}_{10}$  particles.

NSW EPA goals for dust concentration are referred to as long term (annual average) and short term (24 hour maximum) goals. The NSW EPA refers only to goals in relation to TSP

and PM<sub>10</sub> and these are outlined in **Table 5.7** in relation to both current standards and interim goals proposed for future implementation at a regional level.

**Table 5.7 - Air Quality Standards/Goals for Particulate Matter Concentrations**

| Parameter                                             | Air Quality Goal                                                                                                                                                                                                                                                                                                                      |
|-------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| TSP - Total Suspended Particulate matter              | <u>Long Term Goal (annual mean)</u><br>90 µg/m <sup>3</sup> - maximum level that should not be exceeded in urban environments.<br>No short term goals are applied.                                                                                                                                                                    |
| PM <sub>10</sub> - Particulate Matter less than 10 µm | <u>Long Term Goal (annual mean)</u><br>50 µg/m <sup>3</sup> - US EPA Primary Standard<br><u>Short Term Goal (24 hour maximum)</u><br>150 µg/m <sup>3</sup> - current standard - should not be exceeded more than once per year.<br>50 µg/m <sup>3</sup> - NEPM reporting goal - should not be exceeded more than five times per year. |

In addition to the above goals, the NSW EPA has applied a PM<sub>10</sub> annual mean long term goal of 30 µg/m<sup>3</sup> to recent projects.

## 5.7.2 Existing Air Quality

Monitoring programs conducted as part of the environmental management for the existing Westside Mine operations have produced a substantial database on existing ambient air quality conditions. Dust monitoring has been conducted at a total of eight locations (seven dust deposition gauges and one high volume sampler (PM<sub>10</sub>) in the vicinity of Westside Mine, as shown in **Figure 3.2**. TSP is collected quarterly and a PM<sub>10</sub> monitor has been operating since May 2001. Results of the dust monitoring program from 1997 to 2001 are detailed in **Appendix 7** and briefly described below.

The moderately dense vegetation in the area, the small scale of the operation and climatic factors has meant that air quality has not proved to be a significant environmental issue during previous and current operations.

### 5.7.2.1 Dust Deposition

Dust deposition levels have been measured at seven locations surrounding Westside Mine (refer to **Figure 3.2**). Results of the dust monitoring program from July 1997 to January 2001 are summarised in **Table 5.8**.

**Table 5.8 - Monthly dust deposition (insoluble solids) monitoring data (g/m<sup>2</sup>/month)**

| Year      | Dust Deposition Gauge Location |     |          |     |         |         |
|-----------|--------------------------------|-----|----------|-----|---------|---------|
|           | 5                              | 10  | 11A/11B  | 13  | 18/19   | 20/21   |
| 1997/1998 | 1.0                            | 1.8 | 8.8/NA   | 1.2 | 1.3/NA  | 0.5/1.5 |
| 1998/1999 | 0.6                            | 1.6 | 15.6/NA  | 0.8 | 1.7/1.2 | 1.1/0.7 |
| 1999/2000 | 0.9                            | 1.4 | 8.4/NA   | 1.7 | 1.4/NA  | 1.2/1.2 |
| 2000/2001 | 0.7                            | 1.9 | 18.0/0.8 | 1.1 | 1.3/1.9 | 1.7/1.2 |

Investigations into the annual average dust deposition result for sample location 11A attributed the unusually high result to interference. The dust gauge has since been moved inside a fenced area (sample location 11B) and initial results have shown a significant decrease in dust deposition.

These results indicate that annual average dust deposition rates are typically less than 2 g/m<sup>2</sup>/month. In this environment, the EPA criterion allows an increment of approximately 2 g/m<sup>2</sup>/month (annual average).

#### 5.7.2.2 Concentration

Monitoring for TSP concentrations are made four times per year at Number 40 The Trongate, Killingworth (see **Figure 3.2**). Recent results for this monitoring location are presented in **Table 5.9**.

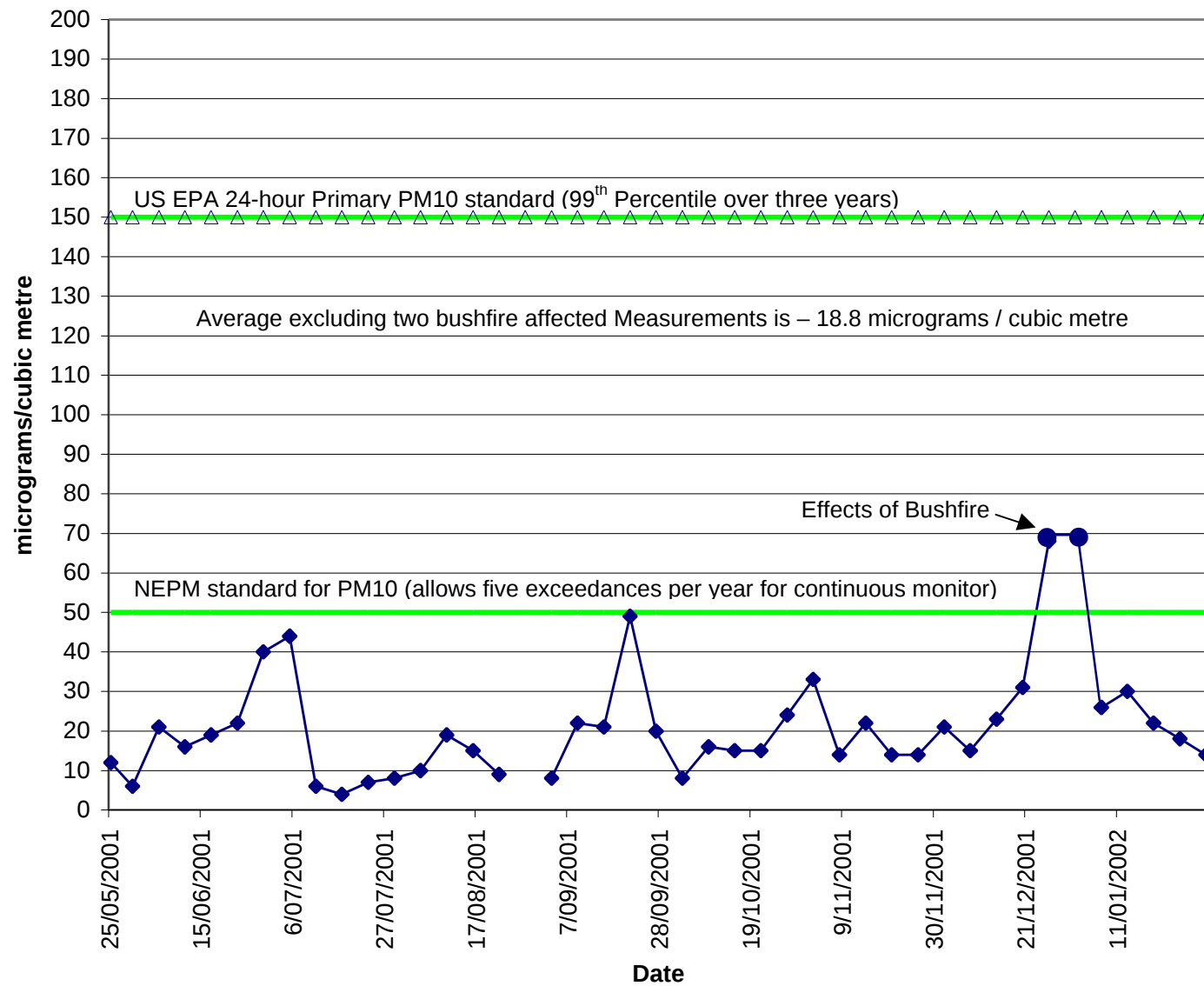
**Table 5.9 - High Volume Sampling Data for TSP (µg/m<sup>3</sup>)**

| Date                  | 24-hour TSP concentration -<br>(µg/m <sup>3</sup> ) |
|-----------------------|-----------------------------------------------------|
| 20/10/99              | 18                                                  |
| 21/12/99              | 21                                                  |
| 21/02/00              | 32                                                  |
| 06/06/00              | 22                                                  |
| 23/08/00              | 34                                                  |
| 22/11/00              | 44                                                  |
| 04/04/01              | 93 (see later discussion)                           |
| 14/06/01              | 13                                                  |
| 23/10/01              | 110 (see later discussion)                          |
| 07/01/02              | 34                                                  |
| <b>Annual average</b> | <b>42</b>                                           |

The annual average concentration is approximately 50% of the NHMRC annual guideline of 90 µg/m<sup>3</sup>. Investigation of the higher than normal reading obtained on 4 April 2001 and 23 October 2001 found that the dominant winds on 4 April 2001 were from the northeast and northwest and on the 23 October 2001 were from the west to northwest, with a minor contribution from the northeast. The elevated readings could not be attributed to Westside Mine on either of those days.

Since 25 May 2001 the company has monitored 24-hour average PM<sub>10</sub> concentrations on a six-day cycle at a site in Wakefield (see **Figure 3.2**). These results are presented in **Figure 5.8**. To date, 24-hour average PM<sub>10</sub> concentrations have ranged from 4 (17/07/01) to 49 µg/m<sup>3</sup> (21/09/01) (there have been no measured concentrations above the 24-hour 50 µg/m<sup>3</sup>, the standard referred to in the Air NEPM (with five exceedances allowed per year) nor above the US EPA's 150 µg/m<sup>3</sup> (average of 99th percentile over three years)).

The average of the 43, 24-hour PM<sub>10</sub> concentrations between 15/05/01 and 31/01/02 (one session failed due to power failure) and excluding two measurements affected by bushfire has been 18.8 µg/m<sup>3</sup>, which is indicative of an area with good air quality and can be compared with the US EPA's annual primary standard of 50 µg/m<sup>3</sup>, or the NSW EPA's long-term goal of 30 µg/m<sup>3</sup>. It should be noted that these data include the effects of emissions from the existing operations on the mine.



Note: ● Sample run for 48 hours

**FIGURE 5.8**

Monitoring Results for 24-hour  
Average PM10 Concentrations

The background dust concentration levels discussed above include emissions from the current Westside Mine operations. Considering the modelled contributions from Westside Mine, Holmes Air Sciences have estimated that the annual average background dust concentration levels, without Westside Mine operations, are  $7 \mu\text{g}/\text{m}^3$  for PM<sub>10</sub> and  $32 \mu\text{g}/\text{m}^3$  for TSP (refer to **Appendix 7**).

### 5.7.3 Air Quality Impact Assessment

#### 5.7.3.1 Dust

The short-term industrial source complex model (ISC3ST – Version 99155) has been used in the study. The model is one of the most widely used regulatory air quality models in the world.

The model requires estimates of particulate matter emission rates for each activity associated with the mining operation. In addition, the model considers dust emissions due to wind erosion from exposed land in the pit and overburden dump areas, and also from stockpiles at the coal crushing plant.

Emissions from all these sources have been determined in accordance with emission factors developed in the United States (US EPA, 1985 and revisions) and in Australia (NERDDC 1988). The adopted emission rates assume standard practices for dust suppression are implemented.

#### 5.7.3.2 Project Specific Emissions

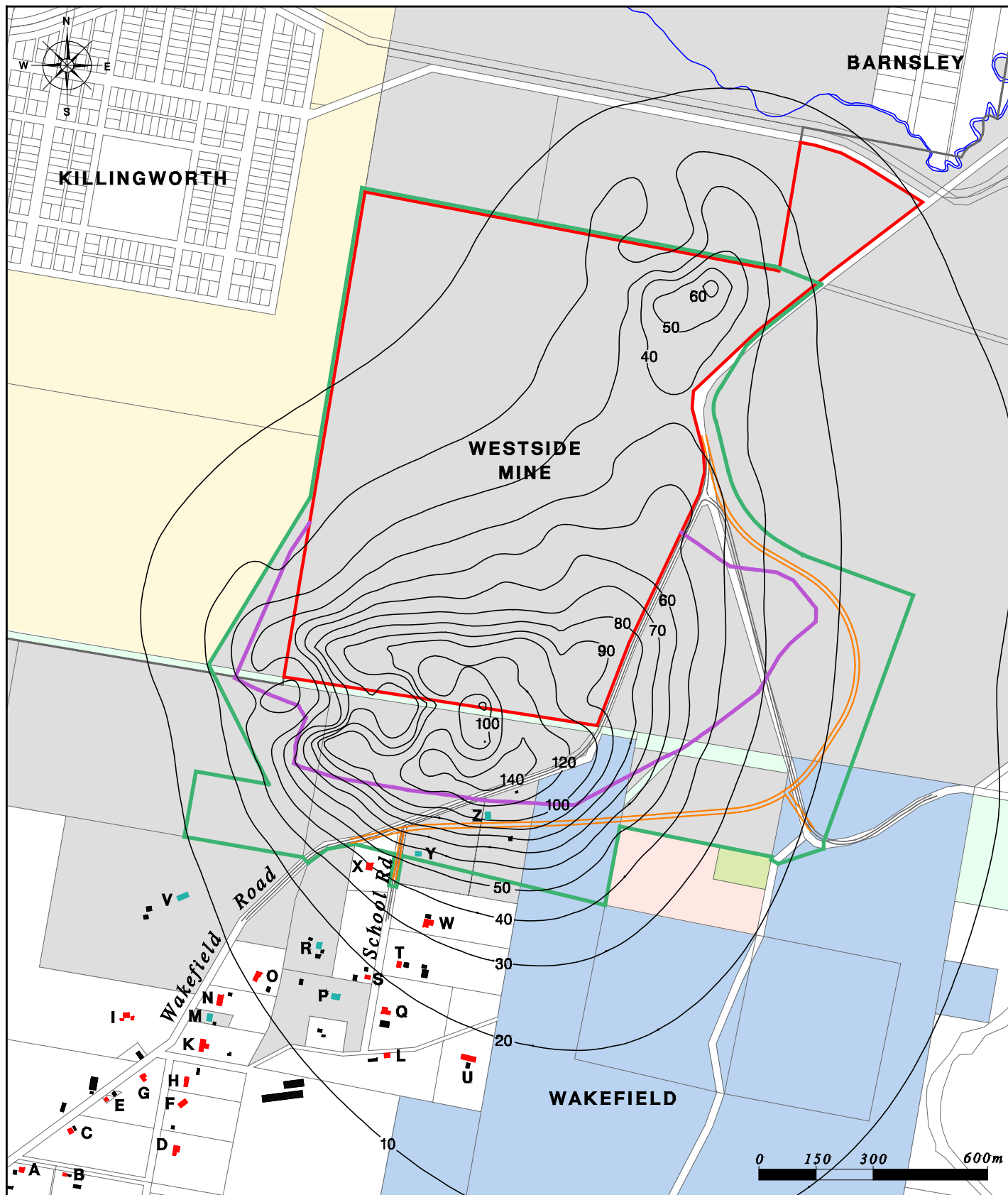
Years 3 and 6 were selected for air quality modelling as these represent the worst-case scenario in terms of closest distance to nearest residence and maximum production rate, respectively.

The details of the dust emission calculations for Years 3 and 6, including contour plots, are provided in **Appendix 7** and discussed below. The Year 1 mining scenario is assumed to be the same as the existing operation, which was found to be generally in compliance with EPA goals (refer to **Section 5.7.2**).

#### Year 3

The contribution from Westside to the maximum predicted annual average PM<sub>10</sub> concentration at private residence X is  $40 \mu\text{g}/\text{m}^3$  in Year 3 (refer to **Figure 5.9**). Adding a background annual PM<sub>10</sub> contribution of  $7 \mu\text{g}/\text{m}^3$  results in a cumulative contribution of  $47 \mu\text{g}/\text{m}^3$ . This is below the US EPA annual standard of  $50 \mu\text{g}/\text{m}^3$ , however, it is above the NSW  $30 \mu\text{g}/\text{m}^3$  annual PM<sub>10</sub> goal. The next most affected is private residence W predicted to experience an annual average PM<sub>10</sub> concentration of  $35 \mu\text{g}/\text{m}^3$  in Year 3, which would be expected to result in a cumulative level of  $42 \mu\text{g}/\text{m}^3$ , after allowing for background levels. Again this is below the US EPA goal but above the NSW EPA's goal. The next two private residences to the south (T and S) are predicted to experience annual average PM<sub>10</sub> concentrations of  $25 \mu\text{g}/\text{m}^3$  and  $19 \mu\text{g}/\text{m}^3$  from Westside operations in Year 3, respectively. Considering background dust levels, Residence T with a cumulative PM<sub>10</sub> level of  $32 \mu\text{g}/\text{m}^3$  would be marginally above the NSW EPA goal in the worst case scenario, whilst Residence S would be below this goal.

In relation to vacant non-mine owned property, the RW Miller Co Pty Ltd and JP Farrell properties, located within the Rhondda Colliery surface mining lease, are predicted to experience PM<sub>10</sub> dust levels above the NSW EPA goal for more than 25% of the property in Year 3.



#### Legend

- PM10 Concentration Contour ( $\mu\text{g}/\text{m}^3$ )
- Existing Westside Mine Boundary
- Proposed Open Cut Mining Boundary
- Development Application Area
- Proposed Wakefield Road Realignment

- Residences
- Buildings
- MCJV Residences

- Macquarie Coal Joint Venture
- BHP
- R.W. Miller Co. Pty Ltd
- J.P. Farrell

- Donaldson Estate/  
Former Rhondda Colliery
- Crown Land
- Other (including Residential)

Umwelt (Australia) Pty Limited

#### FIGURE 5.9

Predicted Annual PM10 Concentration  
due to Mining in Year 3 – ( $\mu\text{g}/\text{m}^3$ )

A4 Scale 1:14 000

Ref No.: R02\_V1/1377\_081.dgn

In relation to these exceedances of the NSW EPA annual average, long term reporting goal, it should be noted that these levels are expected to be worst-case and experienced for relatively short duration, as demonstrated by the lack of exceedances for the Year 6 modelling as discussed below.

The maximum predicted contribution from Westside to annual average TSP concentration is  $50 \mu\text{g}/\text{m}^3$  at private residence X in Year 3 (refer to **Figure 5.10**), which considering the background level of  $32 \mu\text{g}/\text{m}^3$ , results in a cumulative level of  $82 \mu\text{g}/\text{m}^3$  and is below the EPA goal of  $90 \mu\text{g}/\text{m}^3$ . Similarly, no vacant non-mine owned land is predicted to experience any exceedance of this goal for more than 25% of the property.

The maximum predicted annual average incremental dust deposition at any residence not owned by MCJV is  $0.8 \text{ g}/\text{m}^2/\text{month}$ , at Year 3 (refer to **Figure 5.11**), which is well below the NSW annual incremental goal of  $2 \text{ g}/\text{m}^2/\text{month}$ .

## Year 6

As the mining operations move further to the north, the potential dust impacts on the Wakefield rural residential community decrease. This is demonstrated by the Year 6 modelling results. The highest predicted PM<sub>10</sub> dust concentration at a private residence in Year 6 is  $10 \mu\text{g}/\text{m}^3$  at residences X and W (refer to **Figure 5.12**). Allowing for a background concentration of  $7 \mu\text{g}/\text{m}^3$ , this is well below the NSW EPA goal. Similarly, annual average TSP and dust deposition levels at private residences are well below the relevant goals in Year 6, as shown on **Figures 5.13** and **5.14**.

During Year 6 there are, however, predicted exceedances for more than 25% of the two vacant non-mine owned land located to the northeast of the Wakefield residences.

## Conclusion

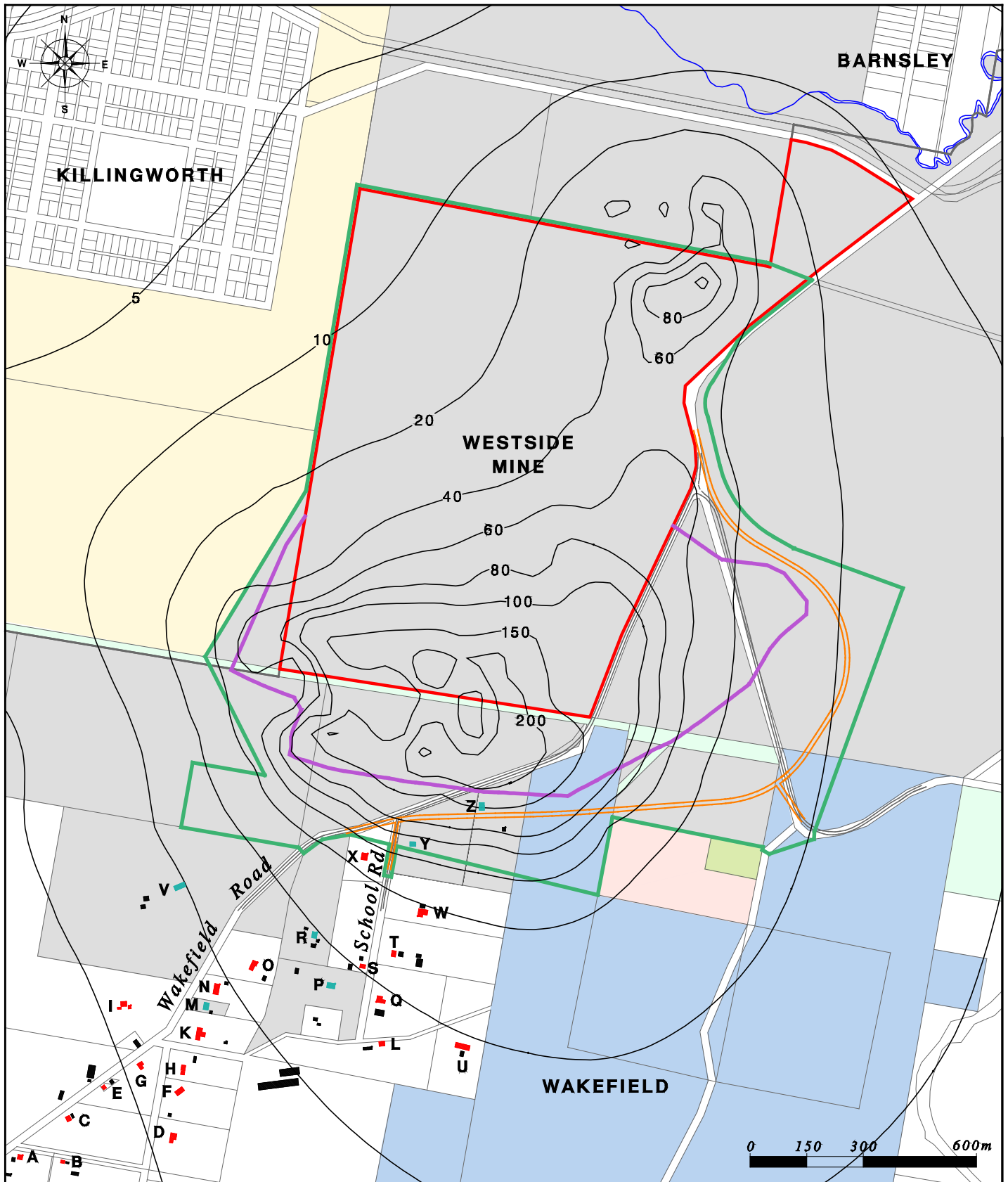
Two private residences (X and W) are affected by dust contribution from Westside above the PM<sub>10</sub> NSW EPA long term reporting goal. Considering the background annual average PM<sub>10</sub> level of  $7 \mu\text{g}/\text{m}^3$ , an additional private residence (T) may have a marginal cumulative exceedance of the EPA long term reporting goal of  $30 \mu\text{g}/\text{m}^3$ . It is uncertain as to whether this long term reporting goal is applicable to this project. OCAL is currently negotiating with residents X and W in order to seek agreement regarding mine impacts or to purchase the properties. Two vacant, non-mine owned properties that are currently located within a surface mining lease, are predicted to experience dust levels above the relevant criteria for more than 25% of the property and OCAL will need to reach agreement with these property owners in relation to these impacts.

Cumulative considerations are inherent in the above air quality assessment, however, further consideration of cumulative air quality impacts is provided in **Section 5.18.2**.

### 5.7.3.3 Odour

Spontaneous combustion of coal can result in the release of odorous gases including oxides of sulphur and hydrocarbons. The emissions are variable and not easily quantified. For this reason, the use of predictive dispersion modelling is not a reliable way of assessing impacts.

The nature of the coal resource that is being mined at Westside Mine means that there is a low risk of spontaneous combustion.



#### Legend

- |                                                                  |                              |                                              |
|------------------------------------------------------------------|------------------------------|----------------------------------------------|
| — Total Suspended Particles Contour ( $\mu\text{g}/\text{m}^3$ ) | Macquarie Coal Joint Venture | Donaldson Estate/<br>Former Rhondda Colliery |
| — Existing Westside Mine Boundary                                | BHP                          | Crown Land                                   |
| — Proposed Open Cut Mining Boundary                              | R.W. Miller Co. Pty Ltd      | Other (including Residential)                |
| — Development Application Area                                   | J.P. Farrell                 |                                              |
| — Proposed Wakefield Road Realignment                            |                              |                                              |
| ■ Residences                                                     |                              |                                              |
| ■ Buildings                                                      |                              |                                              |
| ■ MCJV Residences                                                |                              |                                              |

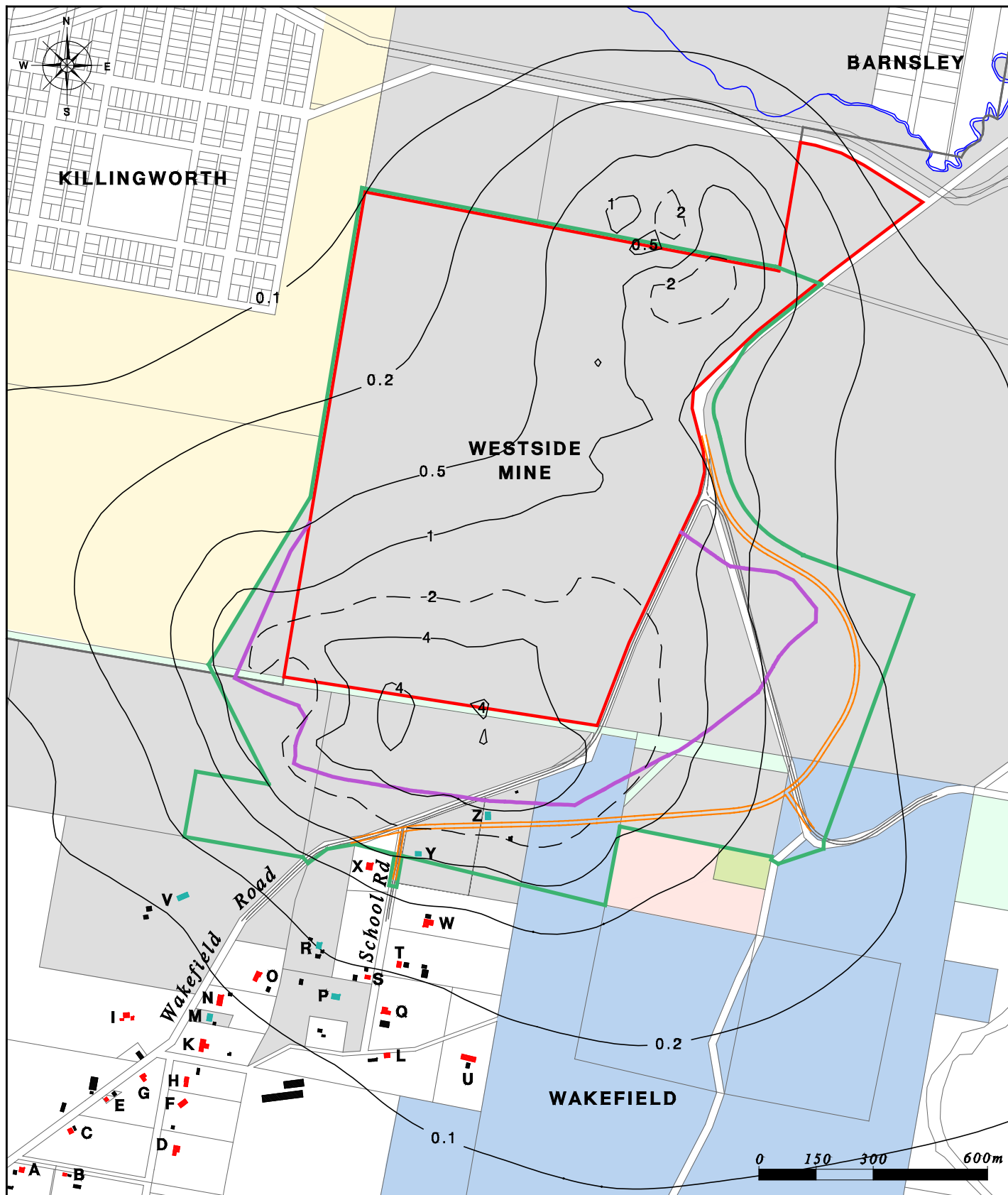
Umwelt (Australia) Pty Limited

**FIGURE 5.10**

Predicted Annual Total Suspended  
Particle Concentration due to  
Mining in Year 3 – ( $\mu\text{g}/\text{m}^3$ )

A4 Scale 1:14 000

Ref No.: R02\_V1/1377\_082.dgn



#### Legend

- Dust Deposition Contour ( $\text{g/m}^2/\text{month}$ )
- Existing Westside Mine Boundary
- Proposed Open Cut Mining Boundary
- Development Application Area
- Proposed Wakefield Road Realignment

- Residences
- Buildings
- MCJV Residences

- Macquarie Coal Joint Venture
- BHP
- R.W. Miller Co. Pty Ltd
- J.P. Farrell

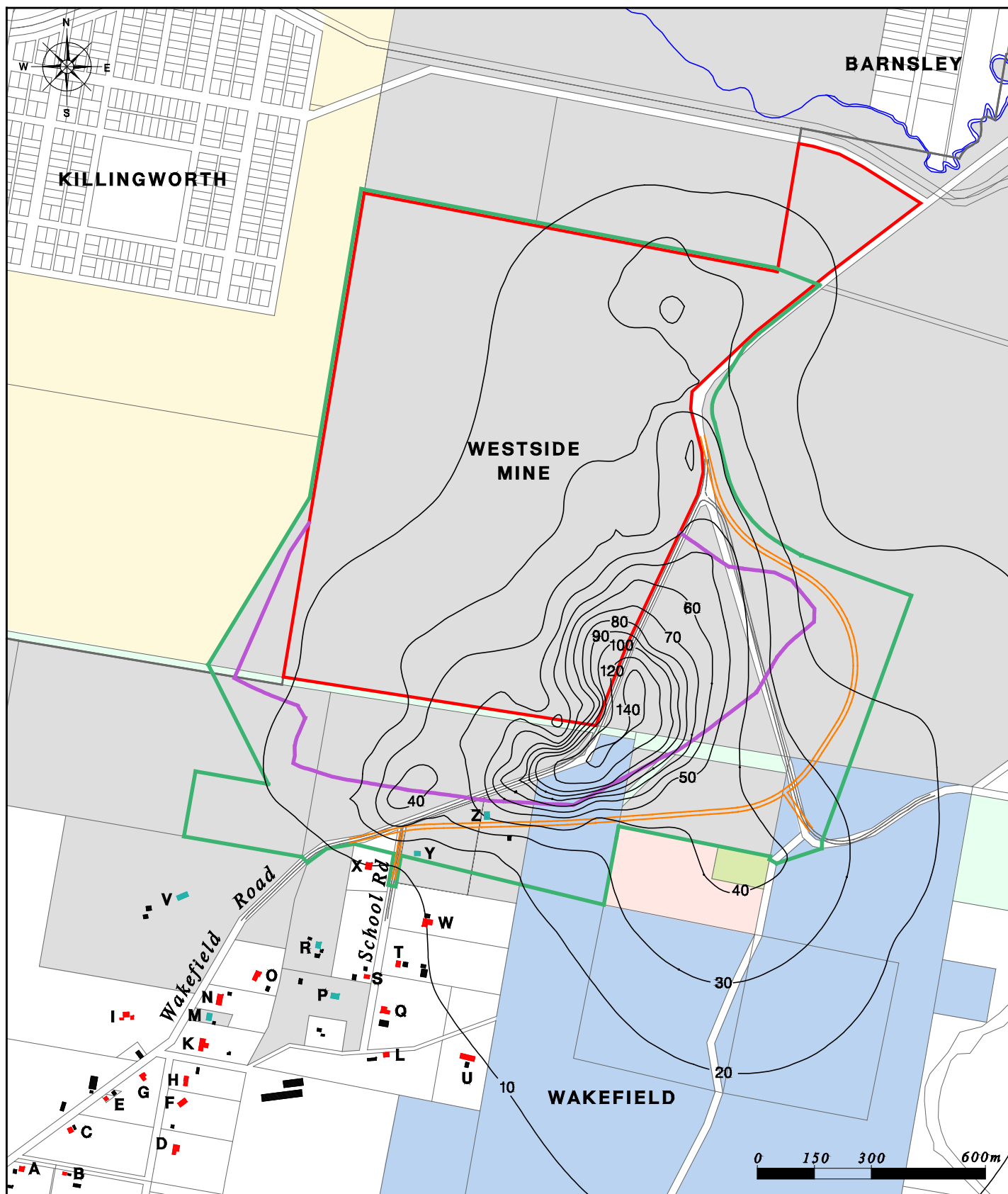
- Donaldson Estate/  
Former Rhondda Colliery
- Crown Land
- Other (including Residential)

#### FIGURE 5.11

Predicted Annual Dust Deposition  
due to Mining in Year 3 – ( $\text{g/m}^2/\text{month}$ )

A4 Scale 1:14 000

Ref No.: R02\_V1/1377\_083.dgn



#### Legend

- PM10 Concentration Contour ( $\mu\text{g}/\text{m}^3$ )
- Existing Westside Mine Boundary
- Proposed Open Cut Mining Boundary
- Development Application Area
- Proposed Wakefield Road Realignment

- Residences
- Buildings
- MCJV Residences

- Macquarie Coal Joint Venture
- BHP
- R.W. Miller Co. Pty Ltd
- J.P. Farrell

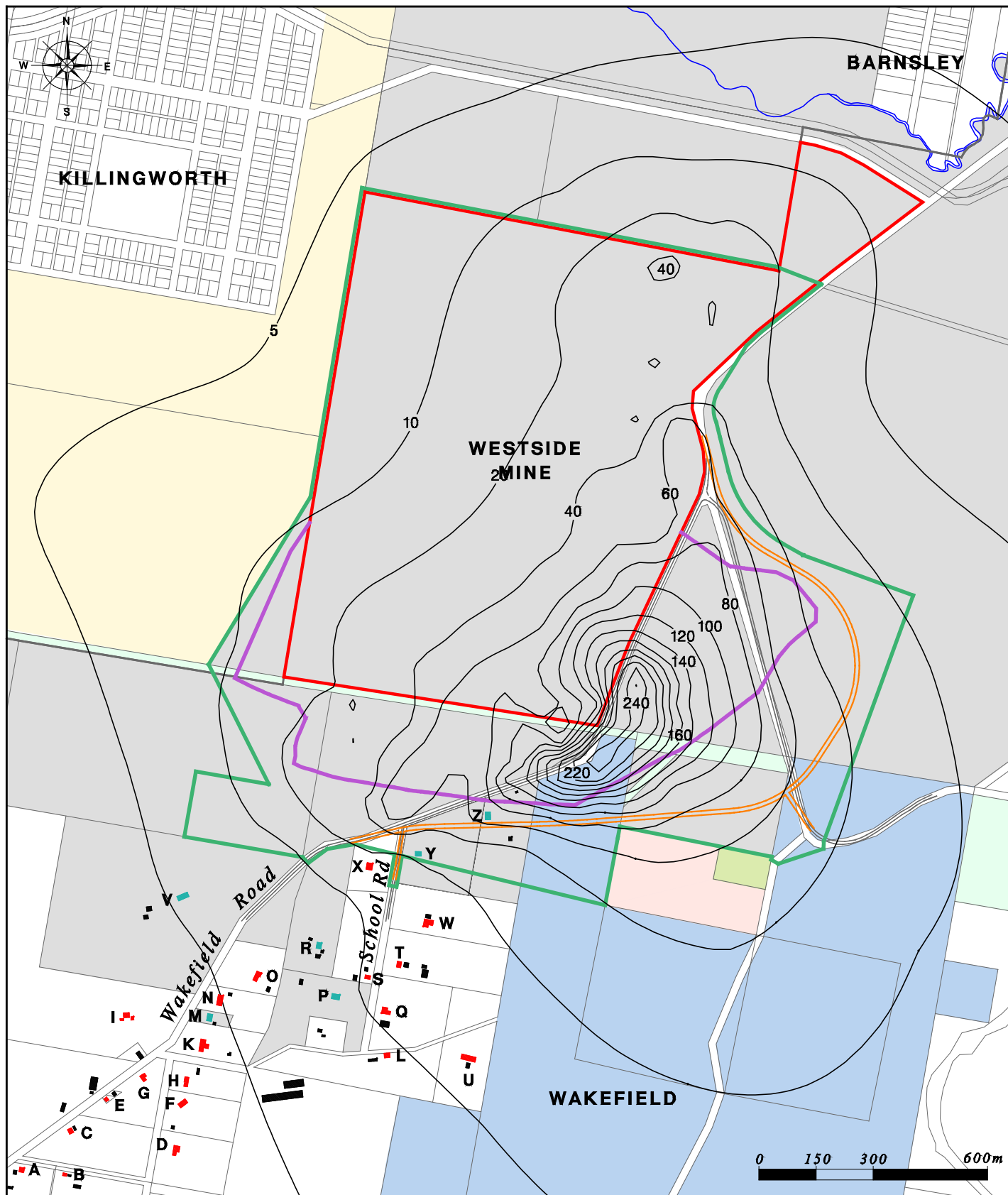
- Donaldson Estate/  
Former Rhondda Colliery
- Crown Land
- Other (including Residential)

#### FIGURE 5.12

Predicted Annual PM10 Concentration  
due to Mining in Year 6 – ( $\mu\text{g}/\text{m}^3$ )

A4 Scale 1:14 000

Ref No.: R02\_V1/1377\_084.dgn



#### Legend

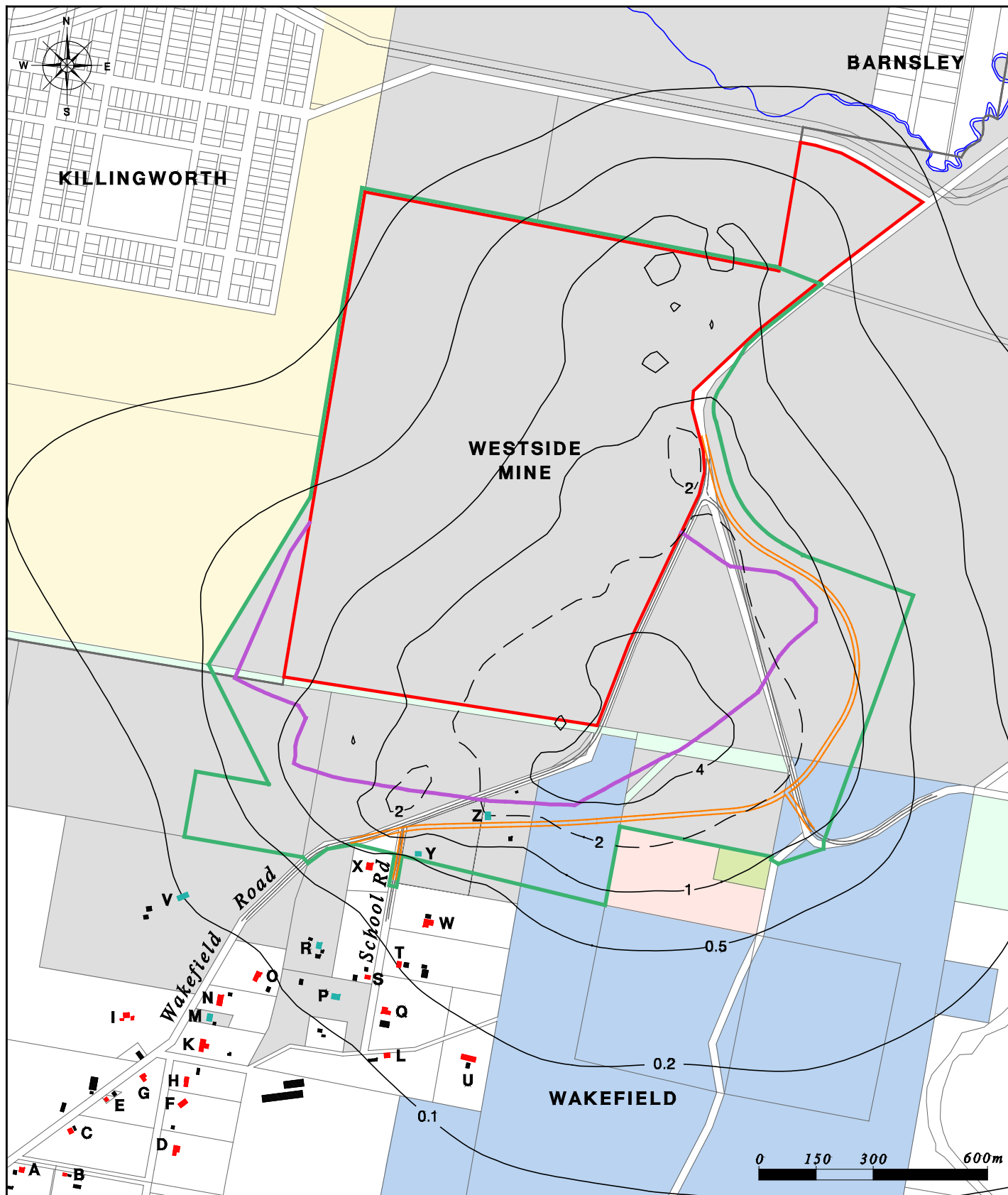
- |                                                                  |                              |                                              |
|------------------------------------------------------------------|------------------------------|----------------------------------------------|
| — Total Suspended Particles Contour ( $\mu\text{g}/\text{m}^3$ ) | Macquarie Coal Joint Venture | Donaldson Estate/<br>Former Rhondda Colliery |
| — Existing Westside Mine Boundary                                | BHP                          | Crown Land                                   |
| — Proposed Open Cut Mining Boundary                              | R.W. Miller Co. Pty Ltd      | Other (including Residential)                |
| — Development Application Area                                   | J.P. Farrell                 |                                              |
| — Proposed Wakefield Road Realignment                            |                              |                                              |
| ■ Residences                                                     |                              |                                              |
| ■ Buildings                                                      |                              |                                              |
| ■ MCJV Residences                                                |                              |                                              |

#### FIGURE 5.13

Predicted Annual Total Suspended  
Particle Concentration due to  
Mining in Year 6 – ( $\mu\text{g}/\text{m}^3$ )

A4 Scale 1:14 000

Ref No.: R02\_V1/1377\_085.dgn



#### Legend

- Dust Deposition Contour ( $\text{g/m}^2/\text{month}$ )
- Existing Westside Mine Boundary
- Proposed Open Cut Mining Boundary
- Development Application Area
- Proposed Wakefield Road Realignment

- Residences
- Buildings
- MCJV Residences

- Macquarie Coal Joint Venture
- BHP
- R.W. Miller Co. Pty Ltd
- J.P. Farrell

- Donaldson Estate/  
Former Rhondda Colliery
- Crown Land
- Other (including Residential)

#### FIGURE 5.14

Predicted Annual Dust Deposition  
due to Mining in Year 6 – ( $\text{g/m}^2/\text{month}$ )

A4 Scale 1:14 000

Ref No.: R02\_V1/1377\_088.dgn

#### 5.7.4 Air Quality Management

Current air quality controls will continue to be implemented during continued mining operation, including:

- watering road surfaces and hardstand areas using water carts, where required;
- maintaining all equipment in good order to limit exhaust fumes;
- provision of dust minimisation training during the environmental site induction;
- use of speed controls for vehicles travelling on surfaces that are potential sources of dust;
- prompt rehabilitation of disturbed areas following completion of mining;
- keeping mine site traffic to well defined routes and on properly formed roads whenever possible;
- the use of dust controls on drills;
- regular grading of roads;
- minimising the area of pre-stripped land; and
- the use of coarse stemming materials for blasting.

A Dust Management Plan will be developed, which will include reporting and monitoring requirements, as discussed in **Section 6.3**.

### 5.8 NOISE AND VIBRATION

A comprehensive assessment of noise and vibration impacts has been prepared by Richard Heggie Associates and is provided in **Appendix 8**. This assessment provides details of existing noise levels in the surrounding area; determines the noise impact assessment criteria based on detailed consideration of existing noise levels and the relevant EPA guidelines; predicts noise levels that are expected to result from mining activities; and provides an assessment of these noise levels against the relevant EPA criteria. An overview of these investigations is provided in this section.

#### 5.8.1 Noise Terminology

Environmental noise levels vary with time, requiring statistical descriptors to characterise the noise environment. The descriptors commonly used to describe noise, which are used in the following discussion and the detailed noise impact assessment in **Appendix 8**, are defined in **Section 10**.

#### 5.8.2 Relevant Noise Goals

##### 5.8.2.1 Operational Goals

The relevant criteria for operational noise are provided by the NSW EPA's *Industrial Noise Policy* (2000) (INP). This policy defines the noise criteria for intrusiveness and amenity. The intrusiveness criterion specifies that the total  $L_{Aeq}$  noise emissions from a proposed development should not exceed the Rating Background Level  $L_{A90}$  (RBL) by more than

5 dBA. The amenity criterion determines the allowable noise level from a proposed development in the context of existing noise sources. In other words, the noise level that will ensure that the cumulative impact of the proposal is within acceptable limits. For “suburban receiver” areas the EPA recommended amenity noise levels are 55 dBA, 45 dBA and 40 dBA for day, evening and night times, respectively.

The noise emission design goals for the proposed continued operation of Westside Mine have been established with reference to the INP. The intrusiveness criteria have been set from RBLs determined in the absence of noise from Westside Mine (refer to **Section 5.8.3**). The goals are 42 dBA for daytime and 39 dBA for evening. No night-time operations are proposed and therefore no night-time goal is applicable.

#### 5.8.2.2 Road Traffic Noise

The EPA released the *Environmental Criteria for Road Traffic Noise* (RTNP) in May 1999, which sets out noise criteria applicable to different road classifications for the purpose of defining traffic noise impacts. The noise limits adopted for the private haul road and Wakefield Road realignment are:

|                            |   |        |
|----------------------------|---|--------|
| $L_{Aeq}$ 1hour daytime    | = | 55 dBA |
| $L_{Aeq}$ 1hour night-time | = | 50 dBA |

However, project-specific noise levels should not increase existing daytime noise levels by more than 2 dBA.

#### 5.8.2.3 Sleep Disturbance

The RTNP also contains guidelines for prevention of sleep disturbance, which are considered below.

The EPA provides two sleep disturbance criteria, which relate to intermittent noise sources. One, as described in the ENCM is that the  $L_1$  level should not exceed background by more than 15 dB, which in this case is 45 dB(A). The second, described in the RTNP suggests that maximum internal noise levels below 50 to 55 dB(A) are unlikely to cause awakening reactions. This results in an external criterion of  $L_{max}$  60 to 65 dB(A). The ENCM criterion of 45 dB(A) has been used for this assessment.

### 5.8.3 Existing Noise Levels

Background noise levels were monitored at three locations adjacent to the Westside Mine site during October 2000 (refer to **Figure 3.2**). Environmental noise loggers were used to monitor the ambient noise levels located at the residential locations.

Weather data for the survey period was obtained from the weather station located at the Westside Mine. Noise data during periods of any rainfall and/or wind speeds in excess of 5 m/s (approximately 9 knots) were discarded in accordance with the INP. A summary of the results of the background surveys is given in **Table 5.10**.

**Table 5.10 - Summary of Existing Ambient background Noise Levels**

| Location                                                     | Description                       | Background Noise Level $L_{A90}$<br>(Rating Background Level) | Estimated Industrial $L_{Aeq}$<br>Noise Level without<br>Westside Mine |
|--------------------------------------------------------------|-----------------------------------|---------------------------------------------------------------|------------------------------------------------------------------------|
| Location H<br>Cnr School Rd and<br>Fassifern Rd<br>Wakefield | Daytime                           | 38 dBA                                                        |                                                                        |
|                                                              | Daytime without<br>mine operating | 37 dBA                                                        | < 47 dBA                                                               |
|                                                              | Evening                           | 34 dBA                                                        |                                                                        |
|                                                              | Evening without<br>mine operating | 34 dBA                                                        | < 39 dBA                                                               |
|                                                              | Night                             | 32 dBA                                                        | < 34 dBA                                                               |
| Location W<br>No. 1 School Rd<br>Wakefield                   | Daytime                           | 38 dBA                                                        |                                                                        |
|                                                              | Daytime without<br>mine operating | 37 dBA                                                        | < 48 dBA                                                               |
|                                                              | Evening                           | 37 dBA                                                        |                                                                        |
|                                                              | Evening without<br>mine operating | 37 dBA                                                        | < 39 dBA                                                               |
|                                                              | Night                             | 33 dBA                                                        | < 34 dBA                                                               |
| No 3 Sackville Rd<br>Killingworth                            | Daytime                           | 41 dBA                                                        |                                                                        |
|                                                              | Daytime without<br>mine operating | 39 dBA                                                        | < 49 dBA                                                               |
|                                                              | Evening                           | 37 dBA                                                        |                                                                        |
|                                                              | Evening without<br>mine operating | 37 dBA                                                        | < 39 dBA                                                               |
|                                                              | Night                             | 31 dBA                                                        | < 34 dBA                                                               |

*Note: The  $L_{A90}$  represents the level exceeded for 90% of the interval period and is referred to as the average minimum or background noise level*

*$L_{Aeq}$  The equivalent continuous noise level is defined as the level of noise equivalent to the energy average of noise levels occurring over a measurement period*

Location H at the corner of School Road and Fassifern Road was chosen as a noise monitoring site in an effort to reduce the effect of noise from the mine site on the rating background noise levels in Wakefield. The results in **Table 5.10** show that the impact of the mine on background rating levels at either Location H or Location W at Wakefield was negligible (less than 0.5 dBA without rounding).

The monitoring of ambient noise at the Killingworth location was influenced by operation of a pool pump between the hours of 4.00 am and 6.00 am every morning and between 6.15 pm and 8.15 pm in the evenings. Noise levels associated with the pool pump operation were removed from the analysis.

## 5.8.4 Mine Noise Impact Assessment

### 5.8.4.1 Project Specific Noise Impacts

A computer model (ENM) was used to predict the noise emissions from the proposed development. The model considered two future worst case phases of development based upon Westside Year 3 conceptual mine plan (being the closest development to Wakefield residences) and Year 6 conceptual mine plan (being the highest production level).

A summary of the predicted  $L_{Aeq(15\text{minute})}$  intrusive noise levels at the potentially most affected residences for Year 3 and Year 6 conceptual mine plans are presented in **Table 5.11**.

**Table 5.11 - Predicted Mine Noise Emission Levels - Calm Weather Conditions**

| Location     | Predicted Noise Level – $L_{Aeq(15\text{minute})}$ |               |               |               | Project Specific Design Goal |                            |
|--------------|----------------------------------------------------|---------------|---------------|---------------|------------------------------|----------------------------|
|              | Year 3                                             |               | Year 6        |               | Period                       | $L_{Aeq(15\text{minute})}$ |
|              | Daytime                                            | Evening       | Daytime       | Evening       |                              |                            |
| Z*           | <b>58 dBA</b>                                      | <b>47 dBA</b> | <b>48 dBA</b> | <b>48 dBA</b> | Daytime                      | 42 dBA                     |
|              |                                                    |               |               |               | Evening                      | 39 dBA                     |
| Y*           | <b>46 dBA</b>                                      | 37 dBA        | 39 dBA        | 35 dBA        | Daytime                      | 42 dBA                     |
|              |                                                    |               |               |               | Evening                      | 39 dBA                     |
| X            | 42 dBA                                             | 35 dBA        | 35 dBA        | 33 dBA        | Daytime                      | 42 dBA                     |
|              |                                                    |               |               |               | Evening                      | 39 dBA                     |
| W            | <b>48 dBA</b>                                      | 36 dBA        | 40 dBA        | 39 dBA        | Daytime                      | 42 dBA                     |
|              |                                                    |               |               |               | Evening                      | 39 dBA                     |
| U            | <b>44 dBA</b>                                      | 34 dBA        | 41 dBA        | 40 dBA        | Daytime                      | 42 dBA                     |
|              |                                                    |               |               |               | Evening                      | 39 dBA                     |
| T            | <b>46 dBA</b>                                      | 35 dBA        | 40 dBA        | 39 dBA        | Daytime                      | 42 dBA                     |
|              |                                                    |               |               |               | Evening                      | 39 dBA                     |
| S            | <b>45 dBA</b>                                      | 34 dBA        | 38 dBA        | 38 dBA        | Daytime                      | 42 dBA                     |
|              |                                                    |               |               |               | Evening                      | 39 dBA                     |
| R*           | 42 dBA                                             | 32 dBA        | 36 dBA        | 35 dBA        | Daytime                      | 42 dBA                     |
|              |                                                    |               |               |               | Evening                      | 39 dBA                     |
| Q            | <b>43 dBA</b>                                      | 33 dBA        | 39 dBA        | 38 dBA        | Daytime                      | 42 dBA                     |
|              |                                                    |               |               |               | Evening                      | 39 dBA                     |
| P*           | 42 dBA                                             | 32 dBA        | 37 dBA        | 36 dBA        | Daytime                      | 42 dBA                     |
|              |                                                    |               |               |               | Evening                      | 39 dBA                     |
| L            | 42 dBA                                             | 32 dBA        | 38 dBA        | 37 dBA        | Daytime                      | 42 dBA                     |
|              |                                                    |               |               |               | Evening                      | 39 dBA                     |
| Killingworth | 36 dBA                                             | 36 dBA        | 36 dBA        | 36 dBA        | Daytime                      | 44 dBA                     |
|              |                                                    |               |               |               | Evening                      | 42 dBA                     |

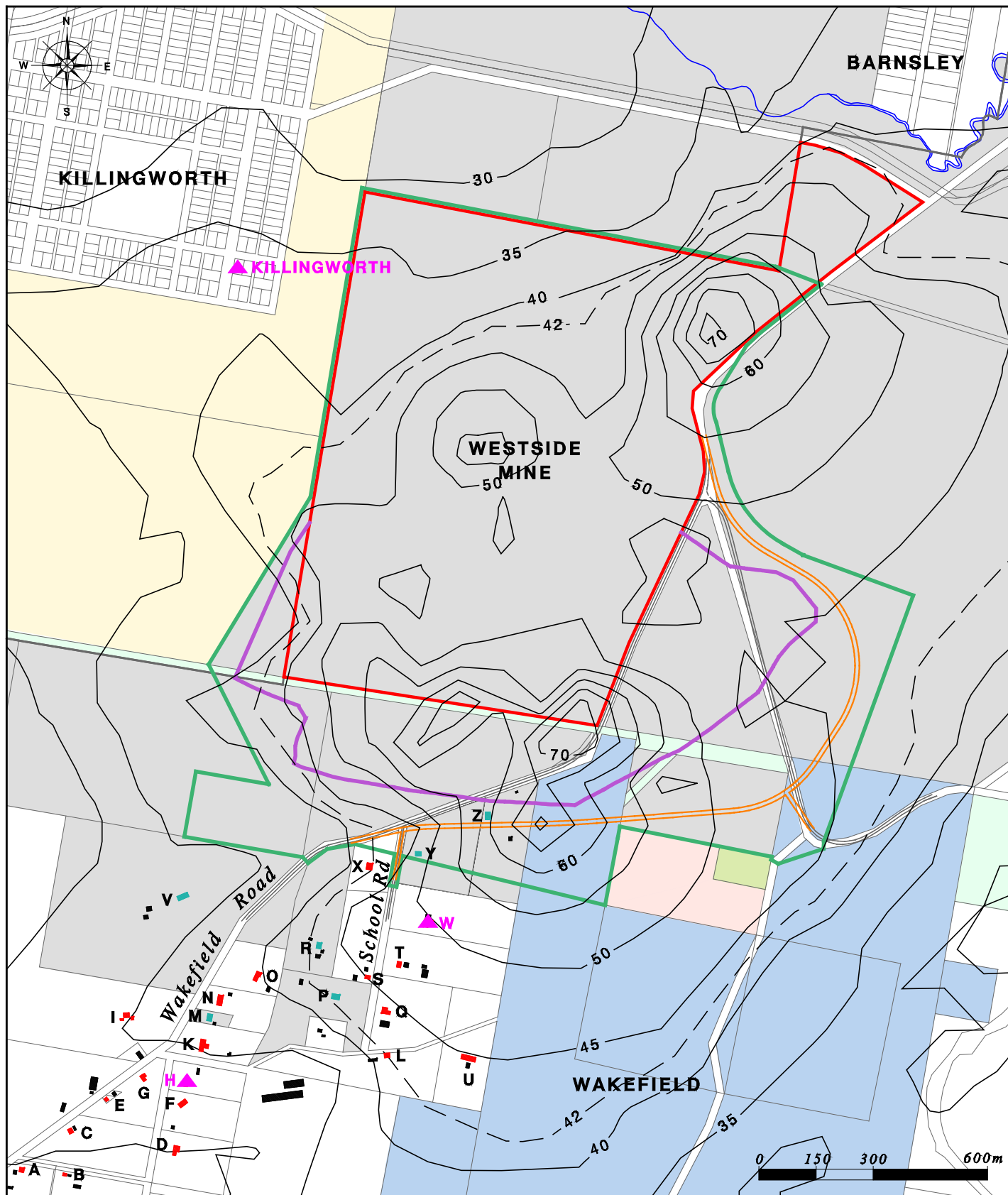
*Note Figures shown in bold denote exceedance of the relevant noise design goal*

*\* Mine owned residence*

*Residences not listed are below the limiting intrusiveness criterion*

Predicted noise levels in the Year 3 worst case scenario in terms of proximity to Wakefield, are shown on **Figure 5.15**. For operation within the Year 3 mine plan during the daytime period the non-mine owned residence at Location W is considered to be in a Noise Affectionation Zone, with a predicted noise level of 48 dBA, being 6 dBA above the relevant noise goal. The major noise impact at this residence is from the drilling operation. Noise levels will meet the INP project specific noise levels in the evening and during the day at times when the drill is not operating. As discussed in previous sections, OCAL is currently negotiating with this property owner to reach agreement or to purchase the property.

Non-mine owned residences at Locations Q, S, T and U have relatively low exceedances of the noise design goal (1-4 dBA) for operation at the mine within the Year 3 mine plan during the daytime period. These exceedance levels place these properties in the Noise Management Zone, requiring specific consultation, monitoring and ongoing management to minimise noise impacts. The major noise impact at these residences is from the drilling



#### Legend

- Noise Contour (dBA)
- - - 42dBA Relevant Noise Design Goal
- Existing Westside Mine Boundary
- Proposed Open Cut Mining Boundary
- Development Application Area
- Proposed Wakefield Road Realignment
- Residences
- Buildings
- MCJV Residences

- Macquarie Coal Joint Venture
- BHP
- R.W. Miller Co. Pty Ltd
- ▲ H-Melrose Residence  
Cnr Fassifern Rd &  
School Rd
- ▲ W-Heesemann  
Residence  
No.1 School Rd
- ▲ Killingworth-  
Barker Residence  
No.3 Sackville Rd

- J.P. Farrell
- Donaldson Estate/  
Former Rhondda Colliery
- Crown Land
- Other (including Residential)

**FIGURE 5.15**  
Westside Mine Noise Contours  
Year 3 Mine Plan

A4 Scale 1:14 000

Ref No.:R02\_V1/1377\_109.dgn

operation. Noise levels will meet the INP project specific noise levels in the evening and at times when the drill is not operating. There are no exceedances of the relevant noise design goal during the evening.

Noise emissions predicted for the Year 6 mine plan during the daytime and evening period comply with the INP project specific noise goals at all non-mine owned residences (refer to **Figure 5.16**). It can be seen from these noise contours that as mining progresses northwards in the East Pit, there is a considerable reduction in potential noise levels within the Wakefield community.

In relation to noise impacts on non-mine owned vacant land, it can be seen from **Figures 5.15** and **5.16** that more than 25% of the RW Miller Co Pty Ltd and JP Farrell properties are affected by noise levels greater than 5 dBA over the project specific noise target. These properties are located within an existing surface mining lease and OCAL will seek to reach agreement with these property owners in relation to noise impacts.

#### 5.8.4.2 Road Traffic Noise Impacts

##### Wakefield Road Deviation

Westside Mine proposes to realign a section of Wakefield Road as part of the proposed development, to allow mining in the East Pit on the eastern side of the existing road alignment.

**Table 5.12** contains the results of noise modelling to determine the estimated change in noise levels at potentially affected residences resulting from the realignment of Wakefield Road.

**Table 5.12 - Predicted Road Traffic Noise Levels**

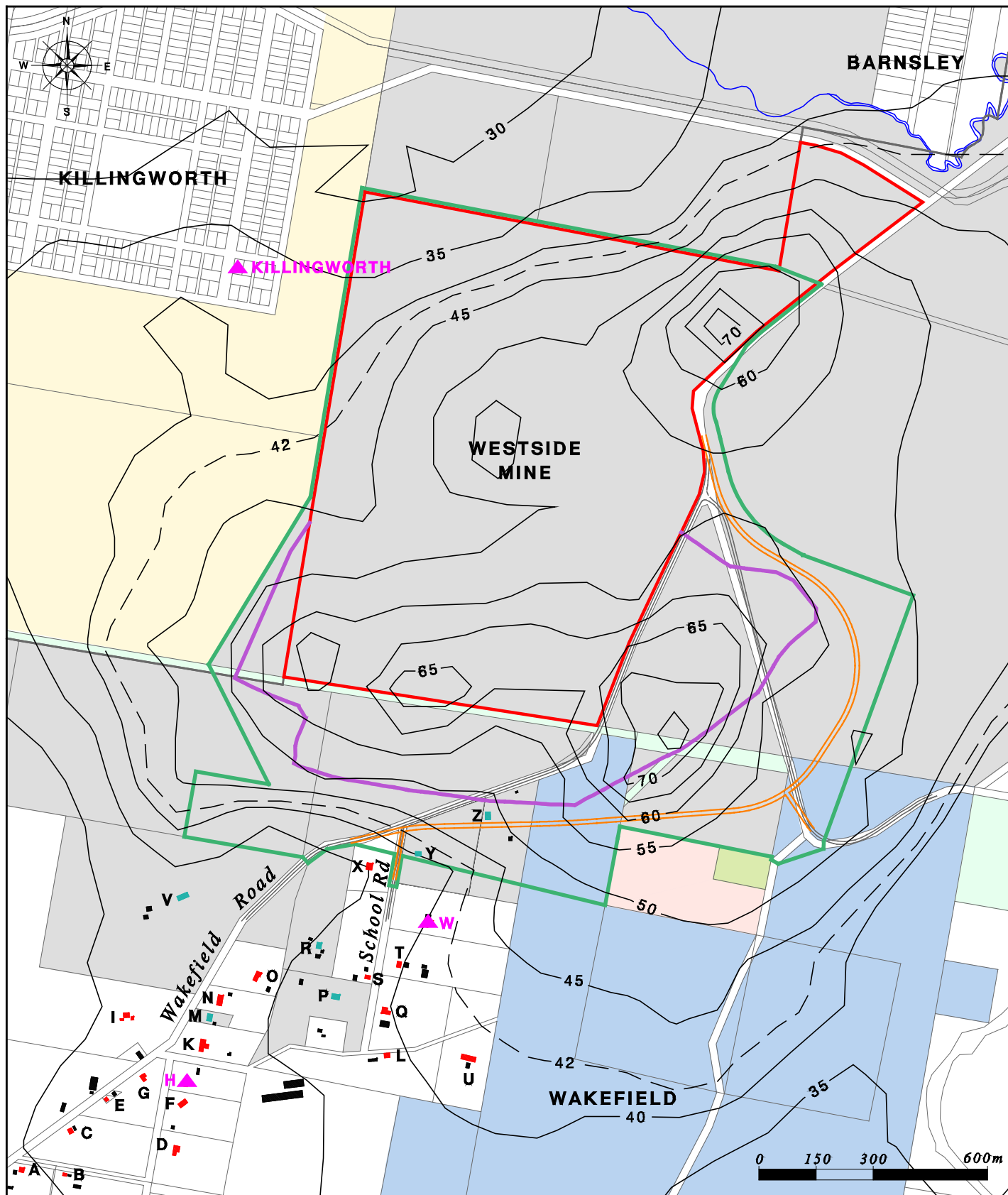
| Location     | Existing Alignment                    |                                         | Future Alignment                      |                                         | Change                                |                                         |
|--------------|---------------------------------------|-----------------------------------------|---------------------------------------|-----------------------------------------|---------------------------------------|-----------------------------------------|
|              | L <sub>Aeq</sub> (1hour)<br>Day (dBA) | L <sub>Aeq</sub> (1hour)<br>Night (dBA) | L <sub>Aeq</sub> (1hour)<br>Day (dBA) | L <sub>Aeq</sub> (1hour)<br>Night (dBA) | L <sub>Aeq</sub> (1hour)<br>Day (dBA) | L <sub>Aeq</sub> (1hour)<br>Night (dBA) |
| Residence Z* | 61.8                                  | 60.9                                    | 67.9                                  | 67.0                                    | 6.1                                   | 6.1                                     |
| Residence Y* | 59.1                                  | 58.2                                    | 60.3                                  | 59.5                                    | 1.3                                   | 1.3                                     |
| Residence X  | 60.1                                  | 59.2                                    | 59.9                                  | 59.1                                    | -0.2                                  | -0.2                                    |
| Residence W  | 53.6                                  | 52.8                                    | 53.9                                  | 53.1                                    | 0.3                                   | 0.3                                     |
| Residence R* | 55.3                                  | 54.4                                    | 55.3                                  | 54.4                                    | 0.0                                   | 0.0                                     |
| Residence N  | 56.0                                  | 55.1                                    | 56.0                                  | 55.1                                    | 0.0                                   | 0.0                                     |

\* Mine owned residence

The results of the traffic noise modelling indicate that, with the exception of location Z, a mine owned residence, the change in road traffic noise levels, due to the road realignment, are less than L<sub>Aeq</sub>(1hour) 2 dBA which is an acceptable tolerance set by the EPA NSW Criterion for Road Traffic Noise.

##### Road Transport of Product Coal

The vast majority of coal from the Westside Mine is hauled to Eraring Power Station by truck from the mine site via an OCAL private haul road. This private haul road links with the Newstan Colliery's haul road on to Eraring. An average of 4000 tonnes of coal is currently hauled per day which requires approximately 296 truck movements. It is proposed to increase the haulage of coal to approximately 5000 tonnes per day with an average of 370 truck movements.



# Legend

- Noise Contour (dBA)
- - - 42dBA Relevant Noise Design Goal
- Existing Westside Mine Boundary
- Proposed Open Cut Mining Boundary
- Development Application Area
- Proposed Wakefield Road Realignment
- Residences
- Buildings
- MCJV Residences

- Macquarie Coal Joint Venture
- BHP
- R.W. Miller Co. Pty Ltd
- ▲ H-Melrose Residence  
Cnr Fassifern Rd &  
School Rd
- ▲ W-Heesemann  
Residence  
No.1 School Rd
- ▲ Killingworth-  
Barker Residence  
No.3 Sackville Rd

- J.P. Farrell
- Donaldson Estate/  
Former Rhondra Colliery
- Crown Land
- Other (including Residential)

**FIGURE 5.16**  
Westside Mine Noise Contours  
Year 6 Mine Plan

A4 Scale 1:14 000

Ref No.:R02\_V1/1377\_110.dgn

The nearest residential dwellings are located approximately 500 metres from the private haul road. The EPA NSW Criteria for Road Traffic Noise generally considers the impact of private haul roads not as traffic noise but as an “on-site” impact. In this case however, due to the length and remoteness of the haul road from the mine site, the receivers would perceive the noise as they would from a public road. It is therefore deemed appropriate to address the noise issues relating to the private haul road in terms of an  $L_{Aeq(1hour)}$  noise descriptor. The private haul road has been considered as a local road type for this assessment to afford the maximum protection to residences in the vicinity of the road.

It is predicted that an  $L_{Aeq(1hour)}$  noise level of 36 dBA would be received at residences 500 metres from the private haul road for the existing coal haulage rates. This would rise to an  $L_{Aeq(1hour)}$  of 37 dBA due to the proposed increase in coal haulage rates. The existing and proposed level of coal haulage along the private haul road is well below the EPA road traffic criteria for daytime of  $L_{Aeq(1hour)}$  of 55 dBA and the night-time  $L_{Aeq(1hour)}$  criteria of 50 dBA. It is also proposed that there may be occasional transport of coal to Vales Point Power Station on a short term campaign basis.

The route of coal trucks to Vales Point Power Station would be via the Westside Mine private haul road to Awaba Road, to the F3 Freeway, and then south along the Freeway to access the power station via Wyee Road and Rutleys Road. On the return journey trucks would leave Vales Point Power Station via Rutleys and Wyee Roads, entering the F3 Freeway at Morisset, travelling north up the F3 Freeway, exiting at George Booth Drive, before heading to Northville Drive, then travelling south via Wakefield Road to Westside Mine. The most potential for noise impact for traffic route to and from Vales Point Power Station would be where traffic used local roads such as parts of Northville Drive and Wakefield Road (north of Westside Mine).

It is planned to limit the amount of coal truck movements to 16 movements per hour (where two movements is equivalent to one return journey) when delivering coal to Vales Point Power Station. This would mean an increase of eight traffic movements per hour on Northville Drive and Wakefield Road (north of Westside Mine) as the private haul road is utilised for despatches from the mine.

It is estimated that, by limiting the amount of heavy vehicle movements to 16 vehicles per hour when delivering coal to Vales Point, the traffic noise increase along Northville Drive and Wakefield Road north of Westside Mine will be below an  $L_{Aeq(1hour)}$  of 2 dBA. This predicted increase in traffic noise levels is within the acceptable tolerances set by the EPA NSW Criteria for Road Traffic Noise.

Alternatively, if an up-ramp is constructed by Powercoal from Awaba Road onto the private haul road, the empty coal trucks would not use Northville Drive and Wakefield Road and would return via the private haul road. This would allow the production restrictions to be relaxed.

If overburden material is transported off site for supply for tile manufacturing purposes (refer to **Section 4.4.2**), the truck haulage rate will be a maximum of six truck movements per hour and would only occur when there is no use of the public road system for transport of product coal to Vales Point Power Station. Consequently, the relevant traffic noise criteria will also be met by these activities.

### 5.8.4.3 Blast Impacts

#### Blasting Emissions Criteria

The EPA has set out the following guidelines on quarry blasting based on human comfort levels. The guidelines have been adapted from the ANZECC Guidelines “*Technical Basis for Guidelines to Minimise Annoyance due to Blasting Overpressure and Ground Vibration*” and are as follows:

##### *Airblast*

The recommended maximum level for airblast is 115 dB Linear Peak.

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

##### *Ground Vibration*

The recommended maximum level for ground vibration is 5 mm/s (peak particle velocity [ppv]). It is recommended that a level of 2 mm/s be considered as a long term regulatory goal.

The ppv level of 5 mm/s may be exceeded on up to 5% of the total number of blasts over a period of 12 months. The level should not exceed 10 mm/s at any time.

##### *Times and Frequency of Blasting*

Blasting should only generally be permitted during the hours of 9.00 am to 5.00 pm Monday to Saturday. Blasting should not take place on Sundays or Public Holidays.

Blasting should generally take place no more than once per day.

##### *Blast Impacts*

The level of airblast and ground vibration has been predicted using the developed site laws for the mine, for Year 3 and Year 6 mine plans, assuming current blasting practice. The maximum instantaneous charge (MIC) will vary, and be limited, depending on the location of the area being mined and its relation to the nearest affected receiver. A summary of the results is contained within **Table 5.13**. The results contained within the table reflect the levels that would be experienced when blasting is at its nearest point to each receiver location.

**Table 5.13 - Predicted Blasting Levels Results (MIC 25 kg)**

| Location | Predicted Mine Blasting Level –<br>Year 3 (MIC 25 kg) |                          | Predicated Mine Blasting Level –<br>Year 6 (MIC 50 kg) |                          |
|----------|-------------------------------------------------------|--------------------------|--------------------------------------------------------|--------------------------|
|          | Airblast dB<br>Linear                                 | Ground<br>Vibration mm/s | Airblast dB<br>Linear                                  | Ground<br>Vibration mm/s |
| R*       | 115                                                   | 2.1                      | 113                                                    | 1.9                      |
| S        | 113                                                   | 1.8                      | 113                                                    | 2.0                      |
| T        | 114                                                   | 2.0                      | 115                                                    | 2.3                      |
| U        | 108                                                   | 1.1                      | 104                                                    | 1.0                      |
| V        | 111                                                   | 1.5                      | 108                                                    | 1.4                      |
| W        | 117                                                   | 2.5                      | 118                                                    | 3.1                      |

**Table 5.13 - Predicted Blasting Levels Results (MIC 25 kg) (cont)**

| Location     | Predicted Mine Blasting Level –<br>Year 3 (MIC 25 kg) |                          | Predicated Mine Blasting Level –<br>Year 6 (MIC 50 kg) |                          |
|--------------|-------------------------------------------------------|--------------------------|--------------------------------------------------------|--------------------------|
|              | Airblast dB<br>Linear                                 | Ground<br>Vibration mm/s | Airblast dB<br>Linear                                  | Ground<br>Vibration mm/s |
| X            | 125                                                   | 4.7                      | 118                                                    | 3.1                      |
| Y*           | 126                                                   | 5.0                      | 123                                                    | 4.4                      |
| Z*           | 132                                                   | 8.3                      | 137                                                    | 13.6                     |
| Killingworth | 99                                                    | 0.6                      | 102                                                    | 0.8                      |
| Barnsley     | 91                                                    | 0.3                      | 95                                                     | 0.5                      |

\* *Mine owned residence*

The results of predictions based on mine blasting show that during operation within the Year 3 mine plan airblast levels will exceed the EPA guidelines at non-mine owned residences at Locations W and X. During operation within the Year 6 mine plan airblast levels are predicted to exceed EPA guidelines at non-mine owned residences at Locations W and X. It should be noted that these airblast levels would only apply when blasting is conducted at the closest point to these residential locations. OCAL is currently negotiating to purchase or put in place agreements with the owners of residences W and X.

#### **5.8.4.4 Noise and Vibration Management**

##### **Noise Management**

In order to reduce the potential noise impact of the proposed development on the surrounding community, OCAL has committed to restricting operations to the northern side of the ridgeline between the existing mine and Wakefield, and continuing to restrict operation hours to daytime and evening, with no night-time operations. In addition, the drill (being the highest contributing noise source at residences to the south of the site) will not be used after 6.00 pm. This would only be reconsidered if a significantly quieter drill were to be introduced into the operation.

It is also planned that after 6.00 pm any dozers to be used will be confined to acoustically screened locations within the mine pit, where possible. This may, for example, involve using dozers at lower elevation benches within the pit, after 6.00 pm.

OCAL will continue to implement existing noise management practices, including:

- periodic noise monitoring at nearby residences; and
- maintenance of plant and equipment in good working order.

##### **Blast Management**

Existing blast design and monitoring procedures will continue to be implemented to ensure that blasting at Westside Mine does not exceed the existing EPA limits of 5 mm/s for vibration and 115 dBL for airblast at residences, unless an agreement for higher limits has been negotiated with the landholder.

### *Blast Controls*

In order to manage blasts such that the potential for exceedance of the relevant criteria is minimised, Westside Mine will continue to implement the existing blast management procedures. The existing procedures include:

- training all relevant personnel on environmental obligations and the safe handling of explosives;
- designing and undertaking blasts to ensure that vibration and airblast limits are met, including use of adequate stemming, a delay detonation system, and careful drilling and hole loading to ensure that the required blast design is implemented;
- taking into account weather conditions such as inversions, wind direction and cloud;
- monitoring blasts at sensitive locations to verify whether vibration and airblast limits are met and to continue to obtain additional data for refining the predictive site-law;
- modification of the blast design, if necessary;
- documentation of the date, location of blast holes and quantity of explosives used each day;
- periodic review of blast management procedures to evaluate performance and identify corrective action, if required; and
- continuing to notify residents prior to blasting, for those residents who request such notification.

## **5.9 HERITAGE ASSESSMENT**

### **5.9.1 Aboriginal Heritage**

A comprehensive Aboriginal archaeological study was conducted by Umwelt (Australia) Pty Limited and the Koompahtoo LALC to assess the impacts to Aboriginal heritage items in the proposed mining area. The results of that study are detailed in **Appendix 9** and summarised below.

The objectives of the study were to:

- undertake an archaeological study of the project area and to record all Aboriginal and non-Aboriginal sites identified;
- assess the significance of sites identified;
- consult, and to undertake the field survey with the assistance of the local Aboriginal community, represented by the Koompahtoo LALC and to examine any areas of concern to the community representative;
- assess the impact of the proposed development on any sites located within the study area; and
- provide advice on the appropriate management of any sites located within the study area.

### 5.9.1.1 Survey Results

To provide systematic sampling of the landscape at Westside, the study area was divided into landform elements based on a combination of information from topographic maps and field appraisal. A predictive model of the relationship between the landform elements and the likely location of Aboriginal sites was developed prior to the archaeological survey of the area.

The study area has been subject to a number of comprehensive archaeological surveys for surface sites over the last 15 years without any Aboriginal sites being identified. During this survey no Aboriginal sites or relics were identified. Aboriginal sites are known to occur in similar landscapes within a few kilometres. The results of this and earlier surveys suggests that Aboriginal use of the study area was not intensive. Traditional people doubtless used the country for hunting and probably passed through it when travelling between the lake and mountains. This form of Aboriginal exploitation is unlikely to produce areas with extensive scatters of stone artefacts.

### 5.9.1.2 Significance Assessment

Aboriginal cultural significance can only be assessed by the local Aboriginal community and can vary to that of scientific significance. The Koombahtoo LALC have advised that they have no objection to the project proceeding.

The scientific significance of Aboriginal sites is assessed according to their potential to contribute to the scientific or archaeological understanding of Aboriginal culture. There are a number of values that are considered in the assessment of scientific significance. These include the site's rarity and its representativeness; the intactness or integrity of the site; its connectedness to other sites; its potential to provide new information about traditional Aboriginal culture in the area; its potential to contribute to a chronology of the local Aboriginal culture; or its potential to provide a conserved sample of archaeological data. This study has identified no Aboriginal sites or relics that might be a constraint to the proposed extension of the open cut mining operations at Westside Mine, the realignment of Wakefield Road, or the construction of the coal haul road.

### 5.9.1.3 Aboriginal Heritage Management

This study has identified no Aboriginal sites or relics that might be a constraint to the proposed development, however, some areas have the potential to contain evidence obscured by ground cover and/or buried evidence of Aboriginal occupation. These include:

- the gentle to moderately sloping lower slopes and other areas adjacent to Diega Creek along the south and southeastern boundary of the proposed mine extension;
- the less disturbed environment east of Rhondda Road; and
- areas adjacent to Cockle Creek.

OCAL will consult with the Koombahtoo LALC prior to conducting work in these areas and provide the opportunity for a Sites Officer from the Koombahtoo LALC to undertake monitoring for Aboriginal sites during vegetation clearance and the stripping of the upper soil horizons in these identified prospective areas. He/she would advise the machinery operator to stop work if archaeological deposits are exposed. Work would resume following consultation between Koombahtoo LALC, NPWS and OCAL, and an appropriate management strategy being agreed upon.

## 5.9.2 European Heritage

A comprehensive assessment of historic, or non-indigenous, heritage values within the proposed area of continued mining operations was undertaken in May 2001. An historic heritage assessment is included in **Appendix 9**, with a summary of the main findings of the report outlined below.

### 5.9.2.1 Westside Mine Investigations and Significance

Field survey of the site identified a number of non-Aboriginal heritage features related to previous underground mining activities north of Diega Creek. These relics include the site of the portal to old underground workings (filled or collapsed), access tracks, mounds, cuttings and various pieces of steel partly buried in the ground between the old mine opening and the creek. An old railway bridge crosses Diega Creek adjacent to the old mine and a rail line ran south to the Rhondda mine rail line that connected to the Main Northern Railway at Cockle Creek. A stone fence was also located, east of the junction of Wakefield Road and School Road.

### 5.9.2.2 Significance Assessment

The assessment of significance of non-Aboriginal heritage is a mechanism for identifying the relative values of heritage features to assist the determination of appropriate management strategies when heritage features are likely to be impacted by development projects. The criteria for assessing significance are outlined in the Burra Charter. Heritage sites are assessed according to their scientific, social, educational and aesthetic values, on a local and regional scale. The assessment considers the intactness, representativeness and rarity of the features, relative to similar features elsewhere.

The Killingworth - West Wallsend district has a long association with the coal mining industry. A number of local histories document the development of the local industry (Lambert et al 1988, Sokoloff 1991). The coal mining industry is well represented on the NSW Heritage Office, Heritage Inventory. The inventory lists at least six early collieries and several more sites associated with the industry within the LMCC area, including Rhondda Colliery just south of the current study area. At least one old colliery is listed for the Newcastle City area, at Stockrington just north of West Wallsend. The old mine site within the current study area is not listed.

The mine portal has collapsed and is barely visible. Its heritage significance is assessed as very low for all categories mentioned above. The bridge is part of the extensive network of rail lines that linked many independent coal mines in the district. It is assessed as having low to moderate local heritage significance and low regional significance. It is unlikely to be impacted by the current proposal.

The stone fence is in poor condition and it has no known local social significance, educational, scientific or aesthetic significance.

### 5.9.2.3 Management Recommendations

The non-Aboriginal heritage sites are of low significance and do not justify preservation or salvage. No specific management is required for historic heritage for this project.

## 5.10 VISUAL AMENITY

### 5.10.1 Existing Visual Amenity

#### 5.10.1.1 Regional Scenic Quality

The City of Lake Macquarie comprises a diversity of landscapes. The combination of rugged forested ranges, an extensive saltwater lake, ocean beaches and its varied, predominantly natural shore and bushland hillside backdrop, forms a landscape of very high scenic quality and amenity for both the residents and visitor (Clouston, 1997).

The Westside Mine Southern Extension area is located in the valley below the Watagan Ranges on the western hinterland of Lake Macquarie. This area comprises scenic rural landscapes and extensive bushland areas, with urban developments generally concentrated around the lake foreshore. The site is located between three areas of significant recreation and conservation value, Lake Macquarie to the southeast and Heaton and Awaba State Forests to the northwest and southwest respectively.

The current visual character of the region is predominately a result of the various land uses that have occurred with settlement and development of the area. The most significant land uses defining the area are land clearing for rural-residential and residential developments and open cut coal mining.

A Scenic Quality Plan for the Lake Macquarie LGA (Clouston, 1997) provides scenic quality ratings for broad areas and proposed management objectives for the various scenic quality categories. Open space within the vicinity of the southern extension area is considered to have moderate scenic quality.

Management objectives outlined by Clouston (1997), for areas of moderate scenic quality are to ensure that new developments do not diminish the scenic quality of Lake Macquarie landscapes by maintaining a dominance of the natural landscape structure, retaining vegetation and landscape features that contribute to the landscape character and ensuring new developments do not dominate the landscape (Clouston, 1997).

#### 5.10.1.2 Local Scenic Quality and Existing Westside Operations

The local scenic quality is defined by the surrounding land uses which include coal mining, rural-residential holdings, residential development and bushland, emulating the typical land use pattern exhibited throughout much of the lower Hunter Valley.

Two dominant ridgelines associated with the foothills of the Sugarloaf Range essentially enclose the site to the west, south and east and are dominant landscape features of the site's viewshed.

Views of the existing Westside Mine operations are generally restricted by undulations in the surrounding topography, existing vegetation and vegetated bunds. However, although filtered by established bunds and vegetation screens, commuters have intermittent views of the existing Westside Mine operations when travelling adjacent to the eastern side of the mine, on Wakefield Road.

Views of the proposed development area are generally shielded by the natural ridgelines and dense vegetation surrounding the area. Established vegetation filters views of the existing operations from Killingworth and Barnsley, while bunding and native vegetation screens limit views of the current operation from Wakefield Road. Views of the proposed development area from Wakefield residences (**Plates 5.1 and 5.2**) are generally restricted by



**PLATE 5.1**  
View from Residence N of Westside Mine to the north, behind the ridgeline



**PLATE 5.2**  
View from Residence O of Westside Mine to the north, behind the ridgeline

**Legend**  
— — — Transect Location (Approximate)

a natural vegetated east-west trending ridgeline bordering the southern extent of open cut mining.

The significance of the likely changes to the existing scenic quality will depend largely on the extent to which these changes will be visible. Detailed visual impact assessment of the proposed development is provided in the following section.

## **5.10.2 Visual Assessment**

### **5.10.2.1 Visibility of the proposed development**

In response to community concerns raised during the consultations process, the initial mine plan proposed by OCAL was substantially modified, limiting the extent of mining to the northern side of a natural east-west trending ridgeline. The ridgeline screens the majority of the proposed mining operations from sensitive viewing locations to the south including the Wakefield rural residential area. No open cut mining operation is now proposed for the southern side of the ridgeline, on the western side of the current Wakefield Road alignment.

A minor portion of the mining area on the eastern side of Wakefield Road will potentially be viewed to varying degrees from approximately ten residences of Wakefield and from the proposed Wakefield Road realignment. Potential views from Wakefield Road are intermittent, dependent on the local topography and existing vegetation. Potential views of the proposed development area from Barnsley and Killingworth, to the northeast and northwest respectively are generally restricted by natural undulations in the surrounding landform, existing vegetation and re-shaping/rehabilitation of the Westside North Pit mining area.

The proposed Wakefield Road realignment will also potentially be viewed from several residences of Wakefield. Variation in the natural topography and existing vegetation limit this potential impact.

Existing visual mitigation measures will be maintained to ensure that rehabilitation effort is focused on areas that are most visually prominent from off-site private residences and public transport routes.

### **5.10.2.2 Visual Impacts**

Assessment of the visual impacts of the project, and determination of appropriate mitigation measures, has been an integral component of project planning. Visual impact analysis for the proposed development has been undertaken for all potentially affected surrounding residences and viewing locations. The assessment considers the potential impacts produced by all aspects of the proposal including mine pits, overburden emplacement areas and the Wakefield Road realignment. This analysis has resulted in the inclusion of features specifically designed to mitigate the visual impact of the project. These features include the prompt rehabilitation of visually exposed areas and strategic establishment of vegetation screens to soften the landscape and screen views of mining activity and the Wakefield Road realignment, where possible.

Potential views of the proposed development area from Barnsley and Killingworth are restricted due to natural undulations of the landform, existing vegetation and reshaping/rehabilitation of the Westside North Pit mining area. Consequently, these locations are not considered to be prominent viewing locations. The potential impact on visual amenity of the proposed development for Barnsley and Killingworth residents is not considered to be significant.

Visual transects have been constructed to demonstrate the potential view of the proposed operations from the Wakefield rural residential area and the realigned Wakefield Road, represented by a transect at the Wakefield Road/Rhondda Road intersection (**Figure 5.17**).

The visual effect of the proposed development at Year 1 will be similar in character to that of the existing landscape, as shown by the visual transects on **Figure 5.18**. Motorists travelling along Wakefield Road currently have intermittent views, through existing vegetation screens, of the South Pit mining area and the North Pit rehabilitation area.

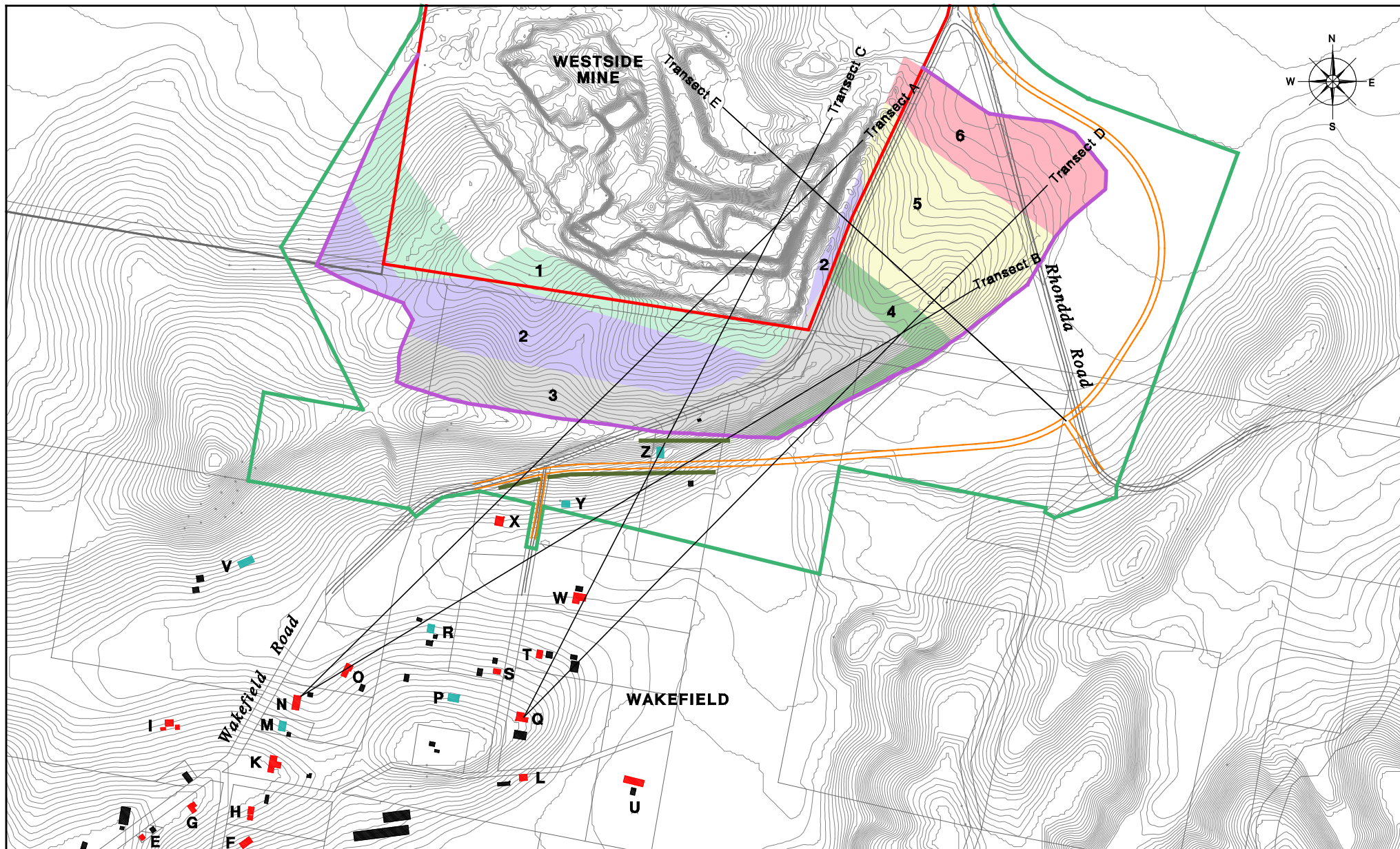
Potential mine related visual impacts from Wakefield residences are restricted by natural undulation in the surrounding landform and existing vegetation (cross-section A-D, **Figure 5.18**). As shown in **Plates 5.1 to 5.4**, a natural east-west trending ridgeline dominates the northern outlook for Wakefield residents.

In Year 3, mining is in the closest proximity to Wakefield residents. Due to the presence of a natural east-west trending ridgeline, the visual impact of the proposed mining operations is generally restricted (cross-section A-D, **Figure 5.19**), however, intermittent short term views of pre-mining overburden removal operations on the eastern side of the existing Wakefield Road alignment will result in a colour contrast with the natural landscape. Views of the proposed Wakefield Road realignment, from Wakefield residences, will include construction earthworks that will create colour contrast over a limited length of the landscape. The potential visual effect of these earthworks is moderate and of short duration. These overburden removal and road realignment works will not form a dominant part of the landscape from most residences. The proposed tree screening adjacent to the realigned Wakefield Road and the pit limit (on the eastern side of the existing Wakefield Road alignment) will assist to minimise these short term views.

Topographic variation and established vegetation will generally shield views of the proposed operations from commuters travelling along the proposed Wakefield Road realignment in Year 3 (cross-section E, **Figure 5.19**).

At Year 6, the visual effect of the proposed operations are similar in character to Year 3, with views of the proposed operations from Wakefield residences generally restricted by intervening topography and existing vegetation (refer to cross-sections A-D, **Figure 5.20**). As the proposed mining operations move into the new East Pit, approximately ten Wakefield residences may have intermittent views through intervening vegetation of the active pit area and bare earthworks (refer to cross-sections B and D, **Figure 5.20**). The potential visual effect of these operations from affected Wakefield residences is considered to be moderate, as these works will not form a dominant part of the landscape and will be of relatively short duration with the active pit activities being obscured from view as the overburden removal process proceeds. Rehabilitation of the earthworks associated with the Wakefield Road realignment and planting of screening vegetation will have minimised the potential visual impact of the road realignment from Wakefield residences by that time.

In relation to the proposed Wakefield Road realignment, commuters may have intermittent views, through intervening vegetation of the new East Pit mining area and earthworks (refer to cross-section E, **Figure 5.20**). The visual contrast of these operations on commuters is expected to be high, however, as the length of road from which these views of the mine are available is approximately 1 kilometre, the duration of the viewing period is only approximately 40 seconds, at a car speed of 90 km/hr. These short duration views are not considered to be significant, particularly as open cut mining operations at Westside Mine have been part of the visual landscape since the early 1990s. Consequently, the impact of continued operations on visual amenity for road commuters is not considered to be significant.



#### Legend

— Existing Westside Mine Boundary  
 — Proposed Open Cut Mining Boundary  
 — Development Application Area  
 — Proposed Wakefield Road Realignment  
 Umwelt (Australia) Pty Limited  
 Source: OCAL

— Transect Line  
 ◆ Residences  
 ■ Buildings  
 ■ MCJV Residence  
 — Planned Tree Planting

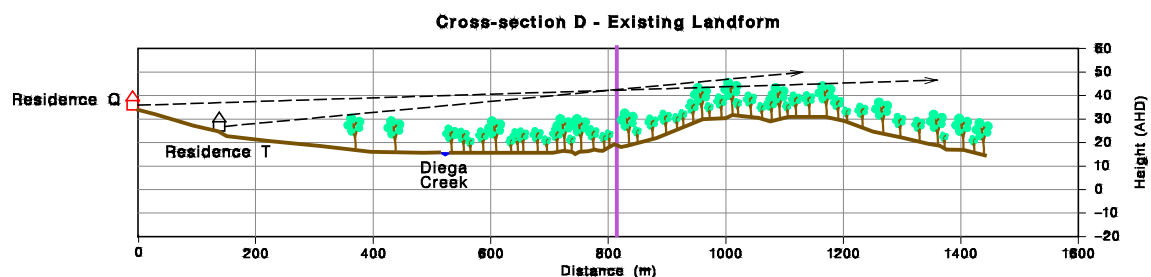
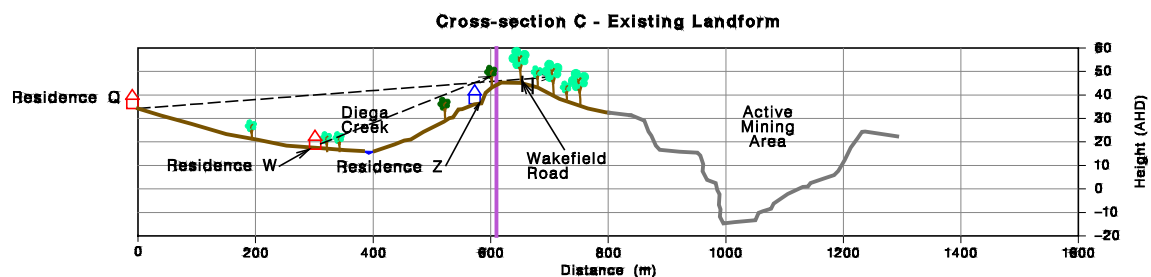
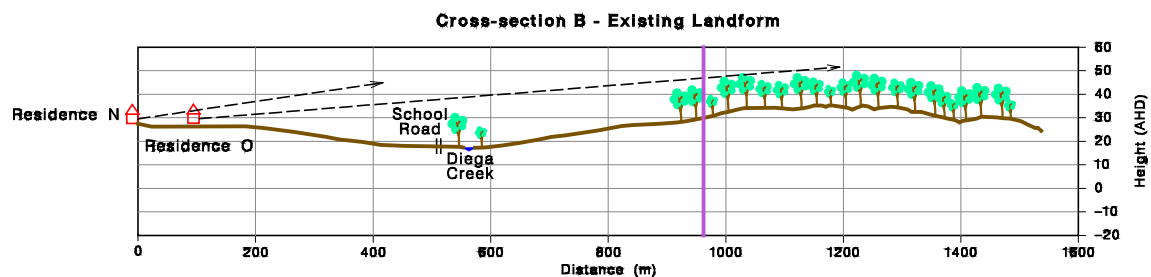
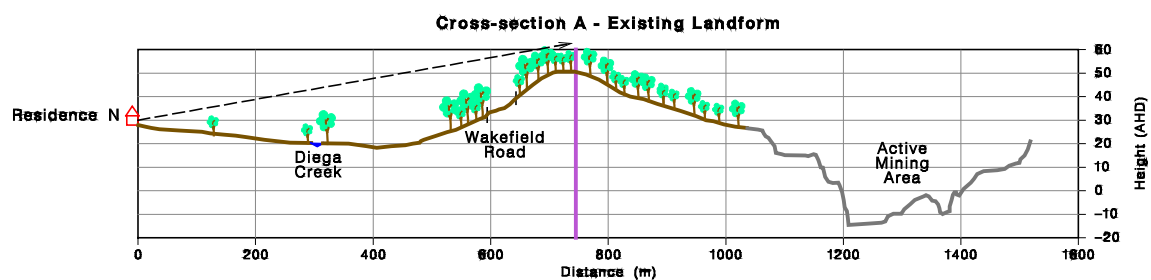
Year 1  
 Year 2  
 Year 3  
 Year 4  
 Year 5  
 Year 6

0 100 250 500m

**FIGURE 5.17**  
Visual Transect Locations

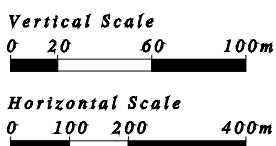
A4 Scale 1:10 000

Ref No.: R02\_V1/1377\_125.dgn



# Legend

- Proposed Open Cut Mining Boundary
- Active Mining Area
- Rehabilitation Area
- △ MCJV Residence
- △ Private Residence
- △ Shed
- Existing Landform within Mining Area
- Existing Vegetation
- Planned Tree Planting



**FIGURE 5.18**  
Visual Transects – Year 1

A3 Scale As Shown

Ref No.:R02\_V1/1377\_115.dgn



**PLATE 5.3**

View from Residence Q of Westside Mine to the north, behind the ridgeline

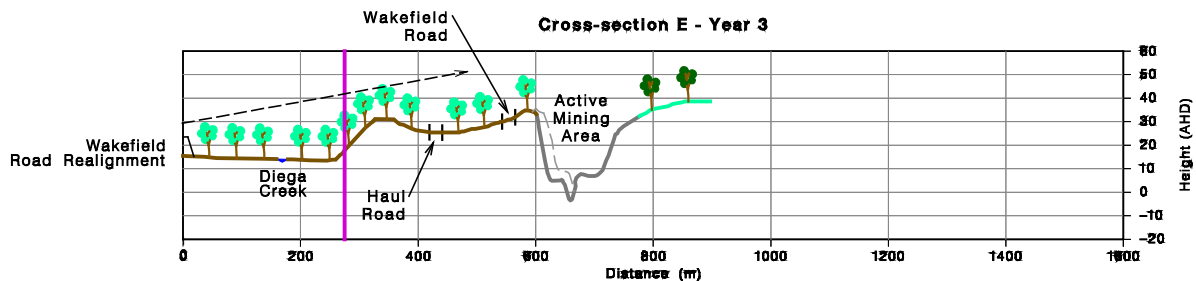
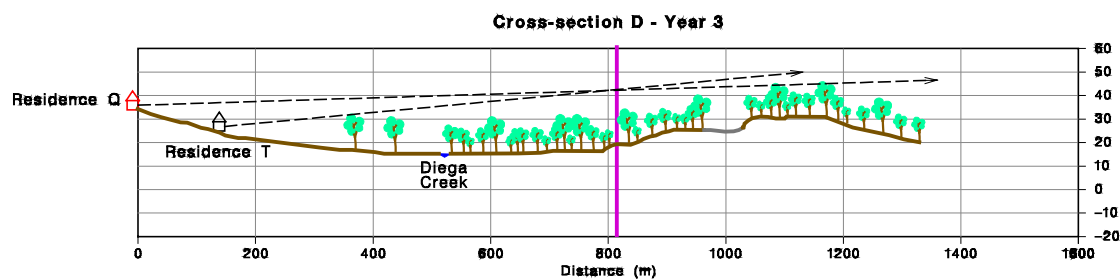
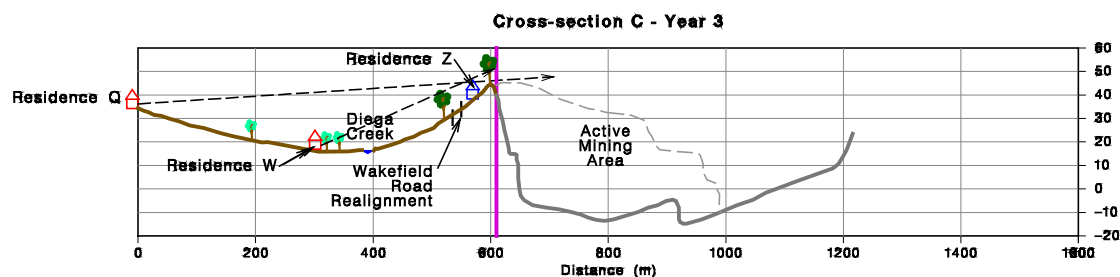
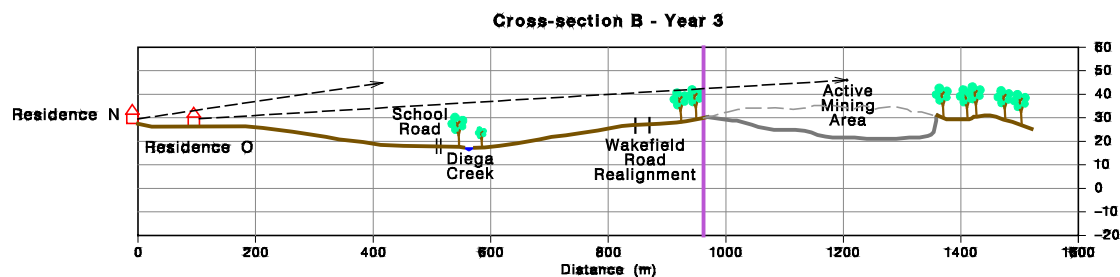
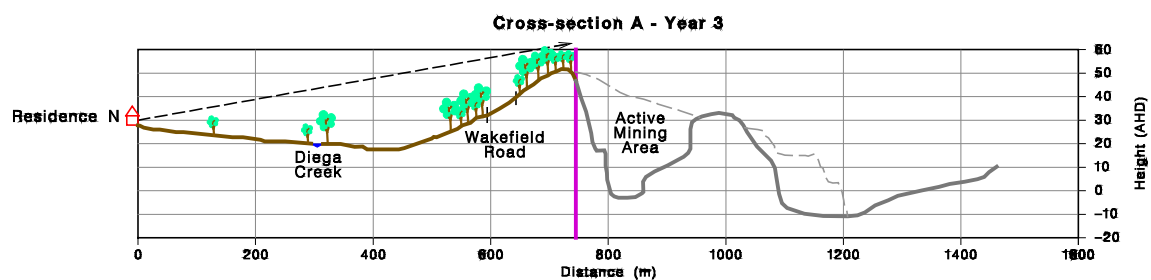


**PLATE 5.4**

View from Residence W of Westside Mine to the north, behind the ridgeline

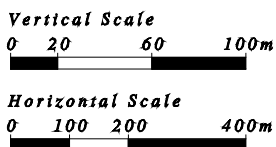
**Legend**

— — — Transect Location (Approximate)



#### Legend

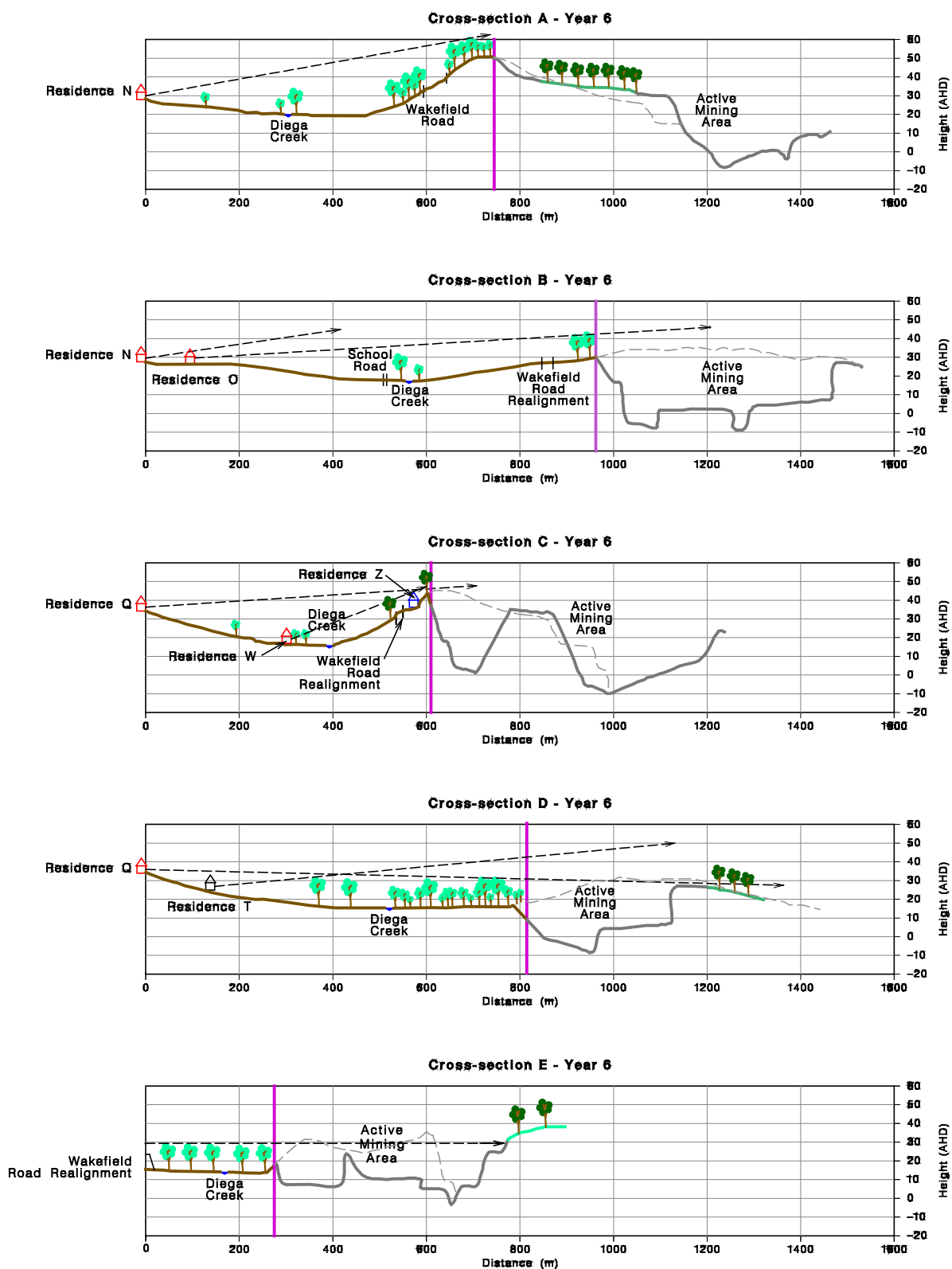
- Proposed Open Cut Mining Boundary
- Active Mining Area
- Rehabilitation Area
- △ MCJV Residence
- △ Private Residence
- △ Shed
- Existing Landform within Mining Area
- Existing Vegetation
- Planned Tree Planting



**FIGURE 5.19**  
Visual Transects - Year 3

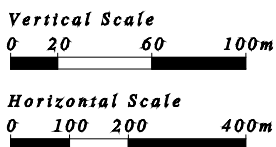
A3 Scale As Shown

Ref No.: R02\_V1/1377\_113.dgn



#### Legend

- Proposed Open Cut Mining Boundary
- Active Mining Area
- Rehabilitation Area
- △ MCJV Residence
- △ Private Residence
- △ Shed
- Existing Landform within Mining Area
- Existing Vegetation
- Planned Tree Planting



**FIGURE 5.20**  
Visual Transects - Year 6

A3 Scale As Shown

Ref No.: R02\_V1/1377\_114.dgn

On completion of operations, the final landform will be revegetated, with consequent representative view of the site as shown on **Figure 5.21**.

### **Mine Lighting**

The visual effect of mine lighting will vary from location to location and with time but will primarily be restricted to only a night glow effect rather than direct lighting impacts. As the proposed mining operations move up to 250 metres to the south of existing operations, the evening lighting effects or glow on nearest residences in Wakefield may be increased. The direct effect of mine lighting, however, will be mitigated by both intervening topography and vegetation. Due to the restricted operating hours of the proposed development (that is normal operations ceasing at 7.00 pm and maximum operating hours being until 10.00 pm), it is not considered that these lighting effects will be significant.

### **5.10.3 Controls and Landscaping**

The potential visual impacts identified in **Section 5.10.2** will be managed through:

- prompt rehabilitation of disturbed areas;
- establishment of a native vegetation screen adjacent to the proposed Wakefield Road realignment, as shown on **Figure 5.18**;
- prioritisation of rehabilitation, focusing effort on areas that are most visually prominent; and
- directing mine lighting plants away from residences, where practicable.

Natural undulations in the surrounding landform and vegetation screens established as part of existing visual mitigation measures provide a shield to residences located to the south of the DA area and commuters travelling along the proposed Wakefield Road realignment.

It is expected that the measures discussed above will reduce the visual impact to acceptable levels, given the existing visual amenity of the area.

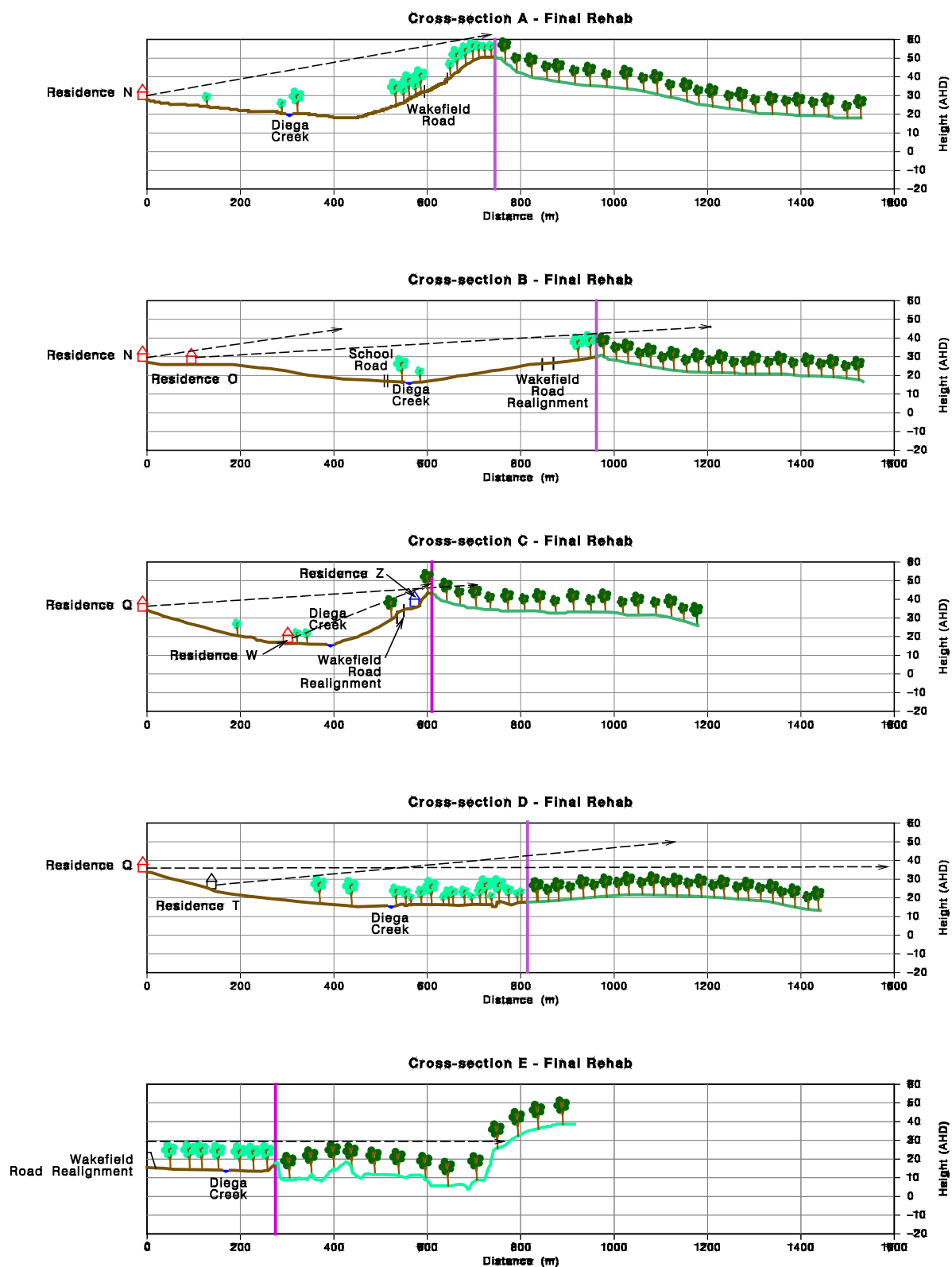
## **5.11 TRANSPORT**

There are a number of major road transport routes and arterial roads as well as a rail network servicing the general locality of Westside Mine. This regional transportation network is illustrated in **Figure 1.1**.

The F3 Freeway traverses rural land to the west of the Killingworth residential area, approximately 1.5 kilometres west of the proposed development area. The F3 Freeway extends from Sydney to Beresfield and provides a major link for traffic between the Hunter Valley, the Central Coast and Sydney.

Access to Westside Mine is via Wakefield Road. Prior to the opening of the F3 Freeway section extending beyond Freemans Waterhole in the early 1990s, Wakefield Road was used as a route from the Freemans Drive Freeway exit to the western suburbs of Newcastle. The F3 Freeway now extends to join the Pacific Highway at Beresfield and has exits at:

- Ryhope leading to Toronto along Awaba Road. Wakefield Road intersects Awaba Road immediately to the east on the Toronto interchange on the F3 Freeway;



#### Legend

- Proposed Open Cut Mining Boundary
- Active Mining Area
- Rehabilitation Area
- △ MCJV Residence
- △ Private Residence
- △ Shed
- Existing Landform within Mining Area
- Existing Vegetation
- Planned Tree Planting

Vertical Scale  
0 20 60 100m

Horizontal Scale  
0 100 200 400m

**FIGURE 5.21**  
Visual Transects - Final Landform

A3 Scale As Shown

Ref No.: R02\_V1/1377\_112.dgn

- West Wallsend leading to Edgeworth along George Booth Drive;
- Seahampton leading to Wallsend along an unnamed connecting road.

The traffic using Wakefield Road to enter the western suburbs of Newcastle is likely to have significantly reduced from previous levels. A mixture of private and commercial vehicles use Wakefield Road when travelling to and from Wakefield, Barnsley and Killingworth or when travelling to and from Teralba via Rhondda Road.

Wakefield Road is approximately 13 kilometres long and extends from Awaba Road near Toronto F3 Freeway interchange in the south, to Barnsley to the northwest. A traffic survey was undertaken on Wakefield Road by LMCC in October 2001 with the survey recording approximately 2410 vehicle movements per day on the road.

Rhondda Road intersects Wakefield Road near the northern boundary of the existing Westside Mine and extends eastwards towards Teralba. It is estimated that Rhondda Road carries less than 800 vehicles/day. The proposed development is not expected to alter traffic volumes on Rhondda Road.

Westside Mine currently has 18 employees. Taking into account employee traffic and deliveries, operation of the mine would generate approximately 50 vehicle movements per day on Wakefield Road with the majority of these being passenger vehicles. This equates to approximately 2% of vehicle movements on Wakefield Road. As discussed in **Section 4.10**, the proposed development may require up to an additional 5 people to be employed. This is expected to generate an additional 5 to 10 passenger car movements per day. This increase in traffic is well within the capacity of Wakefield Road and is not expected to have a detrimental impact on traffic flow or safety.

Product coal from Westside Mine is predominantly hauled to Eraring Power Station via a private haul road. This road passes under Wakefield Road near the mine's entrance and crosses Rhondda Road at an 'at grade' intersection which is located approximately 1.7 kilometres east of the intersection of Wakefield Road and Rhondda Road. At present, on average approximately 4000 tonnes of product coal is transported via the private haul road per day. This equates to approximately 148 laden truck movements. It is proposed that this may increase to on average 185 laden truck movements (5000 tonnes) per day to meet projected increases in production. At peak transport rates, it is estimated that up to 296 laden trucks (8000 tonnes) per day of coal, may be transported along this private haul road. As traffic volumes on Rhondda Road are low (less than 800 vehicles per day). As a result, the potential increase in truck movements is not expected to adversely impact on traffic flow on Rhondda Road with the impacted area being restricted to one 'at grade' intersection.

In the past, up to 50000 tonnes per year (1852 laden truck movements) of coal has been hauled by road to Vales Point Power Station. It is possible that similar volumes may be transported on a campaign basis in the future. The route taken will be via the Newstan private haul road to Awaba Road (using the existing on-ramp) and then via the F3 Freeway to Wyee Road and Rutleys Road. This is the same route as has been approved for Newstan Colliery and has been used in the past for the transport of coal from Westside. Haulage along this route may be undertaken Monday to Saturday. During peak haulage times it is estimated that up to 3000 tonnes of coal per day (110 laden trucks per day) may be hauled along this route from Westside. The most recently available (1995) traffic volumes on Awaba Road were approximately 4289 average annual daily traffic (AADT). The proposed haulage of coal along this route would equate to approximately 0.2% of average annual traffic movements however during times of peak haulage would equate to approximately 2.5% of AADT. From Awaba Road, coal trucks would travel south on the F3 Freeway. The F3 Freeway is a four lane highway with the proposed coal haulage traffic having negligible impact on Freeway traffic volumes.

The truck movements for the return journey will be via Northville Drive and Wakefield Road, north of the mine. As discussed in **Section 5.8**, these truck movements will be restricted to eight per hour whilst travelling this route in order to meet the relevant traffic noise design goal. These traffic levels will not have a significant impact on the traffic flow on these roads. If, in the future, an on-ramp is constructed onto the Newstan private haul road from Awaba Road, this restriction could be lifted and there would be no traffic impact from coal transportation on Northville Drive or the northern section of Wakefield Road. In terms of peak daily traffic and average annual traffic loads the possible continued haulage of coal from Westside to Vales Point Power Station is not expected to adversely impact traffic using Awaba Road or the F3 Freeway.

In accordance with current consent conditions, OCAL currently makes a road maintenance contribution to LMCC for this occasional coal haulage on the Council road system.

### 5.11.1 Proposed Relocation of Roads

As discussed in **Section 4.15** and shown on **Figure 4.3**, in about Year 3 it is proposed to realign approximately 1.2 kilometres of Wakefield Road and move the intersection with Rhondda Road approximately 750 metres to the east of its current location. Design of the proposed road realignment has been undertaken by Geoff Craig & Associates in consultation with LMCC. The road has been designed to have a 10 metre formation width and be surfaced with a two coat seal. Road pavement will have a 20 year design life. The road has been designed for a 90 km/hour speed environment with the sweeping corner being designed for an 80 km/hour speed environment.

The realigned Wakefield Road will result in an extra travelling distance of 0.7 kilometres, resulting in an additional travelling time of 32 seconds for commuters travelling at an average speed of 80 km/hr on this road. As discussed in **Section 4.15.1**, the road realignment and associated intersections have been designed in accordance with Council requirements in order to maintain appropriate safety standards in terms of intersection sight distances and traffic treatments such as turning lanes.

To minimise disruption to traffic it is proposed that the realigned section of Wakefield Road will be fully constructed prior to being opened to traffic. As a result only minor disruptions to traffic using Wakefield Road and Rhondda Road will occur when works are required to connect the road systems. During road construction it will be necessary for heavy earthmoving equipment to cross Rhondda Road on frequent occasions. A Traffic Management Plan outlining appropriate traffic control measures to be implemented will be developed in consultation with LMCC prior to access being required to cross Rhondda Road. As traffic volumes on Rhondda Road are low it is considered that it will be possible for heavy earthmoving equipment to cross Rhondda Road in a safe manner and without unduly disrupting traffic.

## 5.12 UTILITIES AND OTHER SURFACE INFRASTRUCTURE

Public utility infrastructure located within the immediate vicinity of proposed development is restricted to Crown Roads including Wakefield and Rhondda Roads, electricity supply lines and telecommunication cables (refer to **Figure 4.9**).

### 5.12.1 Crown Roads

Approximately 1.2 kilometres of Wakefield Road and 0.3 kilometres of Rhondda Road will be closed as a result of the proposed development. As discussed in **Section 5.11**, it is proposed to realign the affected section of Wakefield Road to the east of its current location,

construct a new intersection and divert Rhondda Road traffic onto the realigned section of Wakefield Road, effectively maintaining this transport corridor between Barnsley and Wakefield.

### 5.12.2 Electricity Supply

The area proposed for continued operations of Westside Mine is currently traversed by 11 kV transmission lines and associated easements (**Figure 4.9**). The 11 kV lines will be relocated to the service corridor adjacent to the proposed Wakefield Road realignment.

The exact alignment of the transmission lines and easement relocation will be determined in consultation with EnergyAustralia, prior to commencement of operations. The relocated transmission lines will be located within areas to be disturbed by construction of the new Wakefield road realignment and consequently there will be no additional impacts on natural flora/fauna and archaeological features of the site.

### 5.12.3 Telecommunication Cables

Several copper network cables currently traverse the proposed development area, servicing residences adjacent to Wakefield Road. The location of these cables is shown in **Figure 4.9**. These copper network cables will be relocated to the east of their current positions, adjacent to the proposed Wakefield Road realignment. The exact location of the network cables will be determined in consultation with Telstra, prior to commencement of the roadworks.

Westside Mine will develop a management protocol in consultation with Telstra, in accordance with standard mining practice, for the protection of telecommunication infrastructure during the mining period. This protocol will include:

- assessment of telecommunication infrastructure prior to mining to establish baseline condition;
- notifying Telstra of the advance mining schedule for each mining pit;
- a monitoring program for assessment of cable damage;
- a schedule for cable repair works, if required; and
- an agreement on remuneration for repair work.

### 5.12.4 Water Supply and Sewerage System

No public water supply or sewerage systems occur within the proposed development area. Town water is supplied to the offices and workshop at Westside via a privately owned supply line that extends from West Wallsend Colliery. Effluent from the site is treated and disposed of on site.

### 5.12.5 Great North Walk

The Great North Walk is a tourist walking trail from Sydney to Newcastle, with a portion located adjacent to the current alignment of Wakefield Road and will be relocated as part of the Wakefield Road realignment. As discussed in **Section 4.15.3**, a designated 1.5 metre walkway will be established adjacent to the realigned road. The Great North Walk Trust, administered by the DLWC, has been consulted regarding this concept and have indicated agreement to such a relocation. The Trust has requested specific further consultation

regarding the final details of the realignment, including signage, and this will be undertaken prior to realignment of Wakefield Road.

## 5.13 HAZARD ASSESSMENT

State Environmental Planning Policy 33 – Hazardous and Offensive Development (SEPP 33) links the permissibility of a proposed industrial development to safety and environmental performance objectives. SEPP 33 applies to any proposals that are considered to be potentially hazardous or potentially offensive industries. As referred to in **Section 2.2.3.2**, continued operation of Westside Mine is not considered to be either potentially hazardous or potentially offensive and therefore SEPP 33 does not apply to that proposal. The justification for that assessment is provided below.

### 5.13.1 Assessment of Potential Hazard

Some materials classed as hazardous will be used during the 7 to 12 year mining operation at Westside Mine. An estimate of the maximum quantity of material that is likely to be stored on site at any time is provided in **Table 5.14**. As none of the screening threshold quantities are exceeded, continued operation of Westside Mine is not considered to be potentially hazardous and therefore SEPP 33 does not apply.

**Table 5.14 - Hazardous Materials to be stored at Westside Mine**

| Dangerous Goods Classification                                            | Hazardous Material               | Mode of Storage                                                                       | Maximum Quantity Stored                           | Distance from Site Boundary (in m)        | Screening Threshold   |
|---------------------------------------------------------------------------|----------------------------------|---------------------------------------------------------------------------------------|---------------------------------------------------|-------------------------------------------|-----------------------|
| <b>CLASS 1: EXPLOSIVES</b>                                                |                                  |                                                                                       |                                                   |                                           |                       |
| 1.1                                                                       | Detonators / primers             | Locked magazines                                                                      | <500 kg primers & <2000 detonators                | Off site Stored at West Wallsend Colliery | Not applicable        |
|                                                                           | Bulk explosives (ANFO/emulsions) | *Not stored on site (in on-road bulk delivery / dispensing trucks on day of use only) | 10 tonne                                          | Varies 50 metres to 800 metres            | Not applicable        |
| <b>CLASS 2: GASES – COMPRESSED, LIQUEFIED OR DISSOLVED UNDER PRESSURE</b> |                                  |                                                                                       |                                                   |                                           |                       |
| 2.1 (flammable gasses)                                                    | Acetylene (dissolved)            | Outside racks or on trolleys                                                          | 4 x G sized cylinders (28 m <sup>3</sup> total)   | 90 metres                                 | > 1000 m <sup>3</sup> |
| 2.2 (non-flammable non-toxic gases)                                       | Argon                            | Outside racks or on trolleys                                                          | 2 x G sized cylinders (17.2 m <sup>3</sup> total) | 90 metres                                 | Excluded              |
|                                                                           | Oxygen                           | Outside on racks or on trolleys                                                       | 3 x G sized cylinders (26.7 m <sup>3</sup> total) | 90 metres                                 | Excluded              |
|                                                                           | Nitrogen                         | Outside racks                                                                         | 2 x G sized cylinders (14 m <sup>3</sup> total)   | 90 metres                                 | Excluded              |

**Table 5.14 - Hazardous Materials to be stored at Westside Mine (cont)**

| Dangerous Goods Classification                           | Hazardous Material           | Mode of Storage                    | Maximum Quantity Stored     | Distance from Site Boundary (in m) | Screening Threshold             |
|----------------------------------------------------------|------------------------------|------------------------------------|-----------------------------|------------------------------------|---------------------------------|
| <b>CLASS 3: FLAMMABLE LIQUIDS</b>                        |                              |                                    |                             |                                    |                                 |
| C1 (combustible liquids with flashpoint <150°C)          | Diesel                       | Bulk storage tanks                 | (60000 L) 60 m <sup>3</sup> | 50 metres                          | Excluded                        |
|                                                          | Unleaded petrol              | 20 L drum                          | 20 L                        | 90 metres                          | Excluded                        |
| C1 (combustible liquids with flashpoint <150°C)          | Bulk Grease                  | Bulk tanks and drums in Oil Bund   | (2000 L) 2 m <sup>3</sup>   | 100 metres                         | Excluded                        |
|                                                          | Degreaser                    | Drums                              | (1000 L) 1 m <sup>3</sup>   | 100 metres                         | Excluded                        |
|                                                          | Lubricating Oil              | Bulk tanks and drums               | (12000 L) 12 m <sup>3</sup> | 100 metres                         | Excluded                        |
| <b>CLASS 5: OXIDISING AGENTS &amp; ORGANIC PEROXIDES</b> |                              |                                    |                             |                                    |                                 |
| 5.1                                                      | Calcium hypochlorite tablets | Drum in external store             | 1 x 10 L drum               | 80 metres                          | 5 tonnes                        |
| <b>CLASS 7: RADIOACTIVE SUBSTANCES</b>                   |                              |                                    |                             |                                    |                                 |
| Radioisotopes                                            | Am241                        | Enclosed within MCI Coalscan Gauge | 11.1 GBq                    | 100 metres                         | Compliance with Australian Code |
|                                                          | Cs 37                        |                                    | 0.74 GBq                    | 100 metres                         | Compliance with Australian Code |

### 5.13.2 Assessment of Potential Offensiveness

In determining whether a proposed development is potentially offensive, the Department of Planning (1994), now PlanningNSW, recommends that the matters below be considered:

- *Does the proposal require a licence under any pollution control legislation administered by the Environment Protection Authority? If so, the proposal should be considered to be potentially offensive.*
- *Does the proposal require any pollution control approval pursuant to any legislation or by-laws administered by council?*
- *If such a pollution control licence is not required, does the proposal cause offence having regard to the sensitivity of the receiving environment?*

As the proposed continuation of mining operations at Westside Mine will operate under the existing environment protection licence (EPL) (No. 004033), it may be considered to be potentially offensive. However, Department of Planning (1994) states that “Typically, the level of offence would not be considered significant if relevant EPA licences can be obtained”. There will be no substantial change to the nature of the existing licensed activities. On this basis, it is considered that the relevant EPA licence can be obtained and therefore the project is not considered to be an offensive industry.

## **5.14 GREENHOUSE EMISSIONS AND ENERGY CONSERVATION**

### **5.14.1 Background**

Greenhouse gases (carbon dioxide, methane, nitrous oxide, chlorofluorocarbons and ozone) are natural components of the lower atmosphere, which act to absorb the harmful short wavelength, high-energy solar rays, let in the visible light and prevent the loss of some of the long wavelength, outgoing energy, effectively regulating the temperature of the Earth. The greenhouse effect, however, is the gradual raising of the air temperature in the lower atmosphere believed to be a result of the accumulation of greenhouse gases.

A number of anthropogenic activities, such as the combustion of fossil fuels (eg coal, oil, petroleum, wood), industry and agriculture release greenhouse gases, while other activities such as clearing of vegetation and pollution of oceans reduce the number of organisms available to consume greenhouse gases, effectively contributing to the greenhouse effect.

In 1990, the Intergovernmental Panel on Climate Change determined that these anthropogenic activities were accelerating the release and accumulation of greenhouse gases to the extent that a global change in the Earth's climate is likely to occur. This conclusion was partly based on evidence that the atmospheric concentration of carbon dioxide is higher now than it has been for that last 150000 years. The associated change in global climate may lead to extreme, unpredictable weather patterns, sea level rise, and alteration of climatic regions, agricultural regions and ocean currents.

### **5.14.2 Policy Framework**

Concern regarding global climate change as the result of the greenhouse effect led to the formulation of the United Nations Framework Convention on Climate Change. The objective of this commission is to reduce greenhouse emissions and stabilise atmospheric concentrations of greenhouse gases at a level that would not interfere with the global climate (ABARE, 1998).

The Commonwealth government National Greenhouse Response Strategy (1992) details Australia's commitment to the reduction of greenhouse gas emissions. As part of this strategy, the Commonwealth government developed a National Greenhouse Gas Inventory and the Greenhouse Challenge Program, which is a co-operative initiative between industry and government to reduce emissions through improved energy process and activity efficiencies.

### **5.14.3 Greenhouse Gas Emissions from Coal Mining**

As part of its commitments under the United Nations Framework Convention on Climate Change, Australia produces an annual inventory of national greenhouse gas emissions. The latest report on Australia's greenhouse emissions are provided in the 1999 inventory (released in April 2001).

Methane is the only greenhouse gas that is considered to be directly produced from mining coal. Methane, naturally present in coal seams, is liberated from the uncovering, excavation, preparation and stockpiling of coal. In addition, carbon dioxide is indirectly generated from mining coal by plant, equipment and materials used in mining activities. Carbon dioxide emissions result from electricity and diesel fuel consumption, the use of explosives and spontaneous combustion of stockpiled coal.

Further, open cut mining activities result in vegetation clearing which in turn reduces the capacity of carbon dioxide sinks available to absorb greenhouse gases.

#### 5.14.4 Greenhouse Gas Emissions from Westside Mine

Detailed assessment of potential greenhouse emissions for the proposed development is provided in **Appendix 8**.

Apart from carbon dioxide, there will be emissions of other greenhouse gases such as carbon monoxide and nitrogen oxides and non-methane volatile organic compounds etc. However these are not currently included in the Australian Greenhouse Offices National Aggregated Inventory. Other gases such as those used in air-cooling etc will be used in sealed systems and recycled to the maximum extent possible. Carbon dioxide will be the only significant greenhouse gas emitted by the project.

In summary, the approximate total carbon dioxide emissions over the life of the project are estimated to be:

- 881 tonnes attributable to electrical energy;
- 25882 tonnes due to combustion of diesel in mobile plant; and
- 0.4 tonnes attributable to the use of petrol.

The total is 26763 tonnes over the seven to twelve year life of the project, or an average of 3840 tonnes per year assuming a seven year life.

In addition, exposed coal seams will release methane to the atmosphere. Methane emissions from open cut mining are not accurately known, but the effective carbon emitted via methane emissions is believed to be minor compared with the emissions from the combustion of the coal and the other sources considered above.

The combustion of the coal product by customers will result in the release of carbon dioxide, which will add to the quantity of carbon in the atmosphere. This is the largest contributor to greenhouse emissions that will occur as a result of the project. The customers of the mine have the capacity to add in the order of a maximum of 4.59 Mt of carbon to the atmosphere as a result of combustion of the coal produced for the life of the project. This is a conservatively high estimate that does not allow for the ash content of the coal.

Finally, the estimated annual average carbon dioxide emission rate of 0.00384 Mt can be compared with the 458.2 Mt carbon dioxide equivalent estimated by Environment Australia to have been produced by Australia in 1999 (excluding land clearing). The greenhouse gas emissions from Westside Mine (excluding the emissions when customers burn the coal) are estimated to be 0.00083% of Australia's 1999 emissions.

Since energy consumption is a significant cost in mining, the mine plan is designed to achieve minimum fuel consumption compatible with efficient operation of the mine and efficient use of capital. Thus measures to minimise emissions are an integral part of the mine plan. For example, the mine plan includes a new internal haul road to reduce haulage distances and consequent greenhouse emissions.

#### 5.14.5 Energy Balance

An energy balance is a comparison of the energy used in coal production to the potential energy produced by making coal available for various end uses.

Estimates of the energy use for the existing and proposed operations are provided in **Table 5.15**, based on an average future production of 0.8 Mt/annum.

**Table 5.15 - Existing and Proposed Westside Mine Energy Balance**

| ENERGY USE/YEAR                   | Existing Westside Mine Operations | Proposed Westside Mine Operations |
|-----------------------------------|-----------------------------------|-----------------------------------|
| Electricity (MWh)                 | 365                               | 487                               |
| (GJ)                              | 1,314                             | 1,753                             |
| Diesel and Petroleum (kL)         | 1,555                             | 2,073                             |
| (GJ)                              | 60,036                            | 80,018                            |
| <b>Total Use (GJ)</b>             | <b>61,350</b>                     | <b>81,771</b>                     |
| <b>ENERGY PRODUCTION / YEAR</b>   |                                   |                                   |
| Clean Coal Production (tonnes)    | 600,000                           | 800,000                           |
| Coal Energy Production (GJ)       | 13,080,000                        | 17,440,000                        |
| <b>Net Energy Production (GJ)</b> | <b>13,018,650</b>                 | <b>17,358,229</b>                 |

Source: Westside Mine (2002)

Conversion factors of 21.8 MJ/kg for coal and 3.6 GJ/GWh, 38.6 GJ/kL and 34.2 GJ/kL have been used for electricity, diesel and petrol, respectively.

These calculations demonstrate that future increased production from Westside Mine will increase the net energy production from in the order of 13 million GJ/year up to an average of 17.4 million GJ/year.

#### 5.14.6 Energy Conservation and Greenhouse Gas Emission Reduction Strategies

Westside Mine's estimated contribution to Australia's net greenhouse gas emissions is predicted to be relatively small, however, coal mining and the burning of coal as fuel is not compatible with reducing carbon dioxide concentrations in the atmosphere. In order to reduce the greenhouse emissions generated by the mine as far as practicable, Westside Mine must ensure that the mine operates in the most efficient manner possible.

Initiatives that will be applied to reduce greenhouse gas emissions during continued mining operations include measures such as the following to contribute to continual improvement:

- minimising energy consumption per unit of production;
- minimising fossil fuel consumption by regular servicing and maintenance of mining equipment and site vehicles;
- optimising the number and depth of blast holes reducing both the quantity of explosives and greenhouse gas produced;
- progressive rehabilitation making a positive contribution to reduction of total greenhouse gas emissions through carbon sequestration; and
- establishment of woodlands on rehabilitated mining areas which will also serve as a sink for carbon dioxide.

Westside Mine is committed to continual improvement in greenhouse gas abatement and energy efficiency at Westside Mine. Measures to maximise energy conservation and minimise greenhouse gas emissions will be investigated and implemented as appropriate during continued operations, including:

- providing and reporting energy efficiency;
- setting and reviewing energy efficiency targets;
- implementing cost effective measures to improve energy efficiency;
- integrating energy management into operation and maintenance procedures;
- evaluating energy implications in equipment purchasing, repair and plant/mine design decisions;
- ensuring personnel are provided with appropriate training to improve energy management in their duties; and
- periodically auditing progress and taking any necessary remedial action.

## 5.15 WASTE MANAGEMENT

Waste streams likely to be generated by the proposed development include:

- oil and grease;
- fuel and oil filters;
- tyres;
- batteries;
- scrap metal;
- paper and cardboard;
- sewage; and
- domestic waste.

All of these waste streams will be managed using the existing Westside Mine waste disposal practices, incorporating waste separation, reuse, recycling or reprocessing, as outlined below. These practices will minimise waste disposal to landfill and ensure that Westside Mine land is not contaminated by waste disposal activities.

### 5.15.1 Oil and Grease

As described in **Section 4.14**, waste oil will be stored in an underground tank for periodic removal by an oil recycling contractor. Rainfall runoff from the workshop washdown area and oil dispensing area will be reticulated via grit traps to a first flush holding tank prior to controlled flow through an oil/water separator. Oil collected from this separator is transferred to the waste oil holding tank.

### 5.15.2 Fuel and Oil Filters

All fuel and oil filters generated during the proposed operations will be collected and periodically removed by a licensed operator for recycling.

### **5.15.3 Tyres**

The existing tyre management system involves tyres being disposed of in the open cut pit, in accordance with relevant EPA guidelines. It is proposed that this practice will continue for the life of the operation. Some worn out tyres may be used to assist in delineating haul roads in the mine.

### **5.15.4 Batteries**

Batteries will be stored at the workshop and periodically removed by a licensed contractor for recycling.

### **5.15.5 Scrap Metal**

Any scrap metal generated during the proposed operations will be collected and stored in a bin located at the workshop. This bin will be periodically emptied by a licensed recycling contractor.

### **5.15.6 Paper and Cardboard**

Paper and cardboard will be collected in a bin located at the workshop. A licensed recycling contractor will periodically empty this bin.

### **5.15.7 Sewage**

The existing onsite envirocycle-type plant will continue to be used for sewage treatment. The resultant clear effluent will be chlorinated and used for irrigation purposes. Any runoff from the irrigated area will be collected in a dam along with rainfall runoff and stored for use in the coal crushing plant dust suppression sprays.

### **5.15.8 Domestic Waste**

All domestic waste generated onsite will be collected by a waste disposal contractor for disposal at an approved Council landfill site.

## **5.16 SOCIO-ECONOMICS**

### **5.16.1 Regional Profile**

#### **5.16.1.1 Population Statistics and Trends**

The City of Lake Macquarie with a population of 180826 (LMCC 2001), is the largest City in the Hunter and the fifth largest City in New South Wales. The City is strategically positioned 1.5 hours north of central Sydney, 20 minutes from the regional capital of Newcastle and 40 minutes from Hunter Wine Country and the Central Coast.

Lake Macquarie LGA has experienced moderate and steady population growth in the past two decades, with a growth rate of 1.12% and 1.05% per annum for the 1986/1991 and 1991/1996 census periods respectively (**Table 5.16**). This growth rate is similar to the State average of 1.22% and 1.07% per annum for the same periods. In contrast to this pattern, the rate of growth in the Hunter Region has slowed from 1.51% per annum between 1986-1991 to 0.32% per annum between 1991-1996 (Australian Bureau of Statistics, 1996).

Population projections prepared by the Department of Planning, show that the population of Lake Macquarie LGA is expected to reach 197200 in 2011 and 207800 in 2021, based on medium level population projections (**Table 5.16**). Lake Macquarie, already over 180000 and very conveniently located between Sydney and Newcastle, is likely to reach over 200000 by 2016 thus overtaking Wollongong as the largest non-metropolitan area in NSW (Department of Planning, 1994).

**Table 5.16 – Population Change in Lake Macquarie LGA, Hunter Statistical Division and NSW**

|                    | Estimated Resident Population |         |         | Population Prediction based on Medium Level Population Growth |         |         |         |         |
|--------------------|-------------------------------|---------|---------|---------------------------------------------------------------|---------|---------|---------|---------|
|                    | 1986                          | 1991    | 1996    | 2001                                                          | 2006    | 2011    | 2016    | 2021    |
| Lake Macquarie LGA | 153540                        | 162026  | 170495  | 185000                                                        | 191400  | 197200  | 202600  | 207800  |
| Hunter SD          | 494690                        | 531965  | 540491  | 590000                                                        | 615900  | 640100  | 663800  | 687300  |
| New South Wales    | 5401881                       | 5731906 | 6038696 | 6483600                                                       | 6750400 | 6994000 | 7225300 | 7450600 |

Source: Australian Bureau of Statistics, 1986,1991 and 1996 and Department of Planning, 1994.

The Lake Macquarie LGA has a relatively mature age structure consistent with Hunter and NSW trends (**Table 5.17**). The median age of the Lake Macquarie LGA population is 35 years, slightly higher than the State median of 34 years. The age structure also shows a high proportion of school aged children (5-19 years) and a higher than State average proportion of people aged 50 and over.

**Table 5.17 – Age Profile of Lake Macquarie LGA, Hunter and NSW**

| Age Group        | Lake Macquarie | Lake Macquarie % | Hunter        | Hunter %     | NSW            | NSW %        |
|------------------|----------------|------------------|---------------|--------------|----------------|--------------|
| 0-4              | 12136          | 7.1              | 38648         | 7.2          | 427690         | 7.1          |
| 5-9              | 12719          | 7.5              | 39992         | 7.4          | 430329         | 7.1          |
| 10-19            | 25247          | 14.8             | 76188         | 14.1         | 840287         | 14.0         |
| 20-49            | 71013          | 41.7             | 229950        | 42.5         | 2689051        | 44.5         |
| 50-64            | 25487          | 14.9             | 77005         | 14.2         | 845286         | 14.0         |
| Over 65          | 23537          | 13.8             | 77375         | 14.3         | 762902         | 12.6         |
| Overseas visitor | 356            | 0.2              | 1333          | 0.2          | 43151          | 0.7          |
| <b>Total</b>     | <b>170495</b>  | <b>100.0</b>     | <b>540491</b> | <b>100.0</b> | <b>6038696</b> | <b>100.0</b> |

Source: Australian Bureau of Statistics, 1996, Basic Community Profiles

#### 5.16.1.2 Economic Activity

From its beginnings as a natural resource base in the mid 1800s, Lake Macquarie has developed into a major hub for the small to medium business sector, dominating employment growth in the Lower Hunter over the past 15 years. The City currently accommodates in excess of 7000 businesses, houses a workforce of 90000 and provides over 60000 jobs ([www.lakemac.com.au/](http://www.lakemac.com.au/), accessed 16/10/01). Coal mining represents one of the major industries within Lake Macquarie with eight coal mines currently operating in the LGA. Tourism, however, is the major growth industry within the City, generating \$193 million annually.

The occupational status of the labour force shows that the highest proportions of the workforce are employed in the retail trade (16.42%), manufacturing (13.49%) and health and community services (11.19%) (**Table 5.18**). The dominance of the retail trade sector is in line with regional and Statewide trends in this industry, as the overall value of the tertiary industry increases. Hunter area health is the largest employer in the Hunter Valley, therefore the high level of participation in this sector reflects Lake Macquarie's position as a regional centre for health services. Lake Macquarie's high representation in the manufacturing sector represents the lower Hunters continued involvement in manufacturing and associated industries, despite the Statewide trend away from this sector.

The mining sector provides approximately 3.3% of the employment base in the Lake Macquarie area, significantly higher than the State workforce participation of 0.84% (**Table 5.18**). This reflects the location of one of the main coal producing regions of the Newcastle Coalfield within Lake Macquarie and also the number of coal mine employees that reside in the Lake Macquarie area and commute to coal mines in other LGAs within the Hunter.

**Table 5.18 – Employment Sectors in Lake Macquarie LGA, the Hunter and NSW**

| Industry                            | Lake Macquarie |            | Hunter     |            | New South Wales |            |
|-------------------------------------|----------------|------------|------------|------------|-----------------|------------|
|                                     | 1991           | 1996       | 1991       | 1996       | 1991            | 1996       |
| Agriculture, Forestry & Fishing     | 0.57           | 0.63       | 3.44       | 3.13       | 3.94            | 3.60       |
| Mining                              | 4.44           | 3.32       | 4.99       | 4.40       | 0.99            | 0.84       |
| Manufacturing                       | 13.75          | 13.49      | 13.38      | 12.99      | 12.77           | 12.19      |
| Electricity, Gas & Water Supply     | 2.57           | 1.77       | 2.40       | 1.59       | 1.42            | 0.86       |
| Construction                        | 8.24           | 7.88       | 7.19       | 6.86       | 6.19            | 6.39       |
| Wholesale Trade                     | 5.53           | 5.41       | 5.02       | 5.02       | 6.45            | 6.25       |
| Retail Trade                        | 15.00          | 16.42      | 13.92      | 15.08      | 12.80           | 13.34      |
| Accommodation, Cafes & Restaurants  | 3.74           | 3.95       | 4.49       | 5.10       | 4.34            | 4.95       |
| Transport & Storage                 | 4.64           | 4.20       | 4.26       | 4.07       | 4.92            | 4.73       |
| Communication Services              | 1.20           | 1.34       | 1.18       | 1.22       | 1.73            | 2.10       |
| Finance & Insurance                 | 3.57           | 3.29       | 3.08       | 2.81       | 5.16            | 4.76       |
| Property & Business Services        | 6.34           | 8.04       | 6.02       | 7.80       | 8.19            | 10.62      |
| Government Administration & Defence | 3.79           | 3.57       | 4.95       | 4.72       | 5.03            | 4.30       |
| Education                           | 7.31           | 7.65       | 6.43       | 6.93       | 6.29            | 6.78       |
| Health & Community Services         | 9.12           | 11.19      | 8.82       | 10.41      | 8.09            | 9.32       |
| Cultural & Recreational Services    | 1.13           | 1.54       | 1.23       | 1.67       | 1.75            | 2.33       |
| Personal & Other Services           | 3.09           | 3.58       | 2.96       | 3.41       | 3.20            | 3.57       |
| Non-classifiable Economic Units     | 0.20           | 1.34       | 0.21       | 1.28       | 0.30            | 1.32       |
| Not Stated                          | 5.77           | 1.42       | 6.02       | 1.51       | 6.44            | 1.74       |
| <b>Total</b>                        | <b>100</b>     | <b>100</b> | <b>100</b> | <b>100</b> | <b>100</b>      | <b>100</b> |

Source: Australian Bureau of Statistics, 1996

## 5.16.2 Social and Economic Impact Assessment

### 5.16.2.1 Profile of Westside Mine Employees

There are 18 employees involved in the operation of Westside Mine. The occupational categories and the numbers of employees are shown below:

|                       |           |
|-----------------------|-----------|
| Senior Staff (OCAL)   | 3         |
| Open-cut Examiner     | 1         |
| Mechanical Engineer   | 1         |
| Engineering Employees | 3         |
| Production Employees  | 10        |
| <u>Total</u>          | <u>18</u> |

The majority of employees live in Lake Macquarie, with personnel also residing in Maitland, Cessnock, Newcastle and Wyong LGAs.

In addition to full time employment for 18 personnel, Westside Mine employs an average of 12 contract truck drivers. It is estimated that these direct employees contribute to approximately 60 indirect jobs in the local community.

### 5.16.2.2 Economic Impacts

The most significant economic impact resulting from the continuation of mining at Westside is the continuation of employment for 18 employees and 12 contract truck driver employees, with the potential for up to 5 further jobs at full production. The continuation of employment for up to 35 personnel for the 7 to 12 year life of the mine extension will have significant flow on effects in the local community.

Coal mining in New South Wales generated \$3.1 billion in export earning for New South Wales in 1999-2000 from the sale of 72.4 Mt of high grade thermal and metallurgic coals (DMR, 2001). These export earnings contribute significantly to the public sector through a range of taxes, excises and charges.

The Federal Government will receive increased revenue as a result of the proposed modifications to Westside Mine in the form of company tax, excise on imported equipment and goods, fuel excise and other assorted taxes such as the Goods and Services Tax and income tax.

The State Government can expect economic benefits from the expansion of the mine, with additional revenue including payroll tax and a number of other taxes, royalties on coal mined and payments for services from statutory bodies.

The Local Government receives financial returns from rates and charges paid by the company, company employees and by other people attracted to the area as a result of the flow on effects of employment as a result of the mining industry.

### 5.16.2.3 Social Impacts

The extension of mining at Westside Mine will provide continued employment for up to 35 personnel for a further 7-12 years. The social impact of the continuation of employment is in the maintenance of employees' current lifestyle.

The proposed development will not have a significant social impact on the local community in terms of workforce needs, as the requirement for a maximum of 5 additional personnel is

not a significant addition to the workforce. As a result there will be no impact on social infrastructure such as education and recreational services and similarly there will be no housing and accommodation impacts within the local area or Lake Macquarie as a whole.

Community consultation conducted as part of the environmental impact assessment process outlined a variety of concerns regarding the environmental impacts of the proposal on the health and amenity of the local residents (refer to **Section 1.6**) consistently throughout the consultation process. These matters have been addressed in detail in the EIS, with extensive controls in place, including a major reduction to the initially proposed mine plan area, in order to minimise impacts on the local community.

The potential for devaluation of property values in Wakefield and an alteration of social amenity and lifestyle due to the proposed proximity of the mine and buyout of properties in the zone of affectation, is also an issue of concern to the local community. OCAL has addressed this concern by ensuring that all property acquisition is at current market value determined without consideration of the potential existence of the Westside Mine Southern Extension. The extensive controls will also assist in maintaining the lifestyle and social amenity for the Wakefield community.

As part of the initial establishment of Westside Mine, a contribution was made to the establishment of a new fire station at Killingworth. As discussed with members of the Wakefield community, OCAL would consider a similar type of contribution to community facilities at Wakefield.

## **5.17 BUSHFIRE HAZARD ASSESSMENT**

### **5.17.1 Method of Assessment**

The bushfire hazard potential of the site has been assessed in accordance with the Department of Planning Circular No. C10 Planning in Fire Prone Areas (1984). This assessment provides an indication of the long term fire hazard and does not consider the variability of fuel due to management, time since last fire or day to day climatic effects. The assessment assumes that there has been little or no hazard reduction management, the vegetation carries maximum fuel load and the fire danger is extreme.

### **5.17.2 Bushfire Hazard Assessment**

In determining the bushfire hazard of the site, the following factors were considered:

#### **State Fire Zone**

Westside Mine is located in the Eastern fire zone. In this fire zone, forest and shrub fires predominate and the main fire season is from September or October through to January or February (Luke and McArthur, 1978).

#### **Land Units**

Four land units occur at Westside Mine. Land units comprise open forests on slopes ranging from 4 to 11%; previously mined areas on slopes of 3 to 10%; swamp forest on 10 to 25% slopes and grassland communities on slopes of approximately 18%. All land units will be partially removed during mining operations. Previously mined areas have been classified as woodland for the purposes of the bushfire assessment due to the immature nature of the vegetation, the lack of fuel within the community combined with a limited prospect for fuel production due to the predominance of shrub vegetation and lack of overstorey species.

## Rating of Fire Hazard

The fire hazard rating is the product of the vegetation hazard index and the slope index as shown in **Table 5.19**.

**Table 5.19 - Calculation of Fire Hazard Rating**

| Slope (%) | Slope Index | Open Forest Hazard Index | Open Forest Fire Hazard Rating | Woodland Fire Hazard Index | Woodland Fire Hazard Rating | Swamp Forest Hazard Index | Swamp Forest Fire Hazard Rating | Grassland Hazard Index | Grassland Fire Hazard Rating |
|-----------|-------------|--------------------------|--------------------------------|----------------------------|-----------------------------|---------------------------|---------------------------------|------------------------|------------------------------|
| 0 - 5     | 1           | 2.8                      | 2.8                            | 0.43                       | 0.65                        | 0.95                      | 0.95                            | 1.65                   | 1.65                         |
| 5 - 10    | 1.5         | 2.8                      | 4.2                            | 0.43                       | 0.86                        | 0.95                      | 1.43                            | 1.65                   | 2.48                         |
| 10 - 20   | 2           | 2.8                      | 5.6                            | 0.43                       | 1.29                        | 0.95                      | 1.9                             | 1.65                   | 3.30                         |
| 20-30     | 3           | 2.8                      | N/a                            | 0.43                       | N/a                         | 0.95                      | 2.85                            | 1.65                   | N/a                          |
|           |             |                          | HIGH                           |                            | LOW                         |                           | MEDIUM                          |                        | MEDIUM                       |

As shown in **Table 5.19**, grassland communities on slopes up to 18% and swamp forest communities on slopes of up to 30% are considered to constitute a medium fire hazard.

The fire hazard rating for open forest areas on slopes of 0 to 20% is higher, and ranges from 2.8 to 5.6. This rating is considered to constitute a high hazard rating.

Regenerating communities which have been classified under the woodland fire hazard rating, are considered to provide a low fire hazard rating on slopes up to 10%, and a medium hazard for slopes between 10 and 20%.

The fire hazard rating for woodland is higher, ranging from 1.65 to 3.30, depending on the slope. These values indicate a medium fire hazard.

Continued mining is not expected to increase the fire hazard in the locality, as areas will be disturbed and rehabilitated progressively, with similar areas of pasture and woodland available to fuel fires at any given time. Due to its nature as a mine site, emergency preparedness is high and fire-fighting equipment is always on hand during the life of the operation. As a consequence, continued operation of Westside Mine is considered not to significantly increase the risk of bushfire in the surrounding area.

## 5.18 CUMULATIVE IMPACT ASSESSMENT

Potential cumulative impacts associated with many aspects of the proposed continued mining operations at Westside Mine have been considered in the environmental impact analysis and assessment presented earlier in this section. This section synthesises this information whilst also assessing potential cumulative impacts associated with interaction of the proposed development with other surrounding existing or proposed activities.

### 5.18.1 Hydrology and Water Quality

The current and proposed mining areas are located adjacent to Cockle Creek and Diega Creek drainage lines. The layout of the mining area has been designed to ensure flows in these creeks are not significantly altered from the existing flow regime in terms of catchment yield, or flow frequency. Development of the on-site water management system and

provision of significant storage volumes on-site has resulted in treated water being discharged from the site during periods when Cockle Creek would otherwise not be flowing.

The proposed extension to mining and associated reshaping of the final landform, will result in minor transfer of catchment area from Cockle Creek catchment to Diega Creek catchment once the final landform is achieved. This 5 hectare transfer of catchment area will only affect Cockle Creek and Diega Creek catchments upstream of the junction of the two the creeks. At this point both creeks have catchment areas in excess of 1000 hectares resulting in a less than a 0.5% change in catchment area. This minor transfer of catchment will not alter the overall catchment area of Cockle Creek downstream of its confluence with Diega Creek. The minor potential increases in catchment runoff as a result of the 5 hectare increase in Diega Creek catchment will be offset through the construction of Sedimentation Dams L, M, N and O. Peak discharges in Diega Creek will also be reduced through the proposed construction of two new culverts over Diega Creek as part of the realignment of Wakefield Road. Construction of the culverts and road will act to temporarily retard flows in Diega Creek and hence will assist in attenuating significant flows in the creek system.

Extension of mining in South Pit and into East Pit will be accompanied by ongoing rehabilitation of the existing mining areas. It is anticipated that the total area of disturbed and unrehabilitated land will reduce from approximately 42 hectares to approximately 36 hectares at completion of mining with final rehabilitation of the site expected to be completed within two years of cessation of mining. During the rehabilitation period, runoff from disturbed areas will be serviced by the water management system for the mine as described in **Section 5.5**. The water management system will minimise sediment generation from the site and ensure that the flow regimes of these sections of Cockle Creek and Diega Creek are not significantly altered.

As discussed in **Section 5.5.6**, monitoring for the 2000/2001 period has demonstrated that the existing water management system for the mine readily complies with licensed discharge conditions. The existing water management system is to be maintained and extended to service the continued mining operations, with the extended system having significant excess capacity to service water management needs. On this basis it is considered that extension of the mine as proposed can be undertaken without adversely impacting on water quality or water quantity in the Cockle Creek and Diega Creek systems.

The proposed mining operation has negligible potential to adversely impact the groundwater regime of the surrounding area. As discussed in **Section 5.5**, groundwater resources in the area comprise low permeability alluvial deposits along Cockle Creek and Diega Creek floodplains, groundwater within the Fassifern and Great Northern seams, and mine water stored in old underground workings within the Great Northern seam. The majority of these old workings have now been subsequently re-mined as part of current operations, with significant dewatering of the remaining area already having taken place.

### 5.18.2 Noise and Dust

Potential noise and dust impacts associated with the proposed development have been assessed in **Sections 5.7** and **5.8**. The methodology for assessment of future noise and dust levels is based on consideration of existing background levels. Therefore the noise and dust impact assessment for this project has considered the cumulative impact of the proposed development in conjunction with other existing land uses in the area. Extensive noise and dust controls and an ongoing monitoring program, are proposed in order to minimise the cumulative noise and dust impacts.

There are no known proposals for any major noise or dust generating activities in close proximity to the existing Westside Mine. However, any future proposals will have to

consider any potential noise and dust cumulative impacts with the Westside Mine Southern Extension operations.

### 5.18.3 Visual

The Lake Macquarie area has a diverse range of landscapes which provides relatively high scenic quality. The scenic quality of the area is subject to a variety of pressures, particularly on the urban fringe. The visual impact of the proposed development, discussed in **Section 5.10**, is expected to be low, as the development is not discernible in most areas due to the topographic features between the mine and surrounding lands. There will however, continue to be limited views of the mine from surrounding public roads and short term views from a few nearby residences.

As discussed in **Section 5.10**, there are a number of features of the project and proposed management procedures, which will assist in protection of the scenic amenity of the area. These features include progressive rehabilitation of disturbed areas and provision of bunding and tree screening adjacent to Wakefield Road.

Progressive rehabilitation of all disturbed areas will ensure that the proposed development does not cause long term cumulative impact on the scenic quality of the area. Over the life of the operation, this progressive rehabilitation of Westside Mine will lead to an improvement in visual amenity.

### 5.18.4 Traffic

The proposed extension to mining will continue to predominantly use the private haul road for the transport of product coal. As a consequence, continued operation and increased production will not contribute significantly to cumulative impacts on the public road system or other traffic generating developments in the area.

As discussed, it is proposed that coal may continue to be hauled to Vales Point Power Station on a campaign basis as has been done in the past. As this is a continuing activity and only contributes a small percentage of the traffic that annually uses the public road system, it is considered coal haulage as proposed will not cause a significant adverse cumulative traffic impact. Similarly, employees will continue to travel by passenger vehicles to and from Westside on Wakefield Road with the proposed potential increase in employees from 18 up to 23 causing a negligible increase in traffic volumes with traffic volumes staying well below the satisfactory capacity of Wakefield Road.

### 5.18.5 Flora and Fauna

The potential impact of continued mining operations on the flora and fauna communities identified, and particularly threatened species and communities identified within the study area have been considered in a local and regional context within **Section 5.6** and the Flora and Fauna and Threatened Species Assessment provided in **Appendix 6**.

It is proposed to disturb approximately 50 hectares of vegetation as a result of the continuation of mining; however, the vegetation communities to be removed are well represented in the local region. Swamp Mahogany dominated communities, which form part of the Sydney Coastal Estuary Swamp Forest Complex Endangered Ecological Community will also be impacted under the proposal, however the removal of 6-7 hectares is not considered significant. Despite this, it is recognised that there is a need to minimise the cumulative loss of native vegetation both locally and at a national level. To minimise the potential cumulative impacts associated with the clearing of native vegetation it is proposed to rehabilitate all lands subject to mining activity or disturbed for infrastructure. Rehabilitation will aim to reinstate habitat of a similar diversity and type to that which exists

in the naturally-forested portions of the locality. The rehabilitation works will utilise a range of locally indigenous species from all vegetative strata and will ensure that the cumulative impact on flora and fauna communities will be positive in the long term.

#### **5.18.6 Aboriginal Archaeology**

An analysis of the archaeological potential and significance of Aboriginal Sites within the project area is presented in **Section 5.9.1**. In considering the significance of evidence of Aboriginal occupation of the area, the analysis took into consideration a range of criteria relating to scientific value, rarity, site condition and structural integrity, as well as cultural value to the local Aboriginal community. Several of these criteria necessarily involve evaluation of the evidence relative to other known occupation evidence in the regional context.

There are no Aboriginal sites or relics identified within the proposed development area, which is located within the catchment of Cockle Creek. Numerous surface and sub-surface investigations of this catchment have been previously undertaken and a database already exists. Extensive salvage of artefacts within this catchment would not extend our understanding of Aboriginal occupation of the Lake Macquarie area or provide a substantial contribution to the cultural heritage of the local Aboriginal community. A sub-surface testing program is therefore not considered necessary.

Although no Aboriginal sites were identified in the proposed development area, some areas have minor potential to contain relics buried in the soil. **Section 5.9.1.3** outlines an Aboriginal heritage management protocol to ensure that continued mining operations do not cause cumulative impact on the Aboriginal heritage of the area.

#### **5.18.7 European Heritage**

A number of relics related to the coal mining industry and to agricultural development in the area were identified. All European heritage items were assessed as of low heritage significance, and not considered to be of local, regional, State or national significance (refer to **Section 5.9.2** and **Appendix 9** for further details).

Documentation of the historic heritage knowledge gained from these investigations makes a positive contribution to the historical record for the local region.

#### **5.18.8 Socio-Economics**

The Westside Mine Southern Extension project will have a positive cumulative impact on employment within the region by maintaining employment opportunities that would otherwise be lost with the closure of Westside Mine. The cumulative social impacts have been minimised by a major modification of the mine plan to reduce impacts on the Wakefield community and an extensive range of control measures to minimise off-site impacts.

## **SECTION 6**

### **Ongoing Environmental Management and Monitoring**

## 6.0 ONGOING ENVIRONMENTAL MANAGEMENT AND MONITORING

This section provides an overview of the existing Westside Mine environmental management and the integration of environmental management and monitoring for the proposed Westside Mine Southern Extension.

### 6.1 EXISTING WESTSIDE MINE ENVIRONMENTAL MANAGEMENT PLAN

An Environmental Management Plan has been developed and implemented for Westside Mine and this plan incorporates the environmental responsibilities for both Oceanic Coal and the mining contractor. The environmental management plan has been developed within the framework of the OCAL Environmental Management System developed generally in accordance with ISO 14000. Existing Westside Mine management plans that will be applicable to future operations within the southern extension area include:

- air quality control;
- water management;
- land management;
- hydrocarbon management;
- waste management; and
- environmental monitoring.

It is anticipated that development consent conditions will require Westside Mine to prepare an Environmental Management Strategy for future operations in consultation with the relevant authorities. This Strategy will provide:

- an overview of the operation;
- environmental objectives to be addressed as part of future operations;
- identification of management strategies and cumulative impacts;
- steps to be put in place to ensure that all relevant regulatory requirements are met; and
- processes for receipt and action regarding community feedback and documentation of the results of consultation during preparation of the Environmental Management Strategy.

The Environmental Management Strategy will provide the framework for issues specific Environmental Management Plans and will be consistent with the existing OCAL Environmental Management System. It is expected that specific additional Management Plans that will be required for the Westside Mine Southern Extension will include:

- Cultural Heritage Management (**Section 6.7**);
- Flora and Fauna Management (**Section 6.5**);

- Bushfire Management (**Section 6.11**);
- Noise and Blast Management (**Section 6.4**);
- Visual Controls (**Section 6.9**); and
- Traffic Management Plan (**Section 6.6**).

In addition it is anticipated that the existing Management Plans will be updated as part of this process. Specific environmental management measures for future Westside Mine operations have been discussed in detail in **Section 5.0**. The following section provides a summary of the key environmental management and monitoring required for the Westside Mine Southern Extension.

## **6.2 WATER AND SOIL MANAGEMENT**

Detailed soil and water management procedures have been discussed in **Section 5.5.3**. In summary, these include:

- collection and treatment of runoff from disturbed areas by a series of diversion drains and treatment ponds;
- diversion of clean runoff around disturbed areas;
- establishment of adequately sized culverts for all creek crossings; and
- construction of a levee to avoid flooding of the pit from Diega Creek.

### **6.2.1 Monitoring and Reporting**

A detailed surface water monitoring program has been established as part of Environment Protection Licence reporting requirements. Water quality is sampled at all discharge points from the site on a daily basis and during extreme events, and are analysed weekly, plus upstream and downstream monitoring of Cockle Creek both on a regular monthly basis as well as daily whenever discharges are occurring. Monitoring results are compiled and analysed in the AEMR.

This monitoring program will be extended to include the three proposed new dams (Dam L, Dam M and Dam N) at the eastern and northern perimeters of East Pit.

The status of all soil and water management infrastructure including dams, diversion drains, catch drains, silt fences and flocculation systems is regularly inspected and reported on by on-site personnel. Similarly reshaped and rehabilitated areas are regularly inspected and maintained to ensure that erosion and sediment generation are minimised. Inspections of the mine site are also regularly undertaken by representatives of DMR and DLWC as part of the MREMP (Mining, Rehabilitation and Environmental Management Plan) process.

The existing program of regular water quality monitoring, inspection and maintenance will be continued for the proposed extended life of mining and will be regularly reviewed in consultation with DMR, DLWC and EPA representatives, with monitoring results being reported in the AEMR.

## 6.3 AIR QUALITY CONTROL

A range of air quality controls will be implemented during continued operation of Westside Mine. These controls will be documented in an Air Quality Management Plan for continued operations and will include:

- watering of unsealed road surfaces and hardstand areas that are subject to regular traffic;
- regular grading of roads;
- speed controls for vehicles travelling on surfaces that are potential sources of dust;
- progressive shaping and rehabilitation of overburden dumps to minimise the area exposed to wind erosion;
- keeping mine site traffic to well defined routes and on properly formed roads whenever possible;
- minimising the area of pre-stripped land; and
- use of dust controls on drills and coarse materials for stemming blastholes.

### 6.3.1 Monitoring and Reporting

The existing Westside Mine air quality monitoring program will be maintained (refer to **Section 3.6.5.2**). This program provides a satisfactory monitoring network for proposed continued operations (refer to **Figure 3.2**) and will allow assessment of compliance of the continued operations with relevant air quality goals. The results of the air quality monitoring will be reported in the AEMR (refer to **Section 6.12.1.2**).

## 6.4 NOISE AND VIBRATION MANAGEMENT

Noise and blast assessment provided in **Section 5.8** has indicated that the following controls will be appropriate for this project:

- restricting mine operating hours from 7.00 am to 10.00 pm Monday to Saturday. Restricting use of the drill in exposed locations from 7.00 am to 6.00 pm, unless a future drill can be obtained to meet the relevant evening noise design goal;
- using dozers in acoustically screened locations after 6.00 pm;
- maintenance of plant and equipment in good working order;
- noise monitoring on site and in the community on an annual basis;
- designing and undertaking blasts to ensure that vibration and airblast limits are met, including use of adequate stemming, a delay detonation system, and careful drilling and hole loading to ensure that the required blast design is implemented;
- consideration of weather conditions in setting blast times; and
- monitoring and continued refinement of blast design.

### 6.4.1 Monitoring and Reporting

The existing Westside Mine blast monitoring program will be utilised to determine compliance of the continued operations with the relevant blast criteria. Noise monitoring will be conducted quarterly at Killingworth and nearest private residences in Wakefield to assess the operation against the relevant criteria and determine the need or otherwise for additional noise controls. Existing response procedures and protocols will be followed in the event of any complaint or measured exceedance of the relevant criteria. The results of the noise and blast monitoring will be reported in the AEMR.

## 6.5 FLORA AND FAUNA MANAGEMENT

As discussed in **Section 5.6.6.5**, a detailed Flora and Fauna Management Plan will be prepared. The plan will address specific measures to prevent impacts on threatened flora and fauna species and ecological communities identified on the site and reduce threats. Specific measures include:

- managing reserved habitats, to protect flora and fauna values;
- minimising disturbance to fauna during site clearing by implementation of specific measures such as management of hollow-bearing tree resources and staged clearing;
- using endemic species in site rehabilitation; and
- implementing a monitoring strategy for threatened flora and fauna species during and following mining activities to assess the success of the ameliorative measures.

The proposed rehabilitation, revegetation and maintenance of habitats, discussed in **Section 5.6.6** will result in no net loss of habitat and provide potential nesting and roosting sites for fauna that may be displaced by removal of a limited number of hollow bearing trees within the area of disturbance.

A further summary of rehabilitation management is provided in **Section 6.10**.

## 6.6 TRAFFIC MANAGEMENT

Haulage of product coal will continue to be via the private haul road which underpasses Wakefield Road. Therefore no ongoing management of traffic will be required in regard to haul traffic and traffic using Wakefield Road. The private haul road crosses Rhondda Road approximately 1.2 kilometres east of the Wakefield Road intersection. Haul road traffic is controlled by Give Way signs and these controls will continue to be used into the future.

Construction of the proposed realignment of Wakefield Road will require earthworks to be undertaken on either side of Rhondda Road and as a result it will be necessary for earthmoving equipment including scrapers and rear dump trucks to cross Rhondda Road. In addition it is proposed to construct a new bridge on Wakefield Road over Cockle Creek. A section of Wakefield Road at the eastern end of the proposed road realignment will also require construction activity on sections of Wakefield Road that will be open to public use at the time. To ensure that adequate safety provisions are in place for all vehicles using Rhondda Road and Wakefield Road, an appropriate Traffic Management Plan for the proposed works will be developed in consultation with LMCC prior to commencement of construction works, and implemented.

Preliminary designs for the proposed realignment of Wakefield Road have been discussed with LMCC engineering staff and these will be finalised and approved by Council prior to commencement of construction.

Once the new section of road is opened, ongoing traffic management will not be required.

## 6.7 HERITAGE MANAGEMENT

The cultural heritage assessment found no Aboriginal sites, however, monitoring will be conducted in identified areas with potential for Aboriginal sites (refer to **Section 5.9.1.3**) during site clearing. This monitoring will be conducted by Koompahtoo LALC. No other specific historic heritage management is required for this project.

## 6.8 GREENHOUSE GAS ABATEMENT

A range of measures to abate greenhouse gas emissions was discussed in **Section 5.14.6**. In summary, these measures include, where practicable:

- monitoring and reporting energy efficiency in relation to diesel fuel usage;
- setting and reviewing efficiency targets;
- implementing cost effective measures to improve energy efficiency;
- integrating energy management into operation and maintenance procedures;
- evaluating energy implications in equipment purchasing, repair and plant/mine decisions;
- ensuring personnel are provided with appropriate training to improve energy management in their duties; and
- auditing progress annually and taking necessary remedial action.

## 6.9 VISUAL CONTROLS

As discussed in **Section 5.10**, potential visual impacts will be managed through:

- prompt rehabilitation of disturbed areas
- prioritisation of rehabilitation, focusing effort on areas that are most visually prominent from off-site private residences and public transport routes; and
- directing lighting plants away from residences, where practicable.

The control of potential light impacts will be further detailed in a Lighting Management Plan. Landscape management measures will be incorporated into the MOP (refer to **Section 6.12.1.1**).

## **6.10 REHABILITATION AND LAND MANAGEMENT**

### **6.10.1 Existing Rehabilitation and Land Management**

Rehabilitation is carried out by Westside Mine on a progressive basis, in accordance with DLWC guidelines. The forward planning of site rehabilitation is provided in the Mining Operations Plan required by DMR and details of rehabilitation progress are included in the Annual Rehabilitation Report, which is appended to the AEMR. In summary, the rehabilitation program includes:

- progressive reshaping of slopes to no more than 14 degrees, where possible;
- construction of soil conservation works; and
- establishment of vegetation on disturbed areas.

Revegetation includes establishment of native trees and shrubs. Trees have been found to persist well with good growth rates and contribute greatly to the aesthetics of the area. The main objective of Westside Mine's rehabilitation program is to produce a post-mining landscape that is stable and at least as productive as the woodlands that previously existed in the area.

### **6.10.2 Proposed Rehabilitation and Land Management**

Rehabilitation of disturbed areas will be undertaken progressively as earthworks are completed (refer to **Figures 4.5 and 4.6**). The rehabilitation program will include reshaping of slopes to less than 14 degrees, where possible, construction of soil conservation works and re-establishment of vegetation. Revegetation will primarily involve establishment of native bushland.

Weed and vermin control will be conducted in accordance with the existing Westside Mine management practices, which require:

- regular site inspections to identify areas of weed infestation and type of weed species;
- development and implementation of an eradication plan applicable to the circumstances, which may include manual removal, spot spraying, boom spraying or biological control;
- minimisation of vegetation disturbance by reducing the number of tracks and using the same access routes;
- minimisation of clearing and other disturbance of vegetation associated with civil works;
- early establishment and maintenance of vegetation, particularly during rehabilitation of overburden dumps; and
- regular maintenance of topsoil stockpiles to eradicate weed infestation.

## **6.11 BUSHFIRE**

Westside Mine currently has two water carts equipped with fire fighting equipment. One of the water carts has a fire fighting monitor that can be operated from inside the cab of the machine. This fire fighting equipment, together with graders and bulldozers used for mining, provides effective bushfire fighting capability. In addition, emergency preparedness training

for mine-site personnel includes bushfire control techniques. A Bushfire Management Plan will be prepared to document the fire control techniques to be utilised.

## 6.12 POST-EIS LEGISLATIVE CONTROLS

Continued operation of Westside Mine including environmental management requirements will be established by development consent conditions. A wide range of other environmental control legislation also applies to this development and is briefly described in this section.

### 6.12.1 Mining Act 1992

The *Mining Act 1992* is administered by the DMR and, amongst other procedures, places controls on methods of exploration and mining, the disposal of mining waste and land rehabilitation and environmental management activities.

The mining lease entitles Westside Mine to prospect, mine and market coal produced from the deposit but there are a number of conditions which must be met in regard to safety, environmental management, waste disposal and payment to the State of a royalty for each tonne of coal sold.

#### 6.12.1.1 Mining Operations Plan

All mining operations in NSW are required to prepare a mining operations plan (MOP) prior to commencement of mining. The MOP describes the mining operations to be conducted within a timeframe of two, five or seven years, depending on the nature and scale of the proposed operation. For an operation with a life in excess of seven years, a new MOP must be prepared prior to expiry of the current MOP.

The matters to be addressed in the MOP are detailed in Preparation of Mining Operation Plans (DMR 1998) and include:

- a description of proposed mining leases, mining methods, transportation methods, coal markets and approvals required by DMR;
- geological information including proven coal resources, constraints affecting mining, economic cut-off limit and potential for sterilisation of the coal resource;
- land preparation information including description of soils, method of land clearance, topsoil stripping, handling and topsoil volumes for rehabilitation;
- proposed surface infrastructure including description of buildings, permits for hazardous goods storage, transportation systems and power supply;
- proposed mining equipment;
- overburden disposal including emplacement sequence, identification of toxic strata, methods of emplacement and area of emplacement;
- rejects disposal including quantities, methods of disposal, dewatering timetable and notification of prescribed dams under the *Dams Safety Act 1978*;
- rehabilitation including landform design, slope angles, surface preparation methods, revegetation methods, landscape planning and post-mining land capability;

- water management;
- flora and fauna management;
- archaeology and heritage management;
- spontaneous combustion management;
- conceptual final void treatment; and
- site security.

The DMR holds a rehabilitation security deposit for the site which is only released when sustainable site rehabilitation is demonstrated.

#### **6.12.1.2 Annual Environmental Management Report**

The DMR requires all mining operations to prepare a comprehensive AEMR. The matters to be addressed in the AEMR are detailed in Preparation of Annual Environmental Management Reports (DMR 1998). In summary these matters include:

- a review of the statutory requirements under which the mine operates;
- an overview of the mining operation process;
- an overview of the environmental management of the mine including water, air and noise monitoring;
- rehabilitation status and performance; and
- initiatives and targets for continuous improvement.

In addition to the matters prescribed by the DMR, the AEMR includes reporting of matters as required by the development consent. The AEMR is distributed to the government agencies that are responsible for regulation of these additional matters.

Westside Mine will continue to prepare AEMRs throughout the life of the 7 to 12 year mining operation, in accordance with the requirements of DMR and the development consent, if approved.

### **6.12.2 Other Environmental Protection Legislation**

The applicant will be required to operate in compliance with other relevant environment protection legislation. The *Protection of the Environment Operations Act 1997* provides an integrated environmental protection licensing system, incorporating the former provisions of the *Clean Air Act 1961*, *Clean Waters Act 1970*, *Noise Control Act 1975*, *Pollution Control Act 1970*, *Environmental Offences and Penalties Act 1989*, and *Waste Minimisation and Management Act 1995*. The EPA administers this pollution control legislation in New South Wales and a brief outline of the relevant legislative provisions is provided below. Other environmental legislation also applicable to the proposed development is the *Mine Subsidence Compensation Act 1961*, *Rivers and Foreshores Improvement Act 1948*, *Water Act 1912*, *Water Management Act 2000*, *National Parks and Wildlife Act 1974*, *Dangerous Goods Act 1975* and the *Environmentally Hazardous Chemicals Act 1985*. A brief overview of this legislation was provided in **Section 2.2.2**. A summary of the post development consent approvals and licences is provided in the following sections.

#### **6.12.2.1 Protection of the Environment Operations Act 1997**

This establishes the procedures for issue of licences for environmental protection including waste management and air, water and noise pollution control. The mine is required to have relevant licences and there are conditions associated with these licences that must be complied with at all times. The Westside Mine mining contractor, as occupier of the site, currently holds an environment protection licence (EPL No. 004033) for the Westside Mine operations. This licence will require amendment to include the proposed Southern Extension Area.

Any breach of the environmental protection legislation is an offence for which there are penalties for a company and its officers. This legislation ensures that all employees and company directors are directly accountable for site environmental management.

#### **6.12.2.2 Other Post Development Consent Approvals and Licences**

Westside Mine will be required to comply with detailed conditions of consent on granting of the DA. In addition, approval and/or licences will be required from various authorities in terms of the legislation outlined in preceding sections, and other requirements.

Apart from the Mining Approvals and EPA licence mentioned in the above sections, the necessary further approvals and/or licences following development consent likely to be required for continued operations are:

- DMR grant of the additional mining title required;
- MSB approval for works within a mine subsidence district under the under the Mine Subsidence Compensation Act 1961;
- approval from LMCC under the Roads Act 1993 to realign a section of Wakefield Road, and close a section of Rhondda Road;
- approval from DLWC to extract groundwater under the Water Act 1912 / Water Management Act 2000. This relates to ongoing operations involving extraction and management of minewater; and
- detailed consultation, provision of design details and approval from the relevant organisations will be required prior to any works affecting public utilities including electricity, telephone, or survey infrastructure. Organisations with whom Westside Mine will undertake further consultation include:
  - Telstra in relation to cables adjacent to Wakefield Road; and
  - EnergyAustralia in relation to works within electricity easements and relocation of power lines.
- Approval from the Great North Walk Trust for relocation of the Great North Walk, adjacent to the Wakefield Road realignment.

## **SECTION 7**

# **Justification and Alternatives**

## 7.0 JUSTIFICATION AND ALTERNATIVES

### 7.1 ALTERNATIVES

Westside Mine considered a number of alternatives to this proposal during feasibility investigations and the environmental impact assessment process. An overview of these alternatives is provided in this section.

#### 7.1.1 Alternative Mine Plans

The initially proposed mine plan for the Westside Mine Southern Extension extended to the maximum limit of the available open cut coal reserves, including the ridgeline between the currently proposed South Pit and Wakefield. The formerly proposed extent of open cut mining is shown on **Figure 2.4** in **Section 2.2.5**. Whilst OCAL sought to maximise coal recovery with this mine plan, the mine planning and environmental assessment process remained an iterative process, taking into account community concerns. During consultation in relation to the formerly proposed rezoning and initial phases of EIS preparation, it became apparent that the Wakefield community and LMCC were particularly concerned regarding mining on the southern side of the ridgeline, mainly from the perspective of potential visual, noise and dust impacts upon the Wakefield community. Taking into account these community concerns, OCAL agreed in consultation with LMCC to limit the extent of proposed mining such that there would be no mining on the southern side of the ridgeline west of Wakefield Road. This mine planning decision effectively reduced the available coal resource by 1.2 million tonnes, reducing the potential life of the operation by up to two years. The currently proposed mine plan minimises visual impacts from the Wakefield community and further reduces potential noise and dust issues associated with the project by providing additional attenuation due to topography and increasing the distance to nearest residences.

#### 7.1.2 Alternative Road Alignments

In exploring the possible realignment of Wakefield Road to facilitate access to the underlying coal resource a number of alternative alignments and alternative road geometries were considered.

Initially it was proposed to realign Wakefield Road to the west of its current alignment. This alignment would have traversed previously mined and reshaped sections of South Pit and would have effectively straightened out the section of Wakefield Road between School Road and Rhondda Road. This option was first considered when it was proposed to mine the ridge between South Pit and Wakefield Road. Subsequently, it was resolved that the mine plan would be modified to the current proposal, as discussed in **Section 7.1.1**. Without mining on the southern side of the ridgeline, establishment of Wakefield Road along this alignment would require extensive earthworks to cut through the ridge so that a suitable vertical alignment for the road could be achieved. This would result in substantial disturbance of the ridgeline. In addition, adoption of this alignment would expose travellers on Wakefield Road to extensive views of the open cut workings and would limit the flexibility of the mining operation. For these reasons realignment of Wakefield to the west of its current location is no longer considered a feasible option.

Several variations of the preferred alignment to the east of the current alignment of Wakefield Road were also considered. These included reconnecting to Wakefield Road south of the bridge over Cockle Creek to utilise the existing bridge structure and a range of horizontal alignments and road curvatures to provide for an appropriate speed environment. The bridge deck over Cockle Creek slopes towards upstream to accommodate the current curvature of the road (ie. a left hand bend for vehicles travelling from Wakefield to

Barnsley). The proposed realignment of the road includes a right hand bend at this location which requires the bridge deck to slope downstream rather than upstream as is the current situation. Investigation of the existing bridge demonstrated that it was more feasible to construct a new bridge adjacent to the old bridge than try to reverse the slope of the existing bridge deck.

Details of the horizontal alignment of the road have been discussed with Council and minor changes made in response to these discussions. As discussed in **Section 4.15.1**, the community has suggested other modifications to the road realignment including the options of reducing the gradient of the Wakefield Road realignment near the School Road intersection or making School Road a cul de sac, alleviating the need for any intersection and reducing the volume of traffic on School Road. Council has indicated that it will conduct a traffic management study in the Wakefield area towards the end of 2002 and that School Road treatment will be finalised at that stage. OCAL will need to seek final approval from LMCC for roadworks under the Roads Act during 2003 and this process can consider the outcomes of Council's traffic management study.

### **7.1.3 Consequences of Not Proceeding**

If continued operation of Westside Mine was not to proceed, there would be the following implications:

- coal production from Westside Mine would cease in 2004;
- employment opportunities for up to 23 full time and 12 contract workers would be lost along with the flow-on economic benefits to the local community and wider Lower Hunter region;
- the opportunity would be lost to permanently rehabilitate severe subsidence problems above areas of old shallow underground mine workings;
- there would be substantial loss in State and Federal government revenue; and
- a significant coal resource may not be recovered and could potentially be sterilised.

## **7.2 JUSTIFICATION OF THE PREFERRED OPTION**

### **7.2.1 Newcastle Coal Production**

The Newcastle Coalfield is the second largest coal-producing region in NSW, with an annual coal production in 1999-2000 of approximately 20.10 Mt (DMR 2001). As noted by DMR (2000), the Minerals Consultative Committee predicts that between 8 and 13 mines will close in the Hunter and Newcastle Coalfields over the next 10 years, due to depletion of reserves. Significant reliance on production from new projects and mine extensions is expected in order to compensate for the loss in production capacities due to mine closures and to take advantage of expected market opportunities. The Minerals Consultative Committee further predicted that by 2007-2008 approximately 50% of production will be from new mines and extensions (DMR 2000). Coal production from the current Westside Mine operations accounts for approximately 4% of Newcastle Coalfield production. Continued operation of Westside Mine will ensure that the mine continues to make this contribution to the domestic coal market from the Newcastle Coalfield.

Existing land uses and land use planning forms a major constraint to coal mine development in the lower Hunter Valley. High levels of population growth have occurred in the southern

and central areas of the Newcastle Coalfield over the past few decades, with increasing urban development in the coastal local government areas of Lake Macquarie and Wyong. In particular, residential development on the western side of Lake Macquarie is of concern with respect to its possible impact on future coal resource development (DMR, 2001). Considering the potential constraints associated with many other Hunter Valley coal resources, it is essential that there continue to be an optimal use of this coal resource. Mining of this available coal resource over the next 7 to 12 years will provide certainty for land use planning in this area.

### 7.2.2 Economic Benefits and Employment

The estimated output from continued operation of Westside Mine will provide total income in the order of \$140 million over the life of the project, which will provide substantial flow on effects.

Government revenues will be generated at Federal, State and local government levels from taxes, royalties and services provided. These sources of income include:

- corporate taxes;
- personal taxes;
- excise duties;
- import duties on plant and equipment;
- fringe benefits tax;
- mineral royalties, licence fees;
- payroll tax;
- land tax and rates;
- provision of government services; and
- goods and services tax.

As noted in **Section 5.16**, one of the most significant effects of continued operations of Westside Mine is the continuation of employment opportunities for up to 25 full-time and 12 contract employees, which otherwise would be lost if operation of Westside Mine was to cease upon completion of mining the reserves under the current development consent for the site. The provision of these substantial employment opportunities for the 7-12 year life of continued operations will have significant flow on effects in the community.

The environmental impacts associated with continued operation of Westside Mine can be managed and are within the design, environmental, financial and management capabilities of OCAL and its joint venture ownership. The total net worth over the life of the operation is estimated to be in the order of \$140 million.

These attributes mean that the employees, the community and government can be confident that the project will be developed to achieve its full potential. Continued operation of Westside Mine is expected to offer stable and reliable employment and substantial national, State and local income generation throughout the life of the project.

### 7.2.3 Social Considerations

Social impacts of the proposal are discussed in **Section 5.16.2**. Analysis of these impacts indicates that the proposed continued operations will have little impact on social infrastructure of the Lake Macquarie LGA, including housing and accommodation services, as there will be negligible change to the existing operational employment opportunities at the mine. Continued operations do not require major construction works, with relatively short duration construction activities only required for the Wakefield Road realignment and internal coal haul road during the life of the project. Any temporary population increase that may occur during construction is marginal and thus will not place any significant strain on existing social services.

The project will have a positive impact on the amenity of the area through progressive rehabilitation of existing subsidence holes caused by previous shallow underground mining operations.

### 7.2.4 Environmental Considerations

This assessment has comprehensively addressed potential environmental impacts associated with continued operation of Westside Mine. Environmental impacts have been assessed for each project component, as well as the cumulative impacts associated with adjoining mining operations (**Section 5.18**).

These investigations have determined that there are aspects of the project that will require careful management to minimise environmental impacts. Environmental management and ongoing monitoring procedures are discussed in **Section 5** and summarised in **Section 6**. Legislative controls are also discussed in **Section 6**. The environmental impact assessment has determined that all potential environmental constraints can be appropriately managed to enable continued operation of Westside Mine.

## 7.3 ECOLOGICALLY SUSTAINABLE DEVELOPMENT

The principles of ecologically sustainable development, which must be considered in the environmental impact assessment process, are:

- the precautionary principle;
- inter-generational equity;
- conservation of biological diversity; and
- valuation and pricing of resources.

### 7.3.1 The Precautionary Principle

The *Intergovernmental Agreement on the Environment and National Strategy for Ecologically Sustainable Development* (Commonwealth of Australia 1992) defines the precautionary principle as:

*“Where there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation.”*

This definition has been incorporated into the *Protection of the Environment Operations Act 1997*. The precautionary principle is based on the premise that many of the potential

benefits of the natural environment may be unknown, and it is prudent and ethical to keep options open for current and future generations (DUAP 1997).

Application of the precautionary principle to coal mining proposals needs to ensure that there has been careful evaluation of the proposal and that decision making for the proposal has been predictable and transparent. This EIS documents the extensive and careful evaluation of project components. Detailed assessment of all potential impacts and necessary management procedures has been conducted and is also comprehensively documented in this EIS.

The decision making process for the design of the proposed development and proposed management procedures has been predictable and transparent in the following respects.

1. All relevant government authorities and landholders potentially affected by the proposed continued mining operations were consulted during EIS preparation. This enabled comment and discussion regarding potential environmental impacts and proposed environmental management procedures (refer to **Section 1.6**).

A planning focus meeting was held to facilitate effective government authority consultation. The planning focus meeting involved presentation of available project details and environmental impact assessment. Key issues of concern were discussed and mechanisms were established to enable further discussion with individual authorities, in order to resolve any outstanding matters.

The community has been extensively consulted throughout EIS preparation (refer to **Section 1.6**). This included direct mailing and individual consultation with local residents. This process enabled potential issues of concern to be raised and progressively reported and discussed during EIS preparation. Specific meetings were also held with key government agencies or landholders with particular concerns in order to resolve details regarding particular issues of concern.

2. AEMRs are prepared for the current operations at Westside Mine. These reports incorporate details of site environmental management, monitoring and environmental response procedures. Current environmental management and monitoring at Westside Mine is consistent with standard management practice and the proposed continued operation will incorporate these standard practices together with the additional controls summarised in **Section 6**. The responsibilities of the proponent and government agencies for environmental management and enforcement are clearly identified in **Section 6.12** of this document.

### 7.3.2 Social Equity Including Inter-Generational Equity

Social equity involves concepts of justice and fairness so that the basic needs of all sectors of society are met and there is a fairer distribution of costs and benefits to improve the well being and welfare of the community, population or society (DUAP 1997).

Another key objective of the continued operation will be overall project management and investment in plant and equipment that minimises pollution and waste and is energy efficient. Where possible, recyclable and recycled materials and water will be used in the operation and all employees will be educated regarding waste minimisation, re-use and recycling. The implementation of this objective will help to ensure that the current standard of environmental amenity is maintained or improved for future generations.

An important outcome of mining within the Southern Extension Area will be the permanent rehabilitation of areas currently subject to ongoing subsidence problems. This process will improve the safety of this land for use by future generations.

### 7.3.3 Conservation of Biological Diversity

Ecological interactions are an integral consideration in ecologically sustainable development. The conservation of biological diversity and the maintenance of ecological integrity are essential to ensuring intergenerational equity and the ongoing functions of life.

All environmental characteristics and habitat values that may potentially be affected by continued operations are described in this document. Likely environmental impacts on these characteristics and values have been assessed and measures proposed to be implemented to minimise these potential impacts are described in **Section 5**.

Areas disturbed during open cut mining will be revegetated, utilising a range of locally indigenous species, in order to minimise the long-term effects on biological diversity.

### 7.3.4 Valuation and Pricing of Resources

The goal of improved valuation of natural capital has been included in Agenda 21 of Australia's Intergovernmental Agreement on the Environment. The principle of improved valuation and pricing refers to the need to determine proper values of services provided by the natural environment.

The proposed continued operation improves the valuation and pricing of the Westside Mine coal resources by:

- optimising available use of the resource and minimising resource sterilisation; and
- use of existing coal handling and transportation facilities to transport product coal to existing markets.

Project feasibility considerations have included the costs of integration of effective environmental management to minimise potential environmental impacts.

## **SECTION 8**

### **Checklist of Matters Raised During Consultation**

## 8.0 CHECKLIST OF MATTERS RAISED DURING CONSULTATION

| Matters to be Considered in the Environmental Impact Statement                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Section                         |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------|
| <b>DEPARTMENT OF URBAN AFFAIRS AND PLANNING</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                 |
| <b>SPECIFIC ISSUES</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                 |
| <b>Air and Noise</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                 |
| Detail existing ambient air quality and noise conditions at the site and locations likely to be impacted by the proposal                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | 5.7.2 & 5.8.3                   |
| Assess impacts on air quality and noise during construction and operation phases of the proposal and ongoing activities, particularly the potential impacts of the proposed auger drilling of the highwall adjacent to Wakefield Road                                                                                                                                                                                                                                                                                                                                                                                        | 5.7.3 & 5.8.4                   |
| Detail proposed mitigation, monitoring and management measures to substantiate the predicted noise and dust impacts and the ongoing performance of the mine                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | 5.7.4, 5.8.4.4 & Appendices 7-8 |
| Provide a greenhouse gas assessment, incorporating the following:<br>i. a quantitative model showing the tonnages of each greenhouse gas produced per year. These figures should be expressed as a percentage of the total national greenhouse gasses produced for that year;<br>ii. a discussion of the types of greenhouse gases being emitted;<br>iii. a discussion of the alternative options considered for;<br>- the chosen fuel source used; and<br>- the technology adopted to reduce greenhouse gas emissions;<br>iv. justification for the chosen fuel source and technology in terms of greenhouse gas emissions. | 5.14                            |
| <b>Water and Soil</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                 |
| Detail existing surface and groundwater conditions at the site and at locations likely to be impacted by the proposal, including a detailed assessment of the different aquifers present                                                                                                                                                                                                                                                                                                                                                                                                                                     | 5.5.1                           |
| Identify the soils in the proposed development application area with an assessment of the risk of soil erosion                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 5.3.1                           |
| Detail potential impacts on water quality, including surface water and ground water impacts, including the surface water and groundwater regime in the vicinity of Diega Creek                                                                                                                                                                                                                                                                                                                                                                                                                                               | 5.5                             |
| Detail proposed location and design specifications for all clean water diversions or drains and internal drainage of the contaminated water circuit                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 5.5.3                           |
| Provide design specifications of the crossing of Cockle Creek, impacts on stream flow velocities and directions, and potential for erosion to be initiated from the crossing                                                                                                                                                                                                                                                                                                                                                                                                                                                 | 5.5.4                           |
| Mitigation and management measures for any potential impact on ground and surface water, including water quality, drainage and stormwater management for the proposal                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 5.5.3, 6.2                      |
| Detail proposed drainage works, soil conservation strategies and erosion and sediment control strategies to reduce the risk of soil erosion associated with the proposal, including details of an erosion and sediment control plan                                                                                                                                                                                                                                                                                                                                                                                          | 5.5                             |
| Discuss proposed monitoring programs for ground and surface water, and reporting procedures regarding chemical and biological parameters of discharges, water quality and ground water levels                                                                                                                                                                                                                                                                                                                                                                                                                                | 6.0 & 6.2.1                     |
| <b>Blasting</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                 |
| Provide details of any blasting to be conducted at the project site                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 5.8.4.3                         |
| Identify any residential zones, dwellings or other sensitive structures businesses or land uses that may be impacts by blasting and describe proposed mitigation and management measures to control generation of blasting impacts and to ensure compliance with relevant blast overpressure and ground vibration standards                                                                                                                                                                                                                                                                                                  | 5.8.4.4<br>Appendix 8           |

| <b>Matters to be Considered in the Environmental Impact Statement</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | <b>Section</b>              |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------|
| <b><i>Planning</i></b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                             |
| Consider relevant Environmental Planning Instruments, particularly the Lake Macquarie Local Environmental Plan (LEP) (1984) and the Comprehensive Draft LEP 2001. This shall include an assessment of the permissibility of the Development Application (DA) within the LEPs and a consideration of the zone objectives within the LEPs that apply to the DA area. Reference must also be made to the Hunter Regional Environmental Plan (1989), State Environmental Planning Policy (SEPP) No. 11 'Traffic Generating Developments', SEPP No. 33 'Hazardous and Offensive Developments', SEPP No. 44 'Koala Habitat' and SEPP No. 45 'Permissibility of Mining' | 2.2.5, 2.5.6, 2.2.4 & 2.2.3 |
| <b><i>Crown Land</i></b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                             |
| Identify the location and status of any Crown land                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 2.1.2 & 2.2.2.13            |
| Detail any potential impacts on the access, use, management or amenity of any Crown land                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 2.2.2.13                    |
| Consider buffer zones for any land sharing a common boundary with Crown land                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | 2.2.2.13                    |
| <b><i>Flora and Fauna</i></b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                             |
| Impacts on flora and fauna at all sites of the proposal, particularly koalas, critical habitats, threatened species, populations or ecological communities, and including ground water dependant ecosystems. The assessment should involve the following steps:                                                                                                                                                                                                                                                                                                                                                                                                  | 5.6 & Appendix 6            |
| i. conduct baseline surveys, and consult relevant databases and listings by the Scientific Committee. This will also provide an assessment of vegetation communities considering the local and regional significance of these communities;                                                                                                                                                                                                                                                                                                                                                                                                                       | 5.6 & Appendix 6            |
| ii. describe the types and condition of habitat in, and adjacent to, the land to be affected by the proposal;                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 5.6.1 & 5.6.2               |
| iii. prepare a list of species, populations or ecological communities, or their habitats, that may occur on the site, and conduct targeted surveys for these;                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Appendix 6                  |
| iv. apply the '8 part test' (section 5A of the EP&A Act) to species, populations or ecological communities, or their habitats, that may be affected by the proposal. The EIS must justify any decision to not apply the test to all of the species, populations or ecological communities identified in step iii;                                                                                                                                                                                                                                                                                                                                                | Appendix 6                  |
| v. Prepare a Species Impact Statement for any critical habitats, species, populations or ecological communities, or their habitats that are likely to be significantly affected by the proposal (note: An SIS must be prepared in accordance with the requirements of the Director-General of the National Parks and Wildlife Service);                                                                                                                                                                                                                                                                                                                          | N/A                         |
| vi. Provide details of any proposed native vegetation clearance and consultation with the Department of Land and Water Conservation (DLWC) undertaken;                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 5.6.5 & 1.6.1               |
| vii. Provide details of any proposed mitigative strategies, including revegetation/rehabilitation works (including details on the possibility of endemic seed or vegetative material collection) and the provision of compensatory habitat.                                                                                                                                                                                                                                                                                                                                                                                                                      | 5.6.6, 6.5 & 6.10           |
| <b><i>Transportation and Roads</i></b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                             |
| Traffic impact study for the proposed construction and operational traffic on local and State roads, particularly truck movements along affected roads during construction and operation of the coal mine. If it is proposed for heavy vehicles to use non-private roads, the use of such routes should be justified and the impacts of road haulage on the existing and proposed communities adjacent to George Booth Drive be assessed                                                                                                                                                                                                                         | 5.11                        |
| Details of the design and location of the proposed realignment of Wakefield and Rhondda Roads                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 4.15 & 5.11.1               |
| Details of the proposal to use the ramps from the coal haul road onto Awaba Road, to be built by Powercoal                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 5.11                        |

| <b>Matters to be Considered in the Environmental Impact Statement</b>                                                                                                                                                                                                                                                                                                                                                                                                                                           | <b>Section</b>                      |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------|
| Assess road traffic noise impact in accordance with EPAs Environmental Criteria for Road Traffic Noise                                                                                                                                                                                                                                                                                                                                                                                                          | 5.8.2.2,<br>5.8.4.2 &<br>Appendix 8 |
| Detail proposed mitigation measures and traffic management measures to reduce potential impacts                                                                                                                                                                                                                                                                                                                                                                                                                 | 5.11 & 6.6                          |
| Detail any developer contributions to the upgrade and maintenance roads on haulage routes                                                                                                                                                                                                                                                                                                                                                                                                                       | 5.11                                |
| <b>Visual</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                     |
| Detail the visual impact of all components of the proposal, including emplacement areas, stockpiles, surface facilities, night lighting and the diversion road. Clear illustration is to be given of predicted visual impacts through the life of the mine from sensitive receiver locations, particularly private residences                                                                                                                                                                                   | 5.10                                |
| Detail proposed management measures to be adopted to limit visual effect. This should include consideration of an earthen bund or tree screen to block the view of the mine from the re-routed Wakefield Road                                                                                                                                                                                                                                                                                                   | 5.10.3                              |
| <b>Mine Operations</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                     |
| Describe all components that make up the proposal, including details of all surface infrastructure to be utilised, and a clear identification of the development application area including a land description with Lot and DP references. This shall include details of all land ownership, mining titles and lease boundaries. The EIS shall assess the environmental impacts of each component                                                                                                               | 2.1.2 & 4.1                         |
| Detail proposed mining program, stages and timeframe                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 4.3                                 |
| Provide details of a Mining Operations Plan (prepared in accordance with DMR Guidelines)                                                                                                                                                                                                                                                                                                                                                                                                                        | 6.12.1.1                            |
| Detail the interrelationship of the proposal with existing developments and existing approved development consents                                                                                                                                                                                                                                                                                                                                                                                              | 1.2, 3.0 &<br>4.0                   |
| Provide a resource and reserve statement (in consultation with DMR) including an overview of site geology, coal geology and quality, in situ reserves, recoverable, mineable and saleable reserves and limits of mining                                                                                                                                                                                                                                                                                         | 4.2                                 |
| <b>Rehabilitation</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                     |
| Details of the proposed rehabilitation of the site to return the mined areas to a stable and productive landform. This should include an outline of the rehabilitation procedures, proposed timing to initiate and complete the rehabilitation, details of proposed revegetation works, potential factors influencing the success of the rehabilitation and details of the proposed contingency measures should the rehabilitation be ineffective. This shall be detailed in a rehabilitation plan for the site | 4.17 & 6.10                         |
| Identify the impact of any unstable soils on the land rehabilitation program specifically where tunnel erosion is a potential problem                                                                                                                                                                                                                                                                                                                                                                           | 5.3                                 |
| Proposals for the management of stockpiled topsoil so as to best ensure maximum retrieval and weed control                                                                                                                                                                                                                                                                                                                                                                                                      | 5.3.3                               |
| <b>Heritage</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                     |
| Provide an Aboriginal heritage assessment, which conforms to the NPWS Guideline titled 'Aboriginal Cultural Heritage and the Integrated Development Assessment Process'. Provide an assessment of European heritage in consultation with NSW Heritage                                                                                                                                                                                                                                                           | 5.9 &<br>Appendix 9                 |
| Detail potential impacts of surface works and infrastructure (including drainage works) on areas of cultural and/or archaeological sensitivity, and detail proposed mitigative and management measures. Include documentation from the Aboriginal community outlining their assessment and recommendations and incorporate these into the recommended management measures in the EIS                                                                                                                            | 5.9, 6.7 and<br>Appendix 9          |
| Identify and map Aboriginal sites which will be affected by the proposal and for which Section 90 consent will be sought under the <i>National Parks and Wildlife Act, 1974</i>                                                                                                                                                                                                                                                                                                                                 | 5.9                                 |
| Identify any native title rights in relation to Crown land, in accordance with the <i>Native Title (Commonwealth) Act, 1993</i>                                                                                                                                                                                                                                                                                                                                                                                 | 2.2.1.2                             |

| <b>Matters to be Considered in the Environmental Impact Statement</b>                                                                                                                                                                                                                                                                                                                                                                                                 | <b>Section</b>    |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|
| Investigate any Aboriginal land claims pursuant to the <i>Aboriginal Land Rights Act, 1983</i>                                                                                                                                                                                                                                                                                                                                                                        | 2.2.2.14          |
| <b><i>Cumulative Impacts</i></b>                                                                                                                                                                                                                                                                                                                                                                                                                                      |                   |
| Assess potential cumulative impacts of the proposal having regard to existing and likely future development in the locality. Consider noise, air quality, visual, water issues, traffic impacts and any loss of Aboriginal or non-Aboriginal heritage items, vegetation or fauna habitat                                                                                                                                                                              | 5.18              |
| <b>OTHER ISSUES</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                   |
| Detail the proposed change in route of the Great North Walk to accommodate the mine plan and consultation with relevant authority regarding this realignment                                                                                                                                                                                                                                                                                                          | 5.12.5            |
| <b><i>State Significant Development Requirements</i></b>                                                                                                                                                                                                                                                                                                                                                                                                              |                   |
| Nominate the name (and contact number) of a person who will be made available to answer public enquires about the proposal                                                                                                                                                                                                                                                                                                                                            | Refer to DA form  |
| Detail consultation held with the community who is likely to be affected                                                                                                                                                                                                                                                                                                                                                                                              | 1.6.1             |
| Consult with the local Council and advise the Department of the relevant newspapers circulating in the area affected by the proposal                                                                                                                                                                                                                                                                                                                                  | Completed         |
| <b><i>Guidelines</i></b>                                                                                                                                                                                                                                                                                                                                                                                                                                              |                   |
| The Department's EIS Guideline 'Coal Mines and Associated Infrastructure' should also be consulted in the preparation of the EIS.                                                                                                                                                                                                                                                                                                                                     | Entire document   |
| <b><i>Integrated Development</i></b>                                                                                                                                                                                                                                                                                                                                                                                                                                  |                   |
| The EIS should also address the detailed requirements of the integrated approval bodies: DLWC, EPA, LMCC, and MSB.                                                                                                                                                                                                                                                                                                                                                    | 1.5               |
| The applicant shall consult the RTA regarding any works affecting a classified road and include any requirements for the preparation of the EIS, should concurrence of the RTA be necessary                                                                                                                                                                                                                                                                           | 1.6.2             |
| <b><i>Consultation</i></b>                                                                                                                                                                                                                                                                                                                                                                                                                                            |                   |
| Consult LMCC and take into account any comments the Council may have in the preparation of the EIS. The EIS should also address other issues that emerge from consultations with relevant local, State and Commonwealth government authorities, service providers and community groups, in particular DLWC, EPA, NPWS, MSB, DMR, RTA, NSW Agriculture, Energy Australia, NSW Fisheries, NSW Heritage, Environment Australia, and the relevant local Aboriginal groups | 1.6.2             |
| <b><i>Commonwealth Environment Protection and Biodiversity Conservation Act 1999</i></b>                                                                                                                                                                                                                                                                                                                                                                              |                   |
| If you need approval under the Commonwealth Act, the EIS will be expected to assess the impacts on these matters                                                                                                                                                                                                                                                                                                                                                      | 2.2.1.1           |
| <b>CONTENT OF EIS</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                   |
| Pursuant to Schedule 2 and clause 54A of the Environmental Planning and Assessment Regulation 1994 (the Regulation), an EIS must include:                                                                                                                                                                                                                                                                                                                             |                   |
| 1. A summary of the environmental impact statement.                                                                                                                                                                                                                                                                                                                                                                                                                   | Executive Summary |
| 2. A statement of the objectives of the development or activity.                                                                                                                                                                                                                                                                                                                                                                                                      | 1.4               |
| 3. An analysis of any feasible alternatives to the carrying out of the development or activity, having regard to its objectives, including the consequences of not carrying out the development of activity                                                                                                                                                                                                                                                           | 7.1               |

| Matters to be Considered in the Environmental Impact Statement                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Section                                                                        |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------|
| <p>4. An analysis of the development or activity, including:</p> <p>(a) a full description of the development or activity; and</p> <p>(b) a general description of the environment likely to be affected by the development or activity, together with a detailed description of those aspects of the environment that are likely to be significantly affected; and</p> <p>(c) the likely impact on the environment of the development or activity; and</p> <p>(d) a full description of the measures proposed to mitigate any adverse effects of the development or activity on the environment; and</p> <p>(e) a list of any approvals that must be obtained under any Act or law before the development or activity may be lawfully carried out</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | <p>}</p> <p>}</p> <p>} 4.0</p> <p>}</p> <p>5.0</p> <p>5.0, 6.0</p> <p>6.12</p> |
| <p>5. A compilation (in a single section of the environmental impact statement) of the measures referred to in item 4(d)</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | <p>6.0</p>                                                                     |
| <p>6. The reasons justifying the carrying out of the development or activity in the manner proposed, having regard to biophysical, economic and social considerations and the principles of ecologically sustainable development.</p> <p>(a) The precautionary principle – namely, that if there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation. In the application of the precautionary principle, public and private decisions should be guided by:</p> <p>(i) careful evaluation to avoid, wherever practicable, serious or irreversible damage to the environment, and</p> <p>(ii) an assessment of the risk-weighted consequences of various options,</p> <p>(b) Inter-generational equity – namely, that the present generation should ensure that the health, diversity and productivity of the environment is maintained or enhanced for the benefit of future generations,</p> <p>(c) Conservation of biological diversity and ecological integrity, namely, that conservation of biological diversity and ecological integrity should be a fundamental consideration,</p> <p>(d) Improved valuation, pricing and incentive mechanisms, namely, that environmental factors should be included in the valuation of assets and services, such as:</p> <p>(i) polluter pays, that is, those who generate pollution and waste should bear the cost of containment, avoidance or abatement,</p> <p>(ii) the users of goods and services should pay prices based on the full life cycle of costs providing goods and services, including the use of natural resources and assets and the ultimate disposal of any waste,</p> <p>(iii) environmental goals, having been established, should be pursued in the most cost effective way, by establishing incentive structures, including market mechanisms, that enable those best placed to maximise benefits of minimise costs to develop their own solutions and responses to environmental problems</p> | <p>7.0</p> <p>7.3.1</p> <p>7.3.2</p> <p>7.3.3</p> <p>7.3.4</p>                 |

## **SECTION 9**

### **References**

## 9.0 REFERENCES

- Australian Bureau of Agricultural and Resource Economics, 1998. Implications of the Kyoto Protocol for APEC Coal Markets, JAPAC International Symposium, Tokyo, 12-13 February 1998.
- Australian Bureau of Statistics, 1996. Basic Community Profiles.
- Australian Bureau of Statistics, 1986. Census of Population and Housing.
- Australian Bureau of Statistics, 1991. Census of Population and Housing.
- Australian Bureau of Statistics, 1996. Census of Population and Housing.
- Clouston, 1997. Lake Macquarie Recreation and Open Space Plan – Scenic Quality Plan. Prepared for Lake Macquarie City Council.
- Commonwealth of Australia, 1992. Intergovernmental Agreement on the Environment and National Strategy for Ecologically Sustainable Development, Australian Government Publishing Service, Canberra.
- Department of Land and Water Conservation, 1999. Draft Guidelines for Designing Stable Drainage Lines on Rehabilitated Mine Sites, NSW Department of Land and Water Conservation, Sydney.
- Department of Mineral Resources, 1998. Preparation of Mining Operation Plans, NSW Department of Mineral Resources, St Leonards, Sydney.
- Department of Mineral Resources, 1998. Preparation of Annual Environmental Management Reports, NSW Department of Mineral Resources, St Leonards, Sydney.
- Department of Mineral Resources, 2000. Coal Industry Profile. NSW Department of Mineral Resources, St Leonards, Sydney.
- Department of Mineral Resources, 2001. Coal Industry Profile. NSW Department of Mineral Resources, St Leonards, Sydney.
- Department of Planning, 1984. Circular No. 10 Planning in Fire Prone Areas.
- Department of Planning, 1994. Population Projections.
- Department of Urban Affairs and Planning, 1997. Upper Hunter Cumulative Impact Study and Strategy.
- Elliot GL and Veness RA, 1981. Selection of Topdressing Material for Rehabilitation of Disturbed Areas in the Hunter Valley. J. Soil Cons. NSW 37(1), pp. 37-40.
- Emery KA, undated. Rural Land Capability Mapping. Soil Conservation Service of New South Wales, Sydney.
- Environment Protection Authority, 2000. Industrial Noise Policy – Environmental Noise Management, Environment Protection Authority, Chatswood.
- Houghton PD & Charman PEV, 1986. Glossary of Terms used in Soil Conservation. Soil Conservation Service of NSW.

- Lake Macquarie City Council, 2001. Draft Lake Macquarie Local Environmental Plan 2001. Lake Macquarie City Council.
- Lambert E, Davidson J, Shilling M & Shilling K, 1988. 'Neath Mount Sugarloaf Book 2. West Wallsend Public School Centenary Committee.
- Luke RH & McArthur AG, 1978. Bushfires in Australia. Department of Primary Industry, CSIRO Division of Forestry Research. AGPS, Canberra.
- NERDDC, 1988. Air pollution from surface coal mining: Volume 2 Emission factors and model refinement, National Energy Research and Demonstration Council, Project 921.
- NSW Fisheries, 1999. Policy and Guidelines for Bridges, Roads, Causeways, Culverts and Similar Structures.
- Riddler AMH, 1990. Agricultural suitability maps – uses and limitations. Agfacts. NSW Agriculture and Fisheries.
- Sokoloff S, 1991. Youngy: Then and Now (The Story of Young Wallsend/Edgeworth). Edgeworth School Centenary Committee.
- US EPA, 1985. Compilation of air pollutant emission factors, AP-42, Fourth Edition United States Environmental Protection Agency, Office of Air and Radiation, Office of Air Quality Planning Standards, Research Triangle Park, North Carolina 27711.
- Williams A, 2001. Report on Geology, Resources and Reserves Westside Mine and Proposed Extension. Prepared as Attachment No 5 to MLA for Westside Mine Extension for Oceanic Coal Australia Limited.

## **SECTION 10**

### **Abbreviations and Glossary**

## **10.0 ABBREVIATIONS AND GLOSSARY**

### **10.1 ABBREVIATIONS**

|               |                                                               |
|---------------|---------------------------------------------------------------|
| <b>AEMR</b>   | Annual Environmental Management Report                        |
| <b>ANZECC</b> | Australian and New Zealand Environment & Conservation Council |
| <b>ARI</b>    | Average Recurrence Interval                                   |
| <b>CL</b>     | Coal Lease                                                    |
| <b>DA</b>     | Development Application                                       |
| <b>DCP</b>    | Development Control Plan                                      |
| <b>DLWC</b>   | Department of Land and Water Conservation                     |
| <b>DMR</b>    | Department of Mineral Resources                               |
| <b>DUAP</b>   | Department of Urban Affairs and Planning                      |
| <b>EIS</b>    | Environmental Impact Statement                                |
| <b>ENCM</b>   | Environmental Noise Control Manual                            |
| <b>EPA</b>    | Environment Protection Authority                              |
| <b>EPI</b>    | Environmental Planning Instrument                             |
| <b>EPL</b>    | Environment Protection Licence                                |
| <b>HVS</b>    | High volume sampler                                           |
| <b>INP</b>    | Industrial Noise Policy                                       |
| <b>LALC</b>   | Local Aboriginal Land Council                                 |
| <b>LEP</b>    | Local Environmental Plan                                      |
| <b>LGA</b>    | Local Government Area                                         |
| <b>m/s</b>    | metres per second                                             |
| <b>mAHD</b>   | metres above the Australian Height Datum                      |
| <b>MCJV</b>   | Macquarie Coal Joint Venture                                  |
| <b>MIC</b>    | maximum instantaneous charge                                  |
| <b>ML</b>     | Mining Lease                                                  |

|             |                                                          |
|-------------|----------------------------------------------------------|
| <b>MLA</b>  | Mining Lease application                                 |
| <b>MOP</b>  | Mining Operation Plan                                    |
| <b>MSB</b>  | Mine Subsidence Board                                    |
| <b>Mtpa</b> | million tonnes per annum                                 |
| <b>NPWS</b> | National Parks and Wildlife Service                      |
| <b>OCAL</b> | Oceanic Coal Australia Limited                           |
| <b>RBL</b>  | Rating Background Level                                  |
| <b>REP</b>  | Regional Environmental Plan                              |
| <b>ROM</b>  | run of mine                                              |
| <b>RTA</b>  | Roads and Traffic Authority                              |
| <b>RTNP</b> | Environmental Criteria for Road Traffic Noise (EPA 1999) |
| <b>SEPP</b> | State Environmental Planning Policy                      |
| <b>TSP</b>  | total suspended particulate                              |
| <b>TSS</b>  | total suspended solids                                   |

## 10.2 GLOSSARY

|                        |                                                                                            |
|------------------------|--------------------------------------------------------------------------------------------|
| <b>A1 Horizon:</b>     | The uppermost layer of soil generally containing some humus.                               |
| <b>Acoustics:</b>      | Sound and its characteristics.                                                             |
| <b>AHD:</b>            | Australian Height Datum.                                                                   |
| <b>Alluvium:</b>       | Sediment deposited by a flowing stream, e.g., clay, silt, sand, etc.                       |
| <b>Amenities:</b>      | Lunch room, showers and toilets.                                                           |
| <b>Amenity:</b>        | An agreeable feature, facility or service which makes for a comfortable and pleasant life. |
| <b>Aquifer:</b>        | A water-bearing rock formation.                                                            |
| <b>Arboreal:</b>       | Adapted for living and moving around in trees.                                             |
| <b>Archaeological:</b> | Pertaining to the study of culture and description of its remains.                         |

|                                           |                                                                                                                                                                                 |
|-------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Average Recurrence Interval (ARI):</b> | The statistically calculated interval likely to be exceeded once in a given period of time. A term used in hydrology, also known as return period.                              |
| <b>Background Noise:</b>                  | Existing noise in the absence of the sound under investigation and all other extraneous sounds.                                                                                 |
| <b>Baseline Studies:</b>                  | Studies conducted to establish prevailing environmental conditions.                                                                                                             |
| <b>Batter:</b>                            | The excavated or constructed face resulting from earthmoving operations.                                                                                                        |
| <b>Catchment Area:</b>                    | The area from which a river or stream receives its water.                                                                                                                       |
| <b>Coal Reserves:</b>                     | Those parts of the Coal Resources for which sufficient information is available to enable detailed or conceptual mine planning and for which such planning has been undertaken. |
| <b>Coal Resources:</b>                    | All of the potentially useable coal in a defined area, based on geological data at certain points and extrapolations from these points.                                         |
| <b>Conglomerate:</b>                      | A rock type comprising greater than 50% rounded waterworn fragments (>2 mm in size) of rock or pebbles cemented together by another mineral substance.                          |
| <b>Conservation:</b>                      | The management of natural resources in a way that will preserve them for the benefit of both present and future generations.                                                    |
| <b>Dangerous Goods Act, 1975:</b>         | Legislation which places controls on the handling of certain goods including explosives, gases, flammable liquids and radioactive substances.                                   |
| <b>Decibel (dB):</b>                      | A unit for expressing the relative intensity of sounds on a logarithmic scale from zero (for average least perceptible sound) to about 130 (for the average pain level).        |
| <b>Decibel dB(A):</b>                     | A modified decibel scale which is weighted to take account of the frequency response of the normal human ear.                                                                   |
| <b>Dip:</b>                               | The direction in which rock strata is inclined.                                                                                                                                 |
| <b>Dispersibility:</b>                    | The proportion of clays and fine silts (defined by having a particle size of less than 0.005 mm) in a soil which can disperse into water on wetting.                            |
| <b>Duplex Soils:</b>                      | A soil in which there is a sharp change in texture between the A and B horizons.                                                                                                |

|                                                                       |                                                                                                                                                            |
|-----------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Ecology:</b>                                                       | The science dealing with the relationships between organisms and their environment.                                                                        |
| <b>Ecosystem:</b>                                                     | Organisms of a community together with its non-living components through which energy and matter flow.                                                     |
| <b>Effluent:</b>                                                      | The liquid waste of sewage and industrial processes.                                                                                                       |
| <b>Environmental Planning and Assessment Act, 1979:</b>               | NSW Government Act to provide for the orderly development of land in NSW.                                                                                  |
| <b>Environment Protection and Biodiversity Conservation Act 1999:</b> | Commonwealth legislation that regulates development proposals that have an actual or potential impact on matters of national environmental significance.   |
| <b>Erodibility:</b>                                                   | The susceptibility of a soil to undergo erosion, based on the inherent characteristics of the soil.                                                        |
| <b>Fauna:</b>                                                         | All vertebrate animal life of a given time and place.                                                                                                      |
| <b>Floodplain:</b>                                                    | Large flat area of land adjacent to a stream which is inundated during times of high flow.                                                                 |
| <b>Flora:</b>                                                         | All vascular plant life of a given time and place.                                                                                                         |
| <b>Geological:</b>                                                    | Science relating to the earth, the rocks of which it is composed and the changes it undergoes.                                                             |
| <b>Geotechnical:</b>                                                  | Relates to the form, arrangement and structure of geology.                                                                                                 |
| <b>Groundwater:</b>                                                   | Sub-surface water which is within the saturated zone and can supply wells and springs. The upper surface of this saturated zone is called the water table. |
| <b>Habitat:</b>                                                       | The environment in which a plant or animal lives; often described in terms of geography and climate.                                                       |
| <b>Hydrogeologic:</b>                                                 | The relation of hydrological phenomena to the surface geology.                                                                                             |
| <b>Hydrology:</b>                                                     | Science that relates to the properties, distribution and circulation of the earth's water.                                                                 |
| <b>Indigenous:</b>                                                    | Native to, or originating in, a particular region or country.                                                                                              |
| <b>In situ:</b>                                                       | In its original place.                                                                                                                                     |
| <b>Kilo Volt (kV):</b>                                                | One thousand volts.                                                                                                                                        |
| <b>L<sub>A1</sub> Noise Level:</b>                                    | The noise level exceeded for 1% of the time. It is used in assessment of sleep disturbance.                                                                |

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| <b>L<sub>A10</sub> Noise Level:</b> | The noise level, measured in dB(A), which is exceeded for 10% of the time, which is approximately the average of the maximum noise levels.                                                                                                                                                                  |
| <b>L<sub>A90</sub> Noise Level:</b> | The noise level, measured in dB(A), exceeded for 90% of the time, which is approximately the average of the minimum noise levels. The L <sub>90</sub> level is often referred to as the “background” noise level and is commonly used to determine noise criteria for assessment purposes.                  |
| <b>L<sub>Aeq</sub> Noise Level:</b> | The average noise energy, measured in dB(A), during a measurement period.                                                                                                                                                                                                                                   |
| <b>Land Capability:</b>             | The ability of a parcel of land to be used in a sustainable manner (that is without permanent damage) for a given land use.                                                                                                                                                                                 |
| <b>Landform:</b>                    | Sections of the earth’s surface which have a definable appearance (eg cliff, valley, mountain range, plain, etc).                                                                                                                                                                                           |
| <b>Mean:</b>                        | The average value of a particular set of numbers.                                                                                                                                                                                                                                                           |
| <b>Measured Resources:</b>          | Those coal resources for which the density and quality of points of observation are sufficient to allow a reliable estimate of the coal thickness, quality, depth, and <i>in situ</i> tonnage and properties of the coal relevant to its proposed usage.                                                    |
| <b>Median Value:</b>                | A value above and below which there are equal numbers of data values.                                                                                                                                                                                                                                       |
| <b>Megalitre (ML):</b>              | One million litres.                                                                                                                                                                                                                                                                                         |
| <b>Meteorology:</b>                 | Science dealing with atmospheric phenomena and weather.                                                                                                                                                                                                                                                     |
| <b>Mining Act, 1992:</b>            | NSW legislation to regulate the prospecting and mining of minerals in the State of NSW. Department of Mineral Resources administers the legislation, which places controls on methods of exploration and mining as well as the disposal of mining wastes, land rehabilitation and environmental management. |
| <b>Mitigate:</b>                    | To lessen in force, intensity or harshness. To moderate in severity.                                                                                                                                                                                                                                        |
| <b>Native:</b>                      | Belonging to the natural flora or fauna in a region.                                                                                                                                                                                                                                                        |
| <b>Outcrop:</b>                     | Bedrock exposed at the ground surface.                                                                                                                                                                                                                                                                      |
| <b>Pan Evaporation:</b>             | The rate of evaporation from a standard shallow circular pan. The pan is filled with water and the loss of water is measured once a day.                                                                                                                                                                    |

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|-----------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Particulates:</b>                                      | Fine solid particles which remain individually dispersed in gases.                                                                                                                                                         |
| <b>Peak Discharge:</b>                                    | Maximum discharge down a stream following a storm event.                                                                                                                                                                   |
| <b>Permeability:</b>                                      | The capacity of rock or solid to transmit fluids (through pores, bedding planes or joints).                                                                                                                                |
| <b>pH:</b>                                                | Scale used to express acidity and alkalinity. Values range from 0-14 with seven representing neutrality. Numbers from seven to zero represent increasing acidity whilst seven to fourteen represent increasing alkalinity. |
| <b>Precipitation:</b>                                     | Rain, snow, sleet, dew formed by the condensation of water vapour in the atmosphere.                                                                                                                                       |
| <b>Protection of the Environment Operations Act 1997:</b> | NSW legislation administered by the Environment Protection Authority that regulates discharges to land, air and water.                                                                                                     |
| <b>Rating Background Level (RBL):</b>                     | A period (day, evening or night) background noise level determined in accordance with chapter 3 of the EPA Industrial Noise Policy (EPA, 2000).                                                                            |
| <b>Recycling:</b>                                         | The return of waste materials to the production system so that the need for use of raw materials is reduced.                                                                                                               |
| <b>Rehabilitation:</b>                                    | The process of restoring to a condition of usefulness. In regard to mining, relates to restoration of land from a degraded or mined condition to a stable and vegetated landform.                                          |
| <b>Revegetation:</b>                                      | The process of re-establishing vegetation cover.                                                                                                                                                                           |
| <b>Run of Mine (ROM):</b>                                 | Bulk material extracted from a mine, before it is processed in any way.                                                                                                                                                    |
| <b>Salinity:</b>                                          | A measure of the concentration of dissolved solids in water.                                                                                                                                                               |
| <b>Sandstone:</b>                                         | A cemented or otherwise compacted sedimentary rock composed predominantly of sand-size quartz grains.                                                                                                                      |
| <b>Seam:</b>                                              | An identifiable discrete coal unit.                                                                                                                                                                                        |
| <b>Sedimentation:</b>                                     | Deposition or settling of materials by means of water, ice or wind action.                                                                                                                                                 |
| <b>Sedimentation Dam:</b>                                 | A dam built to retard dirty runoff to allow sediment to settle out before allowing clean water discharge.                                                                                                                  |
| <b>Sewage:</b>                                            | Waste matter discharged to a sewer.                                                                                                                                                                                        |
| <b>Sewerage:</b>                                          | Works for collecting, treating and disposing of sewage.                                                                                                                                                                    |

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|--------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Site Specific Context:</b>              | Relating to conditions existing at a particular location.                                                                                                                                                |
| <b>Socio-economic:</b>                     | Combination of social and economic factors.                                                                                                                                                              |
| <b>Sound Power Level (SWL):</b>            | The total sound energy radiated per unit time measured as 10 times a logarithmic scale, the reference power being 12 picowatts.                                                                          |
| <b>Sound Pressure Level (SPL):</b>         | Fluctuations in pressure measured as 10 times a logarithmic scale, the reference pressure being 20 micropascals.                                                                                         |
| <b>Spontaneous Combustion:</b>             | Spontaneous ignition of some or all of a combustible material.                                                                                                                                           |
| <b>Stratigraphic Column:</b>               | A sequence of sedimentary rock layers.                                                                                                                                                                   |
| <b>Subcrop:</b>                            | A unit of material that occurs just below the soil profile.                                                                                                                                              |
| <b>Subsidence Impacts:</b>                 | The effect on the land surface due to overlying strata falling into the void left by underground mining.                                                                                                 |
| <b>Surface Drainage Patterns:</b>          | The pattern described by water flowing over the land surface when viewed from above.                                                                                                                     |
| <b>Surface Infrastructure:</b>             | Any man made object, facility or structure on the surface of the land.                                                                                                                                   |
| <b>Thermal Coal:</b>                       | Includes medium to high ash, low sulphur coals used for domestic power generation and medium to low ash high energy coals which are exported.                                                            |
| <b>Topography:</b>                         | Description of all the physical features of an area of land and their relative positions, either in words or by way of a map.                                                                            |
| <b>Total Dissolved Solids (TDS):</b>       | A measure of salinity expressed in milligrams per litre (mg/L).                                                                                                                                          |
| <b>Total Suspended Particulates (TSP):</b> | A measure of the total amount of undissolved matter in a volume of water or air usually expressed in milligrams per litre (mg/L) (for water) or micrograms per cubic metre (ug/m <sup>3</sup> ) for air. |
| <b>Turbidity:</b>                          | A measure of the amount of suspended solids (usually fine clay or silt particles) in water.                                                                                                              |
| <b>Understorey:</b>                        | Vegetation which grows below the canopy of a forest.                                                                                                                                                     |
| <b>Volatile Matter:</b>                    | Matter which is readily transformed to a gaseous state.                                                                                                                                                  |
| <b>Woodland:</b>                           | Land covered by trees that do not form a closed canopy.                                                                                                                                                  |