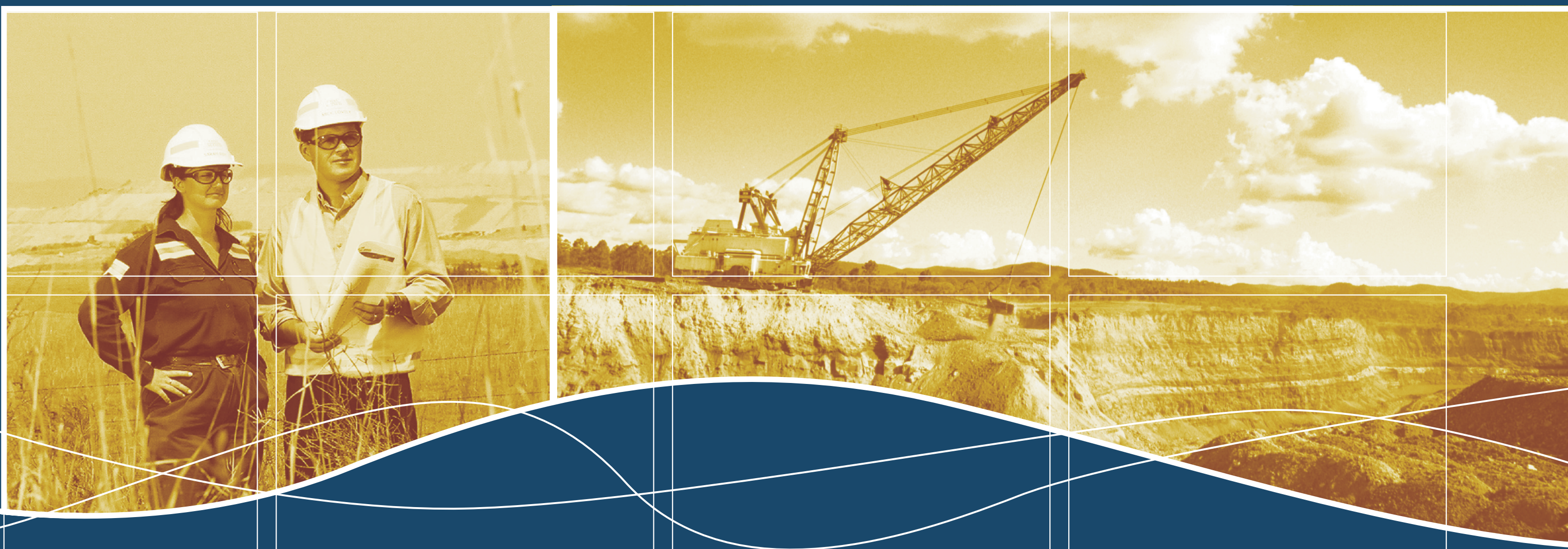
HUNTER VALLEY OPERATIONS

West Pit Extension and Minor Modifications



environmental impact statement

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Hunter Valley Operations
West Pit Extension and Minor Modifications

Environmental Impact Statement

for

Coal & Allied Operations

October 2003

COAL & ALLIED

A Rio Tinto Group Company

HUNTER VALLEY OPERATIONS

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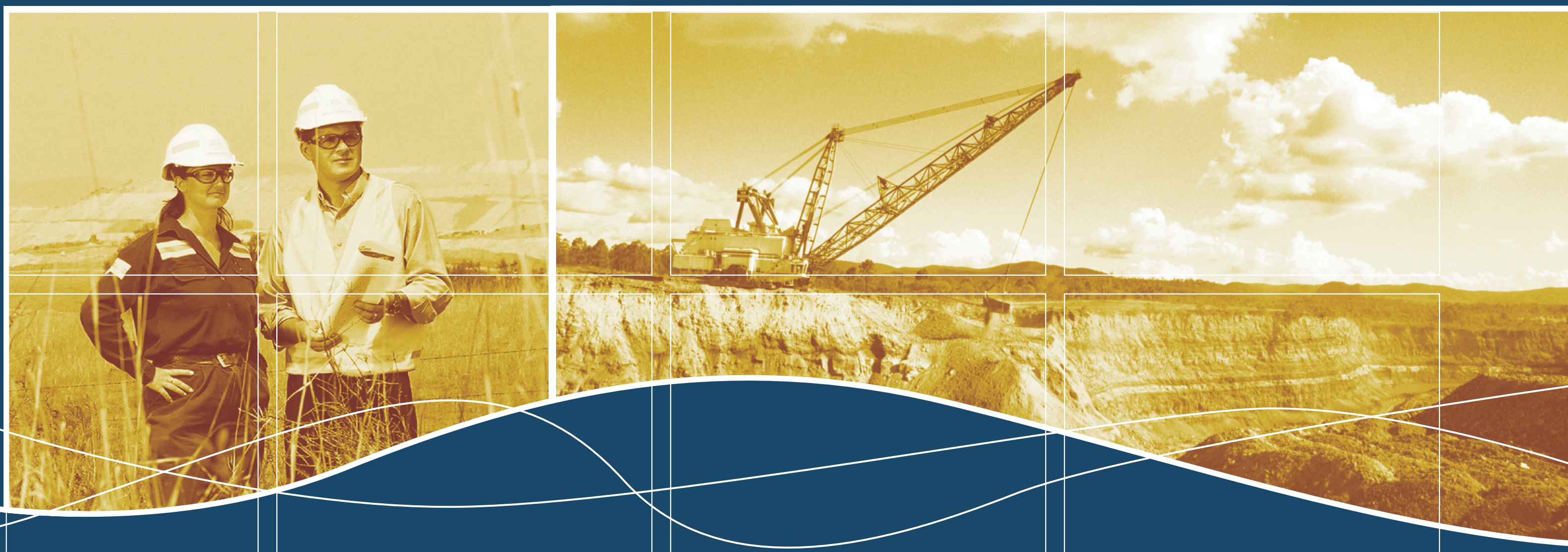

environmental impact statement

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Job number: 8030094

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Date:	**17 October 2003**	Date:	**17 October 2003**	Date:	**17 October 2003**

ERM

Executive Summary

Introduction

Hunter Valley Operations (HVO) is an existing open cut coal mine complex that is wholly owned and operated by Coal & Allied Operations Pty Limited (CNA). HVO is bisected by the Hunter River and is serviced by one integrated fleet of equipment and personnel.

HVOs mining activities north of the Hunter River comprise of four coal mining areas (including West Pit, Carrington, North Pit and the Alluvial Lands), three coal preparation plants (CPPs), two rail loading points, two administration areas, two workshops and numerous internal haul roads and conveyors.

The proposal that forms the basis of this environmental impact statement (EIS) includes the activities currently undertaken north of the Hunter River and extends them as described herein. In doing this, it consolidates the existing 18 approvals for activities undertaken north of the Hunter River. Activities undertaken south of the Hunter River are not part of this proposal.

This EIS has been prepared by Environmental Resources Management Australia Pty Limited (ERM) in association with a number of specialist companies. The EIS has been prepared to support a development application (DA) to be submitted to the Minister for Infrastructure and Planning.

Project Need

The purpose of this project is to extend and improve the efficiency and environmental management of mining at West Pit and fully integrate West Pit into HVO north of the Hunter River. It also provides the opportunity for CNA to consolidate the 18 separate approvals across HVO north of the Hunter River and reduce administration difficulties experienced by both CNA, government agencies abd the community.

Integrating and extending the operations north of the Hunter River will provide benefits to both CNA and to the environment through improved environmental management and the use of real time monitoring across the whole site. This monitoring will allow CNA to actively manage their operations to reduce the impacts of noise or dust. Integrated water management will also potentially lead to the reduction in water supply and discharge requirements across HVO.

Approvals

Development consent is required under the *Environmental Planning and Assessment Act 1979 (EP&A Act)* for the proposal. The *EP&A Act* requires the preparation of an EIS to accompany the DA to the Minister for Infrastructure and Planning.

The purpose of the EIS is to enable consideration of the environmental, social and economic implications of proceeding with the proposal. It has been prepared in accordance with the *EP&A Act* and the *Environmental Planning and Assessment Regulation 2000 (EP&A Regulation)* which provide the framework for the environmental impact assessment of developments in NSW.

The Site and Surrounds

HVOs activities north of the Hunter River are located to the south of the New England Highway, approximately midway between Singleton and Muswellbrook in the Upper Hunter Valley of NSW. These activities are generally surrounded by mining and grazing uses.

HVOs mining activities north of the Hunter River comprise of:

- four coal mining areas, including the West and Mitchell Pits, Carrington, North Pit and the Alluvial Lands;
- the West Pit Coal Preparation Plant (WPCPP), Newdell Coal Preparation Plant (NCPP) and Hunter Valley Coal Preparation Plant (HVCPP);
- the Newdell Loading Point (NLP) and the Hunter Valley Loading Point (HVLP) train loading facilities;
- two administration areas including bathhouses, one adjacent to the HVCPP and one adjacent to the WPCPP;
- two workshops, one adjacent to the HVCPP and one adjacent to the WPCPP; and
- internal haul roads and conveyors.

West Pit is located in the northern part of HVO, and in terms of size, is the largest mining area in HVO north of the Hunter River. Carrington is located to the south of West Pit. North Pit and the Alluvial Lands are located to the south of Carrington within a meander of the Hunter River.

HVO is located within two local government areas (LGAs). The majority of HVO north of the Hunter River is located within the Singleton LGA, including West Pit, Carrington, North Pit, the Alluvial Lands, WPCPP and HVCPP. The northern part of the lease, and the HVLP and NLP are located within the Muswellbrook LGA.

Overview of Existing Consents

General

The development of HVO has occurred through a process of expansion and acquisition since the beginning of operations. As a result, there are 18 separate development approvals which cover HVO's mining activities north of the Hunter River.

West Pit

West Pit is an open-cut dragline and truck and shovel operation that commenced mining in approximately 1952. The current approved annual production is 12 million tonnes per annum (Mtpa) run-of-mine (ROM) coal, which can be delivered by road to WPCPP, HVCPP or NCPP, for both domestic and export markets. ROM coal is transported via the western haul road, which is a private haul road, to the WPCPP and HVCPP. Saleable coal is transferred to Bayswater Power Station by conveyor for domestic consumption and the NLP by trucks along Pikes Gully Road for export consumption.

Activities that have been approved but are yet to be commenced are the mining of Mitchell Pit in the southern part of the lease, augmentation of the WPCPP to increase its capacity and construction of a conveyor from the WPCPP to the NLP.

Carrington

Carrington is operated under a development consent granted on 15 August 2000. The operation is an open-cut truck and shovel operation with an approved annual maximum production of 6 Mtpa of ROM coal. Coal is transported by private haul road to either the WPCPP or HVCPP, prior to delivery to nearby power stations or to the Port of Newcastle by rail through the HVLP.

North Pit

North Pit is an open-cut truck and shovel operation that commenced mining in 1979. Current approved annual production is an average of 4.2 Mtpa ROM coal (including the Alluvial Lands). Coal is currently transported via internal haul roads to HVCPP, prior to being conveyed to the HVLP for rail transport to the Port of Newcastle.

CNA previously owned Liddell CPP and up until 1989, ROM coal was delivered to this CPP for washing and rail loading.

The Alluvial Lands

The Alluvial Lands is an open-cut truck and shovel operation located within a large meander of the Hunter River. When approved, it was estimated that the Alluvial Lands would produce a total of 20.4 million tonnes of ROM. The Alluvial Lands project increased the total production at North Pit to an average of 4.2 Mtpa. ROM coal is transported by private haul road to HVCPP. All product coal is currently railed to the Port of Newcastle through HVLP.

WPCPP

WPCPP was commissioned in 1987 to supply domestic coal to the Electricity Commission of NSW. It is currently approved for 2,000 tonnes per hour (tph) ROM coal and currently processes coal from West Pit and Carrington. Transport of product coal from WPCPP is currently approved via conveyor to Bayswater Power Station and NLP.

Fine and coarse rejects are permitted to be disposed of in West Pit, Old Tailings Dam and Bobs Dump Tailings Dam.

Activities that have been approved but are yet to commence include the augmentation of WPCPP and facilities and the construction of 1,500 tph conveyor from WPCPP to NLP for transport of product coal (currently only approved in Singleton LGA).

HVCPP

HVCPP was constructed in approximately 1981/1982. It is currently approved for 13 Mtpa ROM coal and processes coal from West Pit, Carrington, North Pit, the Alluvial Lands, and Riverview and Cheshunt Pits located south of the Hunter River.

ROM coal is generally transported to HVCPP by truck however consent has been granted for a conveyor to transfer ROM coal from south of the Hunter River to the HVCPP. Product coal from HVCPP is transported by conveyor to the HVLP. Product coal can also be taken by road to a transfer station north of the New England Highway for conveyor transport to Liddell CPP, although since the sale of this CPP in 1989, this no longer occurs.

Fine and coarse rejects are permitted to be disposed in North Pit and in the North Pit Tailings Dam. Coal reject generated from the processing of West Pit coal at the HVCPP is permitted to be disposed in West Pit.

Works that have been approved but are yet to be commenced at HVCPP include the construction of a conveyor to deliver ROM coal from mining areas south of the Hunter River.

NCPP/NLP

NLP was originally installed to service Foybrook Coal. It is currently approved for a washing capacity of 750 tph and a loading rate 3,300 tph. Currently the plant is only used as a loading point although consent still exists for the operation of the washing facilities.

A modification to the consent for the haulage of 2 Mtpa product coal between the HVLP and the NLP was recently approved. The modification was for a period of 9 months.

Activities that are approved but yet to commence include the progressive decommissioning of the washing facilities at NCPP, construction of a conveyor from WPCPP to NLP (only approved in Singleton LGA) and construction of a 400,000 t capacity stockpile at NLP.

HVLP

Consent for HVLP was granted on 8 September 1981. It was subsequently constructed in 1982. Existing approvals for the HVLP include delivery of product coal via overland conveyor at a rate of 2,000 tph, storage of up to 530,000 t, loading capacity of 4,000 tph and rail transport to the Port of Newcastle. Since its construction, the HVLP has been the primary rail loading facility for HVO.

A modification to the consent for the haulage of 2 Mtpa product coal between the HVLP and the NLP was recently approved.

Proposal Description

West Pit currently operates within Coal Mine Lease (CML) 4. It is proposed to extend mining operations to the east into Mining Lease (ML) 1406, Exploration Lease (EL) 5243 and portions of ML 1468 and CML 4. The West Pit extension area is the only mining area in this proposal that does not have a current development consent.

To fully integrate the extension of West Pit into existing operations, as well as maximise resource recovery and ensure best practice environmental controls and management, it is proposed to consolidate the 18 approvals into one. In addition, this proposal also seeks to obtain approval for the following minor activities:

- intermittent transport of product coal between the HVLP, NLP and the Ravensworth Coal Terminal (RCT);
- intermittent haulage of coal from the HVCPP to the HVLP, NLP or RCT along the privately owned Belt Line Road;
- transfer of heavy equipment across the Hunter River via temporary crossings; and
- construction of a conveyor between the HVLP and NLP.

Approval to modify current approved activities are also sought, including:

- increase in capacity of the HVCPP from 13 Mtpa ROM coal to 20 Mtpa ROM coal;
- increase in haulage of coal from mining areas south of the Hunter River to HVCPP from 8 to 16 Mtpa ROM coal;
- allowing the HVCPP and WPCPP to process coal from any of the mining areas in HVO (including south of the Hunter River) and the ability to dispose of reject from any CPP in any approved disposal area within HVO;
- upgrading the Belt Line Conveyor which transfers coal from the HVCPP to the HVLP along the Belt Line Road; and
- increasing production rates at Carrington from 6 Mtpa to 10 Mtpa.

Consultation

General

A consultation strategy was undertaken as a part of the EIA process to assist in the identification of key issues for consideration by CNA and the EIS project team. Consultation with a range of government and community stakeholders was incorporated into the strategy to both inform the stakeholders of the project and to allow any issues of concern to be raised at an early stage of the planning process and incorporated into the EIS.

Government Consultation

All levels of government were consulted in order to identify key issues. Consultation with government has been both formal and informal, and information obtained and has been used to refine the EIS and project planning. In particular, extensive consultation has been conducted with DIPNR, Singleton Shire Council (SSC), Muswellbrook Shire Council (MSC), National Parks and Wildlife Service (NPWS), Environment Protection Authority (EPA) and Department of Mineral Resources (DMR).

Community Consultation

Community consultation was recognised to be an integral component of the proposed development and crucial to the issues identification process. A consultation strategy was developed to promote open and transparent communication with the local community, throughout the EIA process. Elements of the consultation strategy included:

- briefing of HVO employees throughout the EIS process through presentations, monthly reports and newsletters;
- conducting meetings with HVO north of the Hunter River's nearest neighbours;
- distribution of newsletters to surrounding community, including residents of Jerrys Plains;

- conducting community information days at Jerrys Plains;
- briefing the HVO Community Consultative Committee (HVO CCC);
- consultation with the surrounding mines and power stations; and
- consultation with indigenous stakeholders, including various meetings and site inspections with representatives of the local Aboriginal groups.

Environmental Assessment

Background

The project is State significant, integrated and designated development as defined in the *EP&A Act* and *EP&A Regulation*. Therefore, the Minister for Infrastructure and Planning will be the consent authority and an EIS needs to accompany the DA. Integrated development means that other approvals will be required before the development can lawfully be carried out. As such, the Minister must also obtain from each relevant approval body the general terms of any approval granted to the development.

This EIS was prepared in accordance with the *EP&A Act* and *EP&A Regulation* and the principals of ecologically sustainable development (ESD). It reflects the comments and requirements of authorities who have a statutory responsibility for some aspect or consequence of the proposal. The comments and concerns of local residents were also considered during its preparation. Under the *EP&A Act*, the EIS must be publicly exhibited for at least 28 days so interested parties can make formal submissions.

The EIS has examined the environmental consequences of the proposal and where appropriate has developed amelioration methods to minimise potential impacts. The following sections provide an overview of the findings of the EIS having regard to the biophysical, social and economic considerations of the environment.

Biophysical Considerations

Ecology

A flora and fauna study has shown that no flora and fauna species or their habitat or vegetation communities are likely to be lost from the local area as a result of the proposed extension. The West Pit extension area and its surrounds contains vegetation, habitats and flora and fauna species of local, regional and state significance. Potential impacts of the proposed extension include gradual loss of vegetation and habitat over 21 years and a corresponding small, short-term reduction in local and regional connectivity.

Impacts will be mitigated by proposed rehabilitation and regeneration strategies which connect isolated patches of vegetation to enhance regional corridors in accordance with the DMR's *Synoptic Plan*. These measures will conserve, enhance and manage habitat within the study area. The impacts on flora and fauna, including regionally significant biota and threatened and migratory species listed under the *TSC Act* and *EPBC Act*, are unlikely to be significant at the local, regional, state or national level.

Water Resources

Continued mining at HVO north of the Hunter River will result in ongoing loss of coal measures aquifer pressures for a period of more than 200 years. Depressurisation of the coal measures and depressurisation impacts are predicted to extend between 2 and 3 km from the pit perimeter at West Pit. Cumulative depressurisation arising from Carrington may extend the distance to about 3.5 km. This loss of pressure is not predicted to impact Hunter River alluvium or existing bores and wells.

The water quality will reflect that of the coal seams which have salinity levels observed to be 10,000 electrical conductivity (EC). Pumped pit water qualities reflect a composite but lower range of salinities, which range from less than 3,000 EC to more than 6,500 EC and represent a mix of coal measure water, seepage from the shallow regolith and rainfall runoff within the pit

Clean water run-off will continue to be segregated from mine water via the maintenance of contour drains, sedimentation and mine water dams. Continued mining will have a negligible impact on local and regional catchments. Parts of Emu Creek and Farrells Creek catchments will be consumed by mining. However parts of Davis Creek and Parnells Creek catchments will be rehabilitated and natural run-off returned to these creeks. This will result in a net increase in catchment runoff within West Pit at the completion of mining.

Modelling indicates near balanced systems providing Hunter River Salinity Trading Scheme (HRSTS) discharges are utilised during high and flood flows in the Hunter River and make up water remains available from mine dams or the Hunter River. The demand for make up water and the need for discharges will be reduced if storage within the Alluvial Lands is utilised. Connection of the West Pit and North Pit water management system via a pipeline between internal mine dams will facilitate water transfers between the two systems and maximise use of this storage.

Social Considerations

Noise

The noise modelling for HVO north of the Hunter River has shown that under calm weather conditions, all surrounding private residences that are not currently within a zone of affection or subject to a private land holders agreement, experience noise levels below the EPA's noise goals.

The model has also shown that under worst case weather conditions, noise at most properties is below or marginally (less than 3 dB) above EPA noise goals that have been historically applied for calm weather. The exceptions are some private properties located on the southern side of the Golden Highway where winds cause enhanced noise during the early stages of mine operations. However, the proposal's noise impacts at all these locations are predicted to remain similar to existing levels for the first eight years of operation. After this time, Carrington is likely to cease operation, which will contribute to a marked reduction in noise at most residences.

A comparison against possible acquisition limits imposed on similar mining operations suggest that four private residences currently inside a zone of affectation or subject to a private land holders agreement may fall within acquisition limits. Again, mining noise at these locations is predicted to remain relatively unchanged compared to existing levels.

Real time noise monitoring will be used to assess the performance of the mining operations against the predicted noise levels.

Vibration

HVO's existing blast design will incorporate control on the maximum instantaneous charge (MIC) as described in the noise study to ensure acceptable limits are maintained. This will also be addressed through monitoring.

Air Quality

Dust dispersion modelling has demonstrated that all private residences surrounding HVO north of the Hunter River that are not currently inside a zone of affectation or subject to a private land holders agreement will experience dust levels below EPA amenity and health goals for the life of the proposed operations.

Aboriginal Heritage

Aboriginal archaeology and cultural heritage studies were undertaken in consultation with local Aboriginal stakeholders. A number of Aboriginal archaeological sites and associated landform zones will be either partially or completely removed by the proposed extension of West Pit. The majority of sites are considered of low conservation significance, consisting of open artefact scatters many of which are already in disturbed contexts. The artefacts were of locally derived
raw materials and generally did not contain any attributes that make them unique or rare in the Upper Hunter Valley.

However, the overall impact on Aboriginal cultural significance was considered to be substantial given the destructive nature of open cut coal mining. Whilst the in-situ conservation of a number of sites is unfeasible due to the relative positions within the extension area, appropriate management in consultation with the local Aboriginal community including possible salvage operations and exclusion zones will minimise the impacts upon the conservation significance of the area.

Visual

West Pit will become increasingly visible along Lemington Road throughout the 21 year extension. However, the proposal forms an extension of existing operations at West Pit and will be visually integrated with surrounding mining operations throughout the locality.

The design of the mine plan and the proposed vegetation screening to be incorporated into the early stages of the mine plan, will provide significant screening of mining operations. As the mine approaches Lemington Road, bunding will be installed, if required. The vegetation screening will ensure that the proposal is sympathetic to significant viewer locations.

Night lighting is not expected to create significant impacts due to the visual shielding of active mining areas. Lighting will be restricted to the minimum necessary for operational and safety requirements and be directed away from incoming views. Lighting above natural topographic screens will be directed downwards and light shields will be used as required to limit the effect of lighting.

The proposed increase in the rate of mining at Carrington will potentially increase the rate of rehabilitation. This would lead to a reduction in the length of time visual impacts from this pit will be experienced by users of Lemington Road and residents along the Jerrys Plains Road section of the Golden Highway. The visual impacts from North Pit and the Alluvial Lands will continue to decrease over time as mining ceases at the end of 2003 and progressive rehabilitation proceeds.

Transport

Vehicle movements associated with proposed construction activities are not expected to have a noticeable impact on the surrounding road network. While additional flows on Lemington Road, Pikes Gully Road and the West Pit Access Road represent between 3.7 and 9 % of existing flows, the existing level of service on these roads will be maintained. These roads currently carry only a small volume of traffic and have the capacity to cater for much larger volumes of traffic.

Additional traffic movements generated by additional employees on the New England and Golden Highways, represents less than 1 % of existing flows. While additional flows on Lemington Road, Pikes Gully Road and the West Pit Access Road represent between 5 and 11.9 % of existing flows, the existing level of service on these roads will be maintained.

Intermittent haulage will increase flows to approximately 1,598 vehicle movements on Pikes Gully Road and approximately 1,358 vehicle movements on Liddell Station Road. While these movements will increase traffic flows on these roads by 66 and 89 %, they will have little effect on the operation and level of service of these roads, particularly as these flows will be intermittent. The roads currently carry small amounts of traffic and have the capacity to cater for significantly greater amount of traffic.

Social Amenity

Potential impacts upon social amenity such as air quality, noise and vibration have been outlined in the preceding sections. Social benefits to the community will also be generated from the continued opportunities that are presented to local residents from CNA. The operations at HVO north of the Hunter River communicate with local residents through community and family open days, develop the skills of the employees through education and training programs, make donations to the local schools, charity groups and emergency services.

The continuation of social networks, and the unified identity of the area as a coal mining locality will continue to strengthen with the continuing operations of HVO. The retention of employment will support the stability of the local population and therefore support the maintenance of services and industry.

Economic Considerations

A socioeconomic assessment concludes that the proposed 21 year extension to operations at West Pit will provide significant economic benefits to the local and regional economy.

If market conditions are favourable, HVO at its peak, will employ up to 1,246 full time equivalent persons, an increase of 216 people over current employment levels. Of these additional employees, approximately 177 are expected to work principally or partly at HVO north of the Hunter River. This level of employment will provide a significant economic benefit to the community through an increased expenditure on salaries and subsequent local expenditure.

The West Pit extension will make a significant economic contribution to the economy at a local, national and international level. West Pit is expected to provide $4.42 billion in sales revenue and $219 million in royalties. Based on expenditure over the previous 12 months, HVO is expected to inject $219 million into the local economy per annum, which equates to $2.4 billion over the life of the mine.

Cumulative Impacts

General

To fully determine the impacts associated with the proposal, the EIS has included an assessment of the proposal in the context of the cumulative effect of the proposal together with any other existing or proposed mine in the locality.

Noise

The cumulative noise assessment assessed the influences from surrounding industrial activity on residences potentially impacted by the proposal. The assessment shows that all private residences not currently within a zone of affectation will be within or marginally (not more than 3 dB) above the EPA's amenity goal.

The predictions are based on a worst case noise level from each operation. Adopting a conservative 3 dB correction that is expected between the predicted worst case noise level, implies that noise levels at all private residences are predicted to be below the EPA's amenity goal. This correction is due to the inherent downtime of plant over the 9 hour night-time period as compared with a worst case 15-minute noise emission level.

Air Quality

Cumulative air quality impacts were determined by assessing the planned ROM coal production and dust emission rates for each neighbouring mine operating in the area, for the years that dispersion modelling was undertaken. The results of the study indicate that all private properties not currently within a zone of affectation or subject to a private land holders agreement will not experience dust levels above EPA goals.

Visual

An assessment of the visual impacts associated with the proposed mine extension was undertaken in consideration of both the local and regional setting. The visual impact of HVO north of the Hunter River will decrease over the life of the mine as mining operations cease in both the Alluvial Lands and Carrington. Visual impacts to users of Lemington Road will increase in the short term due to the West Pit extension. Lemington Road links the New England Highway with the Golden Highway and forms the main access route to a number of mines. Views of mines and mining operations are common along this road and the West Pit extension will be visually consistent with these existing activities. The visual impacts of the West Pit extension will be mitigated along Lemington Road by the use of vegetation screening early in the mine plan.

Transport

The existing operations at HVO and the surrounding mines provide significant contributions to local traffic volumes, with mine employee traffic expected to make the greatest contribution. The transport study, which included vehicle movements associated with HVO and surrounding mines, concluded that the proposal was unlikely to have any significant cumulative impacts on the local road network. While the proposal will lead to an increase in traffic on most local roads, these increases are relatively minor and are not expected to affect the capacity or level of service of these roads.

Water Resources

The major cumulative effect predicted is related to the cumulative depressurisation of coal seam aquifers in the locality. Coal measures pressures will never recover to pre mining levels, as the region now retains different hydraulic properties, with spoil permeability being two to three orders of magnitude higher than undisturbed coal measures. The net effect of the changed properties will be a relatively flat water table over the mined areas at a maximum elevation of about 50 m AHD.

Cumulative depressurisation impacts as a result of the West Pit extension and Carrington are predicted to extend to a distance of about 3.5 km. Loss of aquifer pressures is not predicted to impact Hunter River alluvium nor any existing water supply bores or wells since all bores and wells are located within shallow alluvium.

Altered drainage patterns associated with the proposed West Pit extension and mining within HVO north of the Hunter River are not expected to significantly alter the cumulative effect on hydrology caused by the impact of mining operations in the Upper Hunter. The potential to accelerate rehabilitation at Carrington as a result of the proposed increase in mining rate will increase catchment runoff and create flow patterns with a greater similarity to the pre-mining landscape.

Ecology

The West Pit extension area and its immediate surrounds have generally been cleared and disturbed at various times in the past and consist of native pasture, scattered trees, regrowth woodland and cleared areas that provide habitats for a variety of flora and fauna, including threatened species. While the proposal will involve clearance of a relatively small area of vegetation of relatively low significance, it will still add to the cumulative impact within the region.

In order to manage the cumulative impact of the loss of vegetation, a number of management strategies have been incorporated into the proposal. These include:

- the implementation of a coordinated rehabilitation strategy for the HVO north of the Hunter River;
- regeneration of woodland areas to maintain a patch of vegetation in the study area that links with other remnants; and
- rehabilitation of large areas of West Pit and Carrington's mined areas to restore the landscape to a state that provides known habitat for populations of threatened species that are currently known on the subject site.

Archaeology

The cumulative destruction of archaeological sites in the local area as a consequence of mining, particularly within the proposed consent area and areas immediately south of the Hunter River, effects both the social (Aboriginal cultural) and archaeological value of the region. In the surrounding area, archaeological sites have been destroyed by mining at Ravensworth-Narama, Cheshunt and Riverview Pits (HVO south of the Hunter River) and Wambo. The destruction of sites by mining activities is however limited to discreet mine pit areas. Areas adjacent to these may be very similar and are likely to contain similar archaeology. Cumulative destruction of sites may therefore have a limited impact on archaeological value of the region as representative samples of different types of terrain or landforms are extant and may be used to address regional research questions.

Environmental Management

CNA have developed an Environmental Management System (EMS) that conforms with ISO14001. The EMS covers CNAs corporate and four mine sites, including HVO, Bengalla, Mount Thorley Operations and Warkworth. It is designed so that CNA can:

- efficiently manage its environmental issues;
- ensure compliance with regulatory requirements;
- continually improve its environmental performance; and
- satisfy the expectations of stakeholders and the local community.

Implementation of the EMS has assisted in achieving environmental regulatory compliance and ensure regular reporting of environmental performance is undertaken.

The EMS uses environmental policy to feed into planning which in turn feeds into implementation and operation, then measurement and evaluation and finally review and improvement. These then feed back into the environmental policy and each relates back to the ISO 14001 standard. A full description of the EMS can be found in Chapter 19.

Conclusion

This EIS has presented the findings of an environmental assessment for the proposed extension of West Pit, minor modifications and the consolidation of approvals across HVO north of the Hunter River.

Based on existing approvals mining at West Pit is expected to intersect existing approval boundaries by 2004. To allow continuity of West Pit and its efficient integration into HVO north of the Hunter River the following is required:

- a new mine plan which requires extension of West Pit to the east;
- minor modifications to operations within HVO north of the Hunter River; and
- the consolidation of the existing approvals.

If approval is not achieved, West Pit will not be fully integrated into mining operations within HVO north of the Hunter River and CNA and government agencies will continue to experience difficulty in the administration of the 18 separate approvals.

The EIS was prepared having regard to biophysical, economic and social considerations and the principles of ESD. No significant environmental impacts have been identified during the preparation of the EIS that cannot be mitigated by appropriate safeguards and management strategies. Mitigation measures identified in the EIS form part of the proposal and will be incorporated into the EMS prepared for HVO.

The social and economic benefits afforded by the continued operation of the mine, provide justification for the proposal.

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PART A

background

A

CHAPTER 1

introduction

1 Introduction

1.1 Background

Hunter Valley Operations (HVO) is located in the Upper Hunter Valley of New South Wales (NSW), approximately 18 km north west of Singleton. HVO is an existing open cut coal mine complex that is wholly owned and operated by Coal & Allied Operations Pty Limited (CNA). HVO is bisected by the Hunter River and is serviced by one integrated fleet of equipment and personnel. Equipment and personnel are dispatched to each of the mining areas as required.

HVOs mining activities north of the Hunter River comprise of:

- four coal mining areas, including the West and Mitchell Pits, Carrington, North Pit and the Alluvial Lands;
- the West Pit Coal Preparation Plant (WPCPP), Newdell Coal Preparation Plant (NCPP) and Hunter Valley Coal Preparation Plant (HVCPP);
- the Newdell Loading Point (NLP) and the Hunter Valley Loading Point (HVLP) train loading facilities;
- two administration areas including bathhouses, one adjacent to the HVCPP and one adjacent to the WPCPP;
- two workshops, one adjacent to the HVCPP and one adjacent to the WPCPP; and
- numerous internal haul roads and conveyors.

HVOs mining activities south of the Hunter River currently include three coal mining areas: South Lemington, Riverview and Cheshunt. A Coal Preparation Plant (CPP), workshops, administration buildings and bathhouses are also located south of the Hunter River.

The proposal continues all aspects of HVOs current activities undertaken north of the Hunter River as it presently operates and extends them as described herein. It also includes the consolidation of the existing 18 approvals for activities undertaken north of the Hunter River. Activities undertaken south of the Hunter River are not part of this proposal.

The proposal that is the subject of this EIS includes the extension of mining at West Pit. West Pit currently operates within Coal Mine Lease (CML) 4. It is proposed to extend mining operations to the east into Mining Lease (ML) 1406, Exploration Lease (EL) 5243 and portions of ML 1468 and CML 4. The West Pit extension area is the only mining area in this proposal that does not have a current development consent.

To fully integrate the extension of West Pit into existing operations, as well as maximise resource recovery and ensure best practice environmental controls and management, it is proposed to consolidate the 18 approvals into one. Consequently this proposal also seeks to obtain approval for the following minor activities:

- intermittent transport of product coal between the HVLP, NLP and the Ravensworth Coal Terminal (RCT);
- intermittent haulage of coal from the HVCPP to the HVLP, NLP or RCT along the privately owned Belt Line Road;
- transfer of heavy equipment across the Hunter River via temporary crossings; and
- construction of a conveyor between the HVLP and NLP.

Approval to modify current approved activities are also sought, including:

- increase in capacity of the HVCPP from 13 million tonnes per annum (Mtpa) run-of-mine (ROM) coal to 20 Mtpa ROM coal;
- increase in haulage of coal from mining areas south of the Hunter River to HVCPP from 8 to 16 Mtpa ROM coal;
- allowing the HVCPP and WPCPP to process coal from any of the mining areas in HVO (including south of the Hunter River) and the ability to dispose of reject from any CPP in any approved disposal area within HVO;
- upgrading the Belt Line Conveyor which transfers coal from the HVCPP to the HVLP along the Belt Line Road; and
- increasing production rates at Carrington from 6 Mtpa to 10 Mtpa.

1.2 Project Need

The purpose of this project is to extend and improve the efficiency and environmental management of mining at West Pit and fully integrate West Pit into HVO north of the Hunter River. It also provided the opportunity for CNA to consolidate the 18 separate approvals across HVO north of the Hunter River and reduce administration difficulties experienced by both CNA and government agencies.

The redesign and extension of West Pit will allow CNA to improve the efficiency of mining and increase the rate of rehabilitation. In addition, the minor modifications to existing approvals and additional activities are designed to increase the flexibility of operations within HVO north of the Hunter River and create a fully integrated open cut mining complex rather than a complex of open cut mines.

Integrating and extending the operations north of the Hunter River will provide benefits to both CNA and to the environment. Improved efficiencies will make HVO north of the Hunter River an economically stronger operation that will be able to mine coal from different seams in different pits to suit market demand. In addition, the proposed improvement in internal flexibility will remove some of the anomalies and now unnecessary approval conditions that are legacies of the 18 separate approvals gained through a process of expansion and acquisition. Under existing conditions, each mining area and CPP operate under its own approval, and in most cases, multiple approvals. Some of these approvals were granted by Singleton Shire Council (SSC) and Muswellbrook Shire Council (MSC) and some by the State Government's Planning Minister at the time, now the Minister for Infrastructure and Planning.

Benefits to the environment will be gained through improved environmental management and the use of real time monitoring across the whole site. This monitoring will allow CNA to manage their operations to reduce impacts by moderating mining activities when alarms are triggered by unacceptable levels of noise or dust. Integrated water management will also potentially lead to the reduction in water supply and discharge requirements across HVO. In addition, the proposed increase in capacity at the HVCPP and increased haulage of coal from south of the Hunter River to the HVCPP will facilitate the washing of all coal produced south of the Hunter River at this facility. This may, at some time in the future, facilitate the cessation of the public road haulage of coal processed at the Lemington Coal Preparation Plant (LCPP) to the Mount Thorley Coal Loader (MTCL) and therefore reduce traffic impacts.

Finally, the consolidation of consents will address an issue identified by government agencies and CNA which relates to the difficulty experienced in the administration of 18 separate approvals. The existence of these approvals from different consent authorities with varying conditions and different approval periods is an impediment to both rational mining operations and administrative practices. The difficulty in administering the 18 approvals is not only experienced by CNA, but also the consent authorities, SSC, MSC and the Minister for Infrastructure and Planning through the Department of Infrastructure, Planning and Natural Resources (DIPNR).

Today there is a high degree of interaction between the mining areas and plants to the extent that they, in essence, constitute a single mining complex. By consolidating the consents into one, CNA will have one set of conditions, one consent authority and a single consent period which will streamline administration for DIPNR and CNA. In addition, the consolidation of the 18 separate approvals will be of benefit to the community as it will reduce the complexity members of the community may experience should they wish to gain a better understanding of the conditions of consent for HVO north of the Hunter River.

1.3 Approvals Required

Development consent is required under the *Environmental Planning and Assessment Act 1979 (EP&A Act)* for the proposal. The *EP&A Act* requires the preparation of an environmental impact statement (EIS) to accompany the development application (DA) to the Minister for Infrastructure and Planning.

The purpose of the EIS is to enable consideration of the environmental, social and economic implications of proceeding with the proposal. It has been prepared in accordance with the *EP&A Act* and the *Environmental Planning and Assessment Regulation 2000 (EP&A Regulation)* which provide the framework for the environmental impact assessment of developments in NSW. The EIS has been prepared in accordance with requirements of the Director-General of the DIPNR, which were obtained for the EIS on 13 May, 2003. The Director-General's requirements for the EIS are presented as Annex A of Volume 1.

The EIS has been prepared by Environmental Resources Management Australia Pty Limited (ERM), in association with a number of specialist companies. A list of these companies and the studies they undertook are contained in Table 1.1. The EIS study team is presented in Annex B of Volume 1.

Table 1.1 Specialist Companies Involved in Preparation of EIS

Company	Study
Holmes Air Sciences (HAS)	Air quality
Australian Museum Business Services (AMBS)	Aboriginal archaeology
Australian Archaeological Survey Consultants (AASC)	Aboriginal cultural heritage
Global Soil Systems (GSS)	Soils and land capability
Northern Transport Planning and Engineering (NTPE)	Transport
Mackie Environmental Research (MER)	Surface and groundwater management

1.4 The Site and Surrounds

HVOs activities north of the Hunter River are located to the south of the New England Highway, approximately midway between Singleton and Muswellbrook in the Upper Hunter Valley of NSW. These are generally surrounded by mining and grazing uses, including:

- Bayswater Power Station and grazing land to the north;
- Cumnock No.1 Colliery and Ravensworth-Narama Mine to the east;
- HVO south of the Hunter River to the south and south east; and
- grazing land to the west.

West Pit is located in the northern part of HVO, and in terms of size, is the largest mining area in HVO north of the Hunter River. The location of West Pit within HVO is shown in regional and local settings in Figure 1 and Figure 2 in Volume 4 of this document.

HVO is located within two local government areas (LGAs). The majority of HVO north of the Hunter River is located within the Singleton LGA, including West Pit, Carrington, North Pit, the Alluvial Lands, WPCPP and HVCPP. The northern part of the lease, and the HVLP and NLP are located within the Muswellbrook LGA.

West Pit includes and is surrounded by a range of woodland, regrowth and pastured areas that have experienced different disturbance regimes in the past such as clearing, grazing and fire. These areas support native as well as introduced plants species. Introduced flora and fauna species are abundant in areas that have been most recently disturbed such as along cleared road and track edges, around dams and in improved pasture. They include a range of pasture grasses and weeds, including several species of noxious weeds. Wild dogs and rabbits are also widespread across the region. The area also supports a range of native fauna species. Birds are more represented in the woodland and regrowth areas compared to the open paddocks and scattered trees in the area. Other fauna within West Pit and HVO north of the Hunter River include ground and arboreal mammals, reptiles and amphibians.

1.5 History of West Pit and HVO North of the Hunter River

1.5.1 West Pit

Mining in the area around West Pit began in 1949 when the operating arm of the Joint Coal Board, the New South Wales Mining Company, started mining leases at Foybrook Open Cut. The New South Wales Mining Company subsequently constructed the Newdell Coal Preparation Plant.

Mining at West Pit (which was then known as Howick) began in 1952 when Construction Pty Limited, under contract to the New South Wales Mining Company started operating on the Howick lease in the Pikes Gully Cut. Title to some of the Howick lease was granted to Clutha Development Pty Limited in 1968 with additional titles granted in 1973 and 1974. A dragline operation started in 1971 and the entire mine was purchased by BP Coal in 1981.

In 1986, approval was given to increase production at West Pit to 3.5 Mtpa ROM coal and construct the WPCPP to supply coal to the Bayswater and Liddell Power Stations as well as other domestic markets. An extension towards the south east was granted in 1989.

At the end of 1989, the operation was purchased by Kembla Coal and Coke, a wholly owned subsidiary of Conzinc Riotinto of Australia Ltd (CRA), and operated by Novacoal, a newly established business unit of CRA.

In 1996, consent was granted for the Howick Coal Mine Expansion Project which included mining Mitchell Pit located to the south west of the original mine. This consent allowed coal production to increase to 12 Mtpa ROM coal.

In 1998, Novacoal and CNA merged and West Pit became part of HVO. West Pit was integrated into HVO over the next two years with the construction of the Western Haul Road and bridge over Lemington Road and the granting of consent to transport and process coal from West Pit at HVCPP.

1.5.2 HVO North of the Hunter River

Excluding West Pit, mining within HVO north of the Hunter River began in the North Pit in 1979 with a production rate of 1.5 Mtpa ROM coal. In 1980, approval was obtained to expand coal production to 4 Mtpa ROM coal and in 1988, approval was given to mine in the southern extension. Production rates were further increased to 4.2 Mtpa ROM coal in 1993 when approval was obtained to mine the Alluvial Lands which is located south of North Pit within a large meander of the Hunter River. Throughout its history, North Pit has been known variously as Hunter Valley Mine, Hunter Valley North and Hunter Valley No. 1 Colliery or Mine.

Coal from North Pit was initially transported to the Liddell CPP for processing and rail loading. However, in 1981, the HVCPP was constructed and coal processing occurred at both facilities until 1989. The HVLP was constructed in 1982 and was used from that time for the transfer of coal for export through Port Waratah at the Port of Newcastle.

The final major addition to HVO north of the Hunter River occurred in August 2000 when approval was granted to commence mining within the Carrington Pit. This mine has an approved production rate of 6 Mtpa ROM coal which is processed at either HVCPP or WPCPP.

1.6 Company Profile

CNA is one of the largest mining companies within the Upper Hunter Valley, with interests in a number of mines throughout the Valley. CNA also has a significant interest in Port Waratah Coal Services in Newcastle. It employs more than 1,500 people, (the majority being in the Hunter Valley) and is responsible for approximately one-third of all coal exports from the Hunter.

CNA is committed to managing and minimising any environmental impacts of its operations. Under the *Minerals Industry Code for Environmental Management*, CNA has agreed to a number of commitments, including:

- accepting environmental responsibility for all of its actions;
- strengthening it relationship with the community;
- integrating environmental management into the way it operates;
- minimising the impacts of its activities;
- encouraging responsible production and use of its products;
- continual improvement of its environmental performance; and
- communicating its environmental performance.

The above commitments extend to the responsible handling of cultural heritage values, progressive rehabilitation of mined areas and sound water and waste management practices. These commitments form the basis of CNA's *Health, Safety and Environmental Policy Statement*, which is described in the following section.

CNA regularly reviews its environmental policies and standards which prescribe what employees must do to appropriately manage the environment whilst mining. A common, integrated ISO14001 certified Environmental Management System (EMS) has been implemented across all CNA's managed sites in the Hunter Valley.

1.7 Objectives of the Proposal

The proposal will be undertaken in accordance with CNA's Health, Safety and Environmental Policy Statement. This states that CNA:

"… are committed to supplying coal-based energy to global markets in an efficient, safe and environmentally responsible manner. To this end we will:

- *Conduct our business in a way that maintains a safe and healthy workplace for our employees, contractors, visitors and surrounding community;*
- *Use all our resources efficiently;*
- *Protect the environment during all stages of mining;*
- *Develop sustainable solutions that contribute to meeting the world's energy needs; and*
- *Provide resources to manage our health, safety and environmental performance."*

1.7.1 Production and Operational Objectives

CNA has a number of production and operational objectives for the operation of West Pit and HVO north of the Hunter River. These are to:

- extend open cut mining at West Pit into areas not covered by existing development consents;
- maintain a world class, competitive open cut coal mining operation which provides quality coal to both domestic and overseas markets;
- provide access to long term coal reserves for the continued supply to existing and emerging markets;
- optimise resource use; and
- continue to operate a mine that meets or exceeds community expectations.

1.7.2 Environmental Objectives

CNA has an excellent record in the development and implementation of sound environmental management practices at its mines. These practices are enhanced through its integrated EMS for all CNA sites. CNA aims to achieve the following environmental objectives for West Pit and HVO north of the Hunter River as a whole:

- minimise impacts on native flora and fauna;
- provide site rehabilitation that enhances existing fauna habitat values;
- limit noise and blasting impacts on surrounding residences;
- limit air quality impacts on the surrounding area;
- protect the quality of local surface and groundwaters;
- maximise on-site mine water usage;

- minimise impacts to public health and amenity risks from mining operations; and
- limit impacts on the visual amenity of the area.

1.7.3 Socioeconomic Objectives

CNA must ensure that the proposed extension to West Pit and integration of operations north of the Hunter River does not adversely affect the existing socioeconomic value of the site and surrounding region. Therefore, CNA will aim to achieve the following objectives:

- maintain, and where possible, increase local employment and educational opportunities;
- optimise the economic benefits in the local and regional communities from continued mining;
- minimise adverse effects on surrounding residential properties during operation of the mine;
- identify sites of Aboriginal or European heritage significance and protect these in situ where possible;
- liaise with the Upper Hunter Wonnarua Council (UHWC) and Lower Hunter Wonnarua Tribal Council (LWTC), the Wonnarua Nation Aboriginal Corporation (WNAC), the Wanaruah Local Aboriginal Land Council (WLALC), Combined Council of Hunter Valley Traditional Owners, the Ungooroo Aboriginal Corporation (UAC) and any other interested stakeholder or appropriate agency in an endeavour to manage the Aboriginal archaeological resource; and
- promote community liaison and effectively resolve community issues and concerns.

1.7.4 Management Objective

CNA must ensure that the proposed extension to West Pit and integration of operations north of the Hunter River improves the management of HVO. Therefore CNA will aim to achieve the following objectives:

- continue to manage the operations in an environmentally responsible manner according to regulatory requirements and best environmental practices, whilst ensuring economic viability; and
- maximise operational synergies within HVO north of the Hunter River by combining the separate consents for the operation into one overarching consent.

1.8 Approach to this EIS

The approach to this EIS has taken into account the complexity of the proposal, which covers the extension of West Pit, minor modifications and consolidation of the 18 separate approvals. In developing this approach each part of the proposal was examined in relation to a range of environmental aspects. An assessment matrix was developed and is shown in Table 1.2.

Two broad categories are evident from this matrix. The first covers those impacts which affect all of HVO north of the Hunter River and the second category covers those impacts which are associated with the West Pit extension. Table 1.3 contains a summary of the chapters based on assessment category.

Table 1.3 Summary of Assessment Categories

Category 1 HVO north of the Hunter River	**Category 2** West Pit Extension
Surface Water	Ecology
Air Quality	Groundwater
Noise and Vibration	Heritage
Traffic	Visual
Waste	Risk
	Socio-economics

Table 1.2 Assessment Matrix

Activity	Ecology	Water	Air	Noise	Heritage	Visual	Traffic	Risk
West Pit Extension	✓	✓	✓	✓	✓	✓	✓	✓
Hunter River Crossing	✓	✓			✓	✓		
Campaign Haulage			✓	✓			✓	
Coal from HVLP/NCPP to RTC			✓	✓			✓	
Haulage from HVLP to NLP			✓	✓			✓	
HVCPP 13 to 20 Mtpa		✓	✓	✓			✓	
South of River Haulage 8 to 16 Mtpa		✓	✓	✓			✓	
Carrington to 10 Mtpa		✓	✓	✓			✓	
Upgrade of Conveyor			✓	✓				
Haulage Flexibility			✓	✓			✓	
Coal Washing Flexibility			✓	✓			✓	

The approach taken for category 1 was to assess the impacts of HVO north of the Hunter River as a whole. For example, the contributions of Carrington, Mitchell Pit, North Pit, the Alluvial Lands and West Pit to air quality, noise and surface water were modelled to determine the impacts across all of HVO north of the Hunter River.

For environmental aspects included in category 2, assessments were conducted within the proposed West Pit extension area. In general these aspects, such as ecology and archaeology, are limited to a particular area. Detailed impact assessments were therefore conducted for the West Pit extension area. In addition, to provide a complete overview of the impacts across HVO north of the Hunter River, previous detailed assessments conducted in each mining area for each environmental aspect were reviewed and are summarised in this document.

1.9 EIS Structure

This EIS has been prepared in accordance with the requirements of the *EP&A Act* and the *EP&A Regulation*, including specific Director-General requirements. It has also been prepared to address the requirements of relevant government agencies, non-government organisations and issues raised by the community.

The EIS contains four volumes. Volume 1 (this volume) contains the main report. Volumes 2 and 3 contain copies of specialist studies, which have been summarised in the relevant sections of Volume 1. Volume 4 contains all relevant figures and graphics referred to throughout Volume 1.

Volume 1 is divided into five parts, as follows.

Part A – Background

Part A contains three chapters. It provides an introduction to the proposed mine extension, the objectives of the proposal, an overview of existing operations at West Pit and HVO north of the Hunter River, interactions with HVO south of the Hunter River and a summary of the existing consents.

Part B – The Proposal

Part B contains three chapters. It provides a detailed description of the West Pit extension as well as the integration of operations within HVO north of the Hunter River which are to be consolidated into a single consent. An outline of the legislative planning framework and approval requirements and an outline of the issues raised during the government and community consultation process are also included in Part B.

Part C – Environmental Interactions

Part C contains 12 chapters. It describes the interactions between the proposed extension and consent consolidation and the socioeconomic and biophysical environment. It provides an assessment of the likely environmental impacts associated with the proposed extension of West Pit and a summary of previous assessments conducted for activities for which approval has already been given. Mitigation measures which form a part of the proposal to minimise the environmental impacts are also described.

Part D – Environmental Management and Project Justification

Part D provides an outline of the EMS and environmental mitigation measures to be adopted as a part of the proposal and provides justification for the proposed extension of West Pit Mine and consolidation of consents for HVO north of the Hunter River.

Part E – References and List of Abbreviations

Part E contains a list of references and abbreviations used in this EIS.

CHAPTER 2

existing operations

2 Existing Operations

2.1 Mining Operations and Facilities

This chapter describes the existing mining operations at West Pit and HVO north of the Hunter River. It describes the current interactions between the existing operations and the constraints to efficient mining and environmental management resulting from the 18 separate approvals currently in effect.

Typically mining can be divided into four stages:

- vegetation clearing;
- overburden and interburden removal;
- coal removal; and
- rehabilitation

The four mining stages are described below while Figure 3 of Volume 4 provides a simplified flowchart of existing operations at HVO north of the Hunter River.

2.1.1 Vegetation Clearing and Topsoil Stripping

The method of vegetation clearing is common across all mining areas and therefore is described once for all of HVO.

A pre-clearing survey is undertaken before vegetation is cleared and topsoil stripped. The purpose of the pre-clearing survey is to identify habitat trees and understorey habitats such as fallen logs.

Before clearing, trees suitable for timber are selectively marked and removed. Tree stands providing a viable seed source are harvested where practical. Vegetation may be chipped for rehabilitation mulch. A topsoil stripping plan is produced as part of detailed mine planning. These plans are required to gain open-cut mining approvals under the *Mining Act 1992*.

Topsoil is removed according to this plan up to 250 m ahead of mining, using dozers whenever possible. Soil is stripped at least 15 m outside the design excavation limit to allow for access tracks. It is then stockpiled or preferentially used immediately on reshaped land ready for final rehabilitation.

Where topsoil must be stored before being used for rehabilitation, the following procedures are adopted:

- stockpiles are located away from trafficable or mine areas, trees or watercourses and placed on flat areas or along the contour to minimise erosion;
- stockpiles are set out in windrows to maximise surface exposure to the atmosphere, which helps maintain soil oxygen levels and biological viability;
- topsoil stockpiles are clearly signposted to prevent contamination or disturbance;
- stockpiles kept for longer than six months are fertilised and sown with a cover crop of deep rooting and nitrogen fixing grasses to maintain topsoil viability and minimise erosion; and
- where necessary weeds are controlled by spraying with specific herbicides.

2.1.2 West Pit

West Pit is an existing open cut coal mine, currently operating in one active pit. The coal seams are extracted via a series of strips that run north east to south west, with the pit progressing down dip to the east as each new strip of coal is uncovered. Mining is currently carried out by a dragline and two 45 m electric shovels, which are supported by loaders, dozers and a fleet of trucks.

Overburden and Interburden Removal

The overburden to the first seam and each subsequent section of interburden between seams is drilled, blasted and loaded by shovel onto haul trucks. These trucks transport overburden to the emplacement areas in worked-out areas of the pit. The truck and shovel fleet pre-strip to the lower Arties seam. The dragline then operates on a multi-pass operation down to the basal Barrett seam.

Coal Removal

The mine plan is designed to enable the production of coal of different qualities. Access to the seams is gained via a series of ramps. Seams range from 0.5 m to approximately 3.5 m in thickness. In some areas simultaneous mining of a number of coal seams occurs to improve efficiency or permit the production of various coal products. To maintain a high rate of coal recovery, close attention is paid to the coal roof clean up and extraction operations, with as much stone as possible removed from the coal in the pit, rather than in subsequent washing operations.

Draglines leave a thin layer of rock above the coal seam prior to removal and cleaning by tracked and rubber tyred dozers and graders. Seams thinner than 2 m are ripped by dozer and pushed into windrows. Seams greater than 2 m are drilled and blasted. Coal is then placed into trucks by front-end loaders and delivered to the ROM coal stockpile facility at either the WPCPP or HVCPP.

Rehabilitation

Rehabilitation of the overburden emplacement is considered an integral component of the mining operations and is conducted progressively over the life of the mine. Rehabilitation plans are produced as part of detailed mine planning. These plans are required to gain open-cut mining approvals under the Mining Act.

Site Infrastructure

The major infrastructure at West Pit is predominantly located on the north western edge of the lease adjacent to Pikes Gully Road. The facilities include:

- workshops to provide maintenance and repair services to the mining fleet;
- vehicle washing facilities for both heavy and light vehicles;
- bulk oil and fuel storages;
- WPCPP;
- bathhouse;
- general stores; and
- technical services offices.

Mobile crib and amenity facilities are also located for employees working in open cut areas. The facilities are trailer mounted and located near active working areas. Currently the workshop, bathhouse and general store are under care and maintenance. The HVO north of the Hunter River facilities adjacent to the HVCPP are used as the central muster point for all mine staff and for the servicing of all equipment.

2.1.3 North Pit and the Alluvial Lands

The North Pit and the Alluvial Lands are existing open-cut mining operations in the southern portion of HVO north of the Hunter River. Mining in this area is expected to finish at the end of 2003. It is a requirement of the existing consent that the void left by mining is filled, and as such, after 2003, overburden from other mines within HVO will be placed in the Alluvial Lands to restore the landscape to within +/- 0.5 m of its pre-mining contours.

Overburden and Interburden Removal

The coal seams are recovered using truck and shovel methods by a series of strips 300 m wide oriented north west to south east. Overburden, up to 30 m in thickness is removed by electric shovels. Access is via highwall berms. Thick interburden is removed using shovels and thin interburden seams and partings within seams are removed using front end loaders.

All material removed by either loaders or shovels is placed into rear dump trucks and transported along a series of haul roads to emplacements in previously mined areas.

Coal Removal

Coal seams are cleared of remaining rock using rubber tyred dozers. Coal less than 2 m in thickness is ripped with tracked dozers, whilst thicker seams are drilled and blasted. Coal is mined by front end loaders and placed in trucks for transport to the HVCPP. Simultaneous mining of all coal seams occurs to permit the production of various coal products.

Site Infrastructure

Site infrastructure for the North Pit and the Alluvial Lands is located to the north of the site and include:

- workshops to provide maintenance and repair services to the mining fleet;
- vehicle washing facilities for both heavy and light vehicles;
- bulk oil and fuel storages;
- general stores;
- bathhouse;
- administration and technical offices; and
- HVCPP.

2.1.4 Carrington

Carrington is located to the west of the North Pit and north west of the Alluvial Lands.

Overburden and Interburden Removal

The coal seams at Carrington are recovered through a process of clearing and topsoil stripping followed by overburden removal and coal removal. Mining occurs in strips oriented north east to south west and north south.

Upper levels of overburden consisting of unconsolidated alluvium averaging 20 m in thickness are removed in one or two benches by excavator or shovel and loaded into trucks for haulage to out-of-pit emplacements or to previously mined blocks.

Coal Removal

Coal is removed from the five workable sections of the nine Broonie Seam splits and the 5.0 to 7.5 m thick Bayswater seam below. After overburden and interburden are removed from the top of the coal seams, the working area is cleaned up with a rubber tyred dozer or grader. Broonie sections are thin enough to be ripped by dozer while the Bayswater seam requires blasting. Ripped or blasted coal is then placed into trucks by front end loader and transported to the HVCPP or WPCPP via haul roads.

Site Infrastructure

Carrington uses existing facilities within HVO. Transportable crib and amenity facilities are provided on site for workers.

2.1.5 Coal Preparation and Handling

Raw Coal Handling

Coal is transferred from the active working areas to the handling facilities at the WPCPP or HVCPP by truck along private haul roads. The source and maximum quantities of coal which are approved for delivery to each CPP from each pit are provided in Table 2.1.

Table 2.1 Summary of ROM Coal Sources and Quantities for CPPs

WPCPP		HVCPP	
Carrington	3 Mtpa	Carrington	6 Mtpa
West Pit	12 Mtpa	West Pit	8 Mtpa
		HVO south of the Hunter River	8 Mtpa
		North Pit and The Alluvial Lands	4.2 Mtpa

The quantity of coal which can be transferred to each CPP is limited by the various consents given to mining operations within HVO north of the Hunter River. Under the current West Pit consent, a maximum of 8 Mtpa of ROM coal can be transferred along the Western Haul Road from West Pit to the HVCPP. A maximum of 3 Mtpa of ROM coal can be transported along the Western Haul Road from Carrington. No reject, overburden, ROM or product coal can be transported along this road from any other pit unless otherwise stated in that relevant pits consent. Figure 4 in Volume 4 shows the currently approved coal movements around HVO north of the Hunter River.

Upon arrival at either of the CPPs, coal is loaded into one of two dump hoppers, each with a capacity of 500 t, which discharge to a ROM coal stockpile with a capacity of 160,000 t. The hoppers are fitted with automatic dust control sprays to control dust emissions. Land next to the dump hoppers is used as an emergency stockpile area for ROM coal to minimise the effect of production variations or inclement weather on the continuity of supply to the CPP.

The raw coal in the dump hoppers is fed via conveyors to the crushers for three stages of crushing and automatic sampling before being either fed directly to the CPP or selective stockpiling on raw product stockpiles. Upon reclaiming by portable ladder type reclaimers of 1,200 t per hour (tph) capacity, the raw coal can be blended before being conveyed to a 1,000 t surge bin feeding the CPP.

Coal Preparation Plants

The WPCPP can store up to 160,000 t of ROM coal and 36,000 t of product coal. The plant is capable of processing 2,000 tph of raw coal to produce a maximum of 6 Mtpa of product coal over 250 days a year operating 24 hours a day.

The HVCPP has two 160,000 t ROM stockpiles and can stockpile 150,000 t of product. This plant consists of six independent modules and has a nominal capacity of 2,000 tph. It is designed to produce both coking and steaming coals.

The NCPP including the NLP has a product coal storage capacity of 400,000 t and a washing capacity of 750 tph over 250 days a year operating 24 hours a day. Coal washing is no longer undertaken at this CPP; however, parts of this facility are used in the transfer and loading of coal.

Prior to washing, rotary breakers are used to crush the ROM coal. At the WPCPP the crushed coal is stacked onto raw coal stockpiles and at the HVCPP coal is either stockpiled or fed directly into the plant. The coal is processed and washed in accordance with market requirements. Crushed coal can be fed directly into the product stockpiles and bypass the CPP if it meets market standards. This occurs at the WPCPP when domestic steaming coal is being produced.

Washing relies on the fact that coal has a lower specific gravity than non-coal material. Coal is then processed in two streams depending on size. Each CPP will separate the raw coal into low ash and high ash products, coarse rejects and fine rejects.

Rejects and Fines Disposal

The washing process in the CPPs produces a number of by-products including coarse rejects and fine rejects. Coarse rejects consisting of material greater than 0.125 mm from both CPPs is transported by rear dump trucks to overburden dumps and buried in West Pit (from WPCPP and HVCPP) or North Pit (from HVCPP). The reject is covered by at least 2 m of inert material. Under the existing approval, only coarse reject from the HVCPP which resulted from the processing of West Pit coal may be transported along the Western Haul Road for disposal in West Pit. All other coarse reject from HVCPP must be disposed of in North Pit emplacement areas.

Fine reject is flocculated and thickened to a solids density of 20 to 30 % by weight. Fine reject from the WPCPP is pumped through a pipeline to the Bobs Creek Dump Tailings Dam, located in the north of West Pit and from the HVCPP to a tailings dam located in North Pit.

After settling, the fine reject water decants into a series of sedimentation ponds where it is combined with mine water to form the water supply for the respective CPP and for dust suppression.

Product Coal Handling

Primary and secondary clean coal products are conveyed separately from the CPP to product stockpiles.

The clean coal from the HVCPP is transported approximately 7.4 km by overland conveyor to the HVLP for transport to the Port of Newcastle. The HVLP consists of two 200,000 t stockpiles and a train loading facility with a capacity of 4,000 tph. Trains of varying capacity from 2,000 to 8,000 t are then loaded with coal for transport to ship loading facilities in Newcastle.

The clean coal from the WPCPP is either transported to the Bayswater and Liddell Power Stations by a conveyor with a capacity of 2.5 Mtpa or to the NLP via Pikes Gully Road. The NLP consists of 400,000 t of product stockpiles and a train loading facility with a capacity of 3,500 tph. Figure 4 of Volume 4 shows the currently approved coal movements around HVO north of the Hunter River.

2.1.6 Site Services Across HVO

Electricity Supply

Electricity is supplied from existing transmission lines to mining equipment such as draglines, electric rope shovels, the workshops, administration facilities, employee amenities, CPP and coal handling facilities at each of the pits.

Fuel Supply

Fuel is regularly delivered to fixed fuel tanks located throughout HVO north of the Hunter River. Each site is fitted with an oil/water separation system, with sumps being pumped out on a monthly basis.

West Pit

Fuel is regularly delivered to two fixed, fully contained fuel farms that house six 110,000 L above ground tanks and one 27,000 L underground tank respectively.

North Pit and the Alluvial Lands

Diesel fuel is stored at three fixed locations that house six 106,000 L above ground and two free standing tanks of 650,000 and 1,200,000 L respectively.

Carrington

No fuel storage facilities are located at Carrington. All fuel requirements for this mine are satisfied by fuel storage areas at North Pit.

NLP

Two above ground diesel fuel tanks are maintained at the NLP with capacities of 30,000 L and 70,000 L respectively.

Explosives

The management of explosives for the whole of HVO is conducted by Orica at a designated storage area within HVO south of the Hunter River. However, boosters and detonating cord are transported, used and stored in on site magazines in accordance with the *Dangerous Goods Act, 1975* and *Dangerous Goods (General) Regulations, 1999*. Hazardous material inventories, material safety data sheets and current licences are made available through the HVO stores system. Magazines are located at North Pit only.

Sewerage

West Pit

West Pit has a sewage treatment plant, located approximately 1 km north of the open cut surface facilities, which treats wastewater from the workshop, bathhouse and office. Sewage is treated on-site in an aerobic digestor and the treated effluent is retained in two detention ponds for evaporation and infiltration. Effluent from the plant is discharged through a number of small farm dams. Overflow from these dams pass into Pikes Gully.

Sewage from the in-pit crib huts is pumped out and removed or treated with the 'biocycle system'. Where required, the sewage from the crib huts is pumped to the sewerage treatment plant.

North Pit and the Alluvial Lands

Sewage from in-pit mobile crib/amenity rooms is treated by aerated treatment plants and the treated effluent is spray irrigated onto evaporation areas. Sewage from the bath house passes through an extended aeration package treatment plant and the purified effluent is disinfected and directed to minewater storage dams where it is recycled.

Carrington

Sewage from in-pit mobile crib/amenity rooms is treated by aerated treatment plants and the treated effluent is spray irrigated onto evaporation areas.

2.1.7 Employment Status and Operating Hours

HVO currently has nearly 600 employees, with additional contractor resources of approximately 400 people. Of these, approximately 250 people work in West Pit and the WPCPP. HVO, including West Pit operates 24 hours a day, seven days a week.

2.1.8 Access

Access to HVO can be gained from either Lemington or Pikes Gully Roads. Access to West Pit is gained from Pikes Gully Road, while access to North Pit, the Alluvial Lands and Carrington is gained from Lemington Road.

2.2 Water Management

2.2.1 Overview

The water management system for HVO, including West Pit, operates through the separation of clean and dirty water circuits. The objective of the system is to minimise disruptions to site operations and minimise any potential off-site impacts. The systems involve:

- maximising beneficial reuse of mine water;
- controlling water quality and quantity at its source wherever possible;
- segregating water of different quality;
- reusing the lowest quality of water first;
- ongoing maintenance and review of the system; and
- disposing of excess water in accordance with the relevant guidelines and regulations.

2.2.2 Water Supply and Use

Water supply requirements for HVO differ depending on whether the area is a net user or producer of water. At West Pit, supplies collected from run-off into the Parnells Creek catchment are supplemented with water pumped from Dam 13 at Liddell Colliery. North Pit and Carrington are predicted to be net produces as a result of dewatering operations.

HVO generally requires water for the following:

- coal preparation;
- dust suppression;
- potable purposes; and
- vehicle washdown

The management of water for these purposes is described below.

Coal Preparation

Water used in the WPCPP is supplied from the Parnells Creek Dam which can be supplemented by supply from Dam 13 at the Liddell Colliery. Water for the HVCPP is sourced from Dam 11 N which collects water from active mining areas in North Pit, Cheshunt and Riverview and from Dam 9 N which takes water from Carrington.

Water lost during the washing process is:

- contained in the coarse reject, which is trucked to and placed on the spoil dumps;
- incorporated in the fine rejects;
- bound in the product coal; and
- evaporated.

The greatest volume of water from the WPCPP and HVCPP is incorporated in the tailings which are pumped to the Old Tailings Dam or the Bobs Dump Tailings Dam from the WPCPP or to the North Pit Tailings Dam from the HVCPP. Water from the tailings in Bobs Dump Tailings Dam is pumped back for reuse in the WPCPP. A small quantity of water is permanently bound in the tailings. Seepage that occurs from this dam is collected and reused for dust suppression on haul roads.

Dust Suppression Water

A number of water trucks are used for haul road dust suppression within HVO. Water truck fill stations are located adjacent to dams at West Pit and North Pit.

Potable Water

HVO is not connected to the Singleton Shire town water supply. Potable water is generally trucked in from local suppliers in the Singleton and Muswellbrook area.

Vehicle Washdown

Vehicle washdown water at West Pit is obtained from Parnells Dam. At North Pit and the Alluvial Lands, this water is provided from dams adjacent to the HVCPP.

Water from all washdown areas is directed to sediment dams for reuse.

2.2.3 Mine Water Management

The mine water management system can be divided into three distinct water management units in HVO north of the Hunter River, including:

- West Pit;
- HVLP; and
- Carrington and North Pit.

West Pit

West Pit is divided into four catchments. In the east, there is undisturbed land in advance of mining. Run off from this catchment is captured by Sediment Dams 16 and 17 West which settle sediment and then release water to Farrells Creek.

The second catchment consists of a large area of land disturbed by mining operations in the active pit and advancing overburden emplacements behind the active pit. Water from these areas is treated as mine water and is collected for eventual release from Parnells Dam through a series of drains and a pump over the intervening ridgeline.

The third catchment area is made up of disturbed and undisturbed lands located to the west of the advancing pit. This land is predominantly covered by natural vegetation or mining rehabilitation and drains or is pumped to Parnells Dam. The final catchment is made up of undisturbed land and is located on the western edge of the operation.

A contour drain system diverts clean runoff from the undisturbed catchment in a south westerly direction into Parnells Creek. If necessary, excess water is discharged from Parnells Dam to Parnells Creek and ultimately the Hunter River under the Hunter River Salinity Trading Scheme (HRSTS).

North Pit and Carrington

North Pit catchments are separated into east and west along a central ridgeline of rehabilitated land. Clean and dirty waters are separated with clean waters discharging off-site via sediment dams. Water directed into Carrington Pit becomes mine water.

Two large catchments surround the HVCPP and two dams, Dam 15 N and 16 N, store mine water and run-off. This dam system can contain up to a 1:20 year runoff event but would overflow in a 1:100 ARI 24 hour rainfall event.

Mine water from the active pit at North Pit is directed to Dam 11 N and Carrington Pit mine water is directed to Dam 9 N in advance of mining. Water from Dam 9 N is distributed to the East Sump and to Dam 11 N. Water from Cheshunt and Riverview may also be brought via a pipeline across the Hunter River to Dam 11 N. This dam is used to supply water for reuse in the HVCPP and dust suppression. It also discharges excess water to the Hunter River under the HRSTS.

HVLP

Surface water capture and reuse for dust suppression are the main focus of water management at HVLP and NLP. NLP can also draw saline water from Dam 13 at Liddell. The HVLP holds a licence under the *Water Act 1912* to draw water from Bayswater Creek.

2.3 Interactions between HVO North and South of the Hunter River

HVO north and south of the Hunter River largely form a single operation in which water management, coal preparation and transport, equipment and personnel are shared across the natural boundary formed by the Hunter River.

Currently water from Riverview and Cheshunt is pumped into the North Pit for storage and use in the HVCPP. In addition, up to 8 Mtpa of ROM coal is transported across the Hunter River by haul truck to the HVCPP for processing and subsequent transport via the Belt Line Conveyor to the HVLP for export from the Port of Newcastle. CNA currently has approval to construct a conveyor to transport ROM coal from pits south of the Hunter River to the HVCPP.

In addition, HVO has a single general manager responsible for the management of all operations both north and south of the Hunter River and a single workforce and equipment fleet which may be allocated across any part of HVO as required and permitted under the various consents. A single Environment Protection Authority EPA (EPA) licence covers all of HVO.

2.4 Environmental Management and Monitoring

2.4.1 Overview of EMS

All of CNA's mining operations within the Hunter Valley work under a single ISO 14001 certified EMS. The EMS forms the basis for CNA to be able to undertake rigorous and consistent environmental management across all of its Hunter Valley operations. Environmental targets have been established for each business unit, which relate to a range of environmental aspects within the mining operations.

2.4.2 Meteorological Monitoring

Meteorological monitoring is conducted using a weather station located at HVO (in close proximity to the HVCPP). Data collected include, wind speed and direction, relative humidity, rainfall temperature and atmospheric pressure. The weather station is operated and maintained in accordance with *Australian Standard (AS) 2923-1987*, with data compiled on a monthly basis for analysis and interpretation. Real time data is also available via the EMS intranet site.

2.4.3 Surface and Groundwater

All surface and sub-surface water is managed using EMS Procedure 7.1 (Water Management) and Procedure 7.2 (Water Discharge) such that impacts to the environment and HVO's neighbours, as well as interference to mining, is minimised.

Water management focuses on control of water quality and quantity and the separation of waters with differing qualities. Other management options include the use of lowest quality water first, ongoing maintenance of the system and disposing of water to the environment in accordance with statutes and regulations. Water quality and quantity as well as extraction and disposal of water to the Hunter River are monitored as required under EPA licence criteria.

In addition to surface monitoring, groundwater monitoring is also undertaken to increase the understanding of the processes of diffuse salt generation and migration and to facilitate the prediction of future salt loads from within the spoil groundwater and to monitor the structural integrity of the alluvial levee.

2.4.4 Erosion and Sediment Management

The management of impacts from erosion and sedimentation are described in EMS Procedure 7.1 (Water Management). Appropriate containment and retention facilities form the primary aspects of erosion and sediment management for HVO north of the Hunter River. Containment facilities include dams and drains which capture run-off and reduce the potential for erosion. Dams also provide the opportunity for sediment to settle prior to water reuse or discharge should that be required.

Dams and drains are visually inspected regularly to ensure that dams have at least 75 % of their design capacity available for sediment containment. Dams are desilted as required.

2.4.5 Air Quality Management

The minimisation of the generation of dust and mitigation of dust deposition at the surrounding privately owned residences are the main objectives of air quality management. Mitigation measures to reduce these impacts are outlined in EMS Procedure 8.1 (Dust Management CPP) and Procedure 8.2 (Air Quality – Mobile Equipment).

Seven dust gauges are maintained around West Pit and a total of six high volume TSP and five real time dust monitors are located around HVO. This dust monitoring network which extends throughout HVO north of the Hunter River provides site management with monitoring data to assist in the management of air quality issues.

2.4.6 Noise Management

Operational noise is managed using EMS Procedure 9.1 (Noise) and on the site through the installation and operation of noise monitoring equipment. The use of this monitoring equipment assists CNA to maintain emitted noise levels within the workplace at levels below the health criteria such that they do not unduly affect the amenity of the surrounding privately owned residences.

Quarterly noise monitoring is conducted around HVO to quantify and describe the acoustic environment around the site and compare results with specified limits.

2.4.7 Vibration and Airblast

Blasting operations at HVO are managed using EMS Procedure 9.2 (Blasting). The objective of blasting is to cause the greatest fragmentation while generating a minimal amount of dust and vibration for the surrounding neighbours. In addition, HVO aim to adhere to all safety standards and conform to EPA licence criteria for vibration and overpressure. These are:

- blast noise shall not exceed 120 dB(L) at the affected property, and 95 % of all blasts shall be less than 115 dB(L); and
- ground vibration levels shall not exceed 10 mm per second (mm/s) peak particle velocity at the affected property, and 95 % of results shall be less than 5 mm/s.

In addition to the EPA licence criteria, CNA have imposed blasting goals including vibration and overpressure targets, wind speed and direction restrictions and blast management improvements to further minimise the impact of blasting on the community.

Blast monitoring units are distributed around HVO to ensure compliance with the EPA criteria. The monitors located close to the mining operations are used as early warning units. Monitors are also used to provide blast performance information which is then used to improve both mine production and vibration and overpressure levels at surrounding residences. Prior to blasting, near neighbours who are likely to be impacted or who have requested prior notification are notified of a blast by either phone or e-mail.

Seven of the blast monitors are located on private residences of which four have a private land holders agreement with CNA which allow exceedance of EPA licence criteria. For the purposes of the noise, vibration and air quality assessments, these residences have been referred to as Property Nos. 8, 10, 11 and 12.

Blasting is permitted between the hours of 7.00 am and 6.00 pm Monday to Saturday. No blasting is permitted on Sundays or public holidays.

2.4.8 Community Relations

CNA aim to maintain good community relations through EMS Procedure 1.9 (Communications) and a range of policies and programs including:

- *Immediate Neighbour Community Relations Strategy (INCRS)* where immediate neighbours are visited regularly by the HVO General Manager, Department Managers and environmental representatives to brief them on aspects of the operation and gain feedback from them on their perception of the operation;
- 24 hour contact telephone line allowing the community to contact CNA staff, should they have an issue with the operation of the mine.
- complaint resolution, which forms part of CNA's EMS (Procedure 1.9) where communications contain management procedures for receiving, recording and addressing complaints made by the public;

- community liaison including Community Consultative Committees (CCCs), including one for HVO, to monitor compliance with conditions of consent and provide a forum for important community discussion, and an Aboriginal Development Consultative Committee (ADCC) to support local Aboriginal people and organisations in a range of projects;
- management and protection of sites of Aboriginal cultural heritage significance;
- communication with the community through family open days, face to face meetings with neighbours, residents and interest groups, site tours, newsletters and a website;
- CNA Community Trust which contributes funds to both the improvement of the environment of the Upper Hunter as well as the quality of life for members of the local community; and
- donations to local sporting clubs, schools, individuals and community based organisations as well as on-going partnerships with local and regional organisations such as the Hunter Westpac Rescue Helicopter Service and the Hunter Valley Research Foundation (HVRF).

2.4.9 Reporting Procedures

An Annual Environmental Management Report (AEMR) is produced for HVO. The production and distribution of the report fulfils the reporting requirements of the following regulatory agencies and other stakeholders:

- SSC;
- MSC;
- DIPNR;
- EPA;
- Department of Mineral Resources (DMR);
- National Parks and Wildlife Service (NPWS); and
- HVO CCC.

The report compiles monitoring results and discusses trends, system changes and responses to any potential issues identified throughout monitoring. Targets for future initiatives are also identified.

CHAPTER 3

summary of existing consents

3 Summary of Existing Consents

3.1 Introduction

The development of HVO has occurred through a process of expansion and acquisition since the beginning of operations. As a result, there are 18 separate development approvals which cover HVOs mining activities north of the Hunter River. This chapter summarises the consents for each separate mining area or activity, the consent authority and any works which have been approved, but have not yet commenced.

3.2 Mining Operations

3.2.1 West Pit

West Pit is an open-cut dragline and truck and shovel operation that commenced mining in approximately 1952. Current mining, coal handling and preparation operations are undertaken in accordance with Development Consent Nos. 9/96 and 9/96 M1. The current approved annual production is 12 Mtpa ROM coal, which can be delivered by road to WPCPP, HVCPP or NCPP, for both domestic and export markets. ROM coal is transported via the Western Haul Road, which is a private haul road, to the WPCPP and HVCPP. Saleable coal is transferred to Bayswater Power Station by conveyor for domestic consumption and the NLP by trucks along Pikes Gully Road for export consumption.

West Pit has formerly been referred to as Howick Mine. Mining in the West Pit area commenced prior to the introduction of the *EP&A Act* and operated for many years under existing use rights. Subsequent development consents and modifications are summarised in Table 3.1 below.

The boundaries for the different consents at West Pit are shown in Figure 5 of Volume 4.

Activities that have been approved but are yet to be commenced are the mining of Mitchell Pit in the southern part of the lease, augmentation of the WPCPP to increase its capacity and construction of a conveyor from the WPCPP to the NLP.

3.2.2 Carrington Pit

Carrington Pit is operated under Development Consent No. 106-6-99, which was granted by the then Minister for Planning on 15 August 2000. The operation is an open-cut truck and shovel operation with an approved annual maximum production of 6 Mtpa of ROM coal. Coal is transported by private haul road to either the WPCPP or HVCPP, prior to delivery to nearby power stations or to the Port of Newcastle by rail through the HVLP. Figure 5 of Volume 4 shows the consent boundary for Carrington and associated activities.

A modification to the consent to permit a 13 month trial of extended blasting times was approved on 23 January 2003. This allows blasting to occur between the hours of 7.00 am to 6.00 pm to take advantage of weather conditions that will minimise impacts on surrounding residents.

A second modification to the consent to allow blasting to occur within 500 m of powerlines was approved on 10 June, 2003.

3.2.3 North Pit

North Pit is an open-cut truck and shovel operation that commenced mining in 1979. Current operations are undertaken in accordance with Development Consent Nos. 79/50 and 88/5 issued by SSC. Current approved annual production is an average

Table 3.1 Summary of Approvals at West Pit

Consent No.	Issue Date	Consent Authority	Summary of Approved Activity
Existing use rights (pre *EP&A Act*)			▪ Mining in the West Pit area
78/10909	8/5/1986	DEP(1)	▪ Construction of WPCPP ▪ Increase production to approximately 4.2 Mtpa ROM coal
89/158	7/6/1990	SSC	▪ Southern extension of mining ▪ Increase to 7 Mtpa ROM coal
9/96	27/7/1996	DUAP(2)	▪ Second southern extension and integration of entire mining area ▪ Increase to 12 Mtpa ROM coal ▪ Augment WPCPP and construct conveyor to NCPP (in Singleton LGA only)
695/99	4/4/2000	SSC	▪ Construction of haul road bridge over Lemington Road
9/96 M1	14/4/2000	DUAP(2)	▪ Modification to Development Consent No. 9/96 to construct haul road and transport up to 8 Mtpa ROM coal from West Pit to HVCPP

Notes: (1) DEP = Department of Environment and Planning which is now known as DIPNR
(2) DUAP = Department of Urban Affairs and Planning which is now known as DIPNR

of 4.2 Mtpa ROM coal (including the Alluvial Lands). Coal is currently transported via internal haul roads to HVCPP, prior to being conveyed to the HVLP for rail transport to the Port of Newcastle. Figure 5 of Volume 4 shows the boundaries for the separate consents as mining progressed from North Pit to the Alluvial Lands.

North Pit has formerly been referred to as Hunter Valley Mine, Hunter Valley North and Hunter Valley No. 1 Colliery/Mine. It has been subject to a number of previous DAs and subsequent modifications as summarised in Table 3.2 below. CNA previously owned Liddell CPP and up until 1989, ROM coal was delivered to this CPP for washing and rail loading.

3.2.4 The Alluvial Lands

The Alluvial Lands is an open-cut truck and shovel operation located within a large meander of the Hunter River. Mining is undertaken in accordance with Development Consent No. 7/93, which was issued by SSC on 13 May 1993, as described in Figure 5 of Volume 4. It was estimated that the Alluvial Lands would produce a total of 20.4 million tonnes of ROM. The Alluvial Lands project therefore increased the total production at North Pit to an average of 4.2 Mtpa. ROM coal is transported by private haul road to HVCPP. All product coal is currently railed to the Port of Newcastle through HVLP.

3.3 Coal Processing and Handling

3.3.1 WPCPP

WPCPP was commissioned in 1987 to supply domestic coal to the Electricity Commission of NSW. It is currently approved for 2,000 tph ROM coal and currently processes coal from West Pit (under Development Consent Nos. 9/96 and 9/96 M1) and Carrington Pit (under Development Consent 106-6-99). Transport of product coal from WPCPP is currently approved via conveyor to Bayswater Power Station and NLP.

Fine and coarse rejects are permitted to be disposed of in West Pit, Old Tailings Dam and Bobs Dump Tailings Dam.

The operation of WPCPP has been subject to a number of consents as summarised in Table 3.3 below.

Activities that have been approved but are yet to commence include the augmentation of WPCPP and facilities and the construction of 1,500 tph conveyor from WPCPP to NLP for transport of product coal (currently only approved in Singleton LGA), Figure 5 of Volume 4.

Table 3.2 Summary of Approvals at North Pit

Consent No.	Issue Date	Consent Authority	Summary of Approved Activity
77/20	29/6/1977	SSC	▪ Construction of a haul road to transfer station and conveyor to Liddell CPP
78/40	25/8/1978	SSC	▪ Construction of surface facilities
78/54	24/5/1979	SSC	▪ Commencement of mining for 1.5 Mtpa ROM coal ▪ All coal to Liddell CPP
79/50	23/1/1980	SSC	▪ Expansion of mining to 4 Mtpa ROM coal ▪ Construction of HVCPP and conveyor to HVLP (in Singleton LGA only) ▪ Coal to HVCPP or Liddell CPP
88/5	16/8/1988	SSC	▪ Southern extension of mining ▪ ROM coal maintained at 4 Mtpa

Table 3.3 Summary of Approvals for WPCPP

Consent No.	Issue Date	Consent Authority	Summary of Approved Activity
78/10909	8/5/1986	DEP(1)	▪ Construction of CPP
89/158	7/5/1990	SSC	▪ Increased washing days to 250 days per year
9/96	27/7/1996	DUAP(2)	▪ Augmentation of the WPCPP and facilities ▪ Construction of coal conveyor to NCPP within Singleton LGA only
106-6-99	15/8/2000	DUAP(2)	▪ Transport of 3 Mtpa ROM coal destined for domestic use along the western haul road to WPCPP

Notes: (1) DEP = Department of Environment and Planning which is now known as DIPNR
(2) DUAP = Department of Urban Affairs and Planning which is now known as DIPNR

3.3.2 HVCPP

HVCPP was constructed in approximately 1981/1982. It is currently approved for 13 Mtpa ROM coal and processes coal from West Pit, Carrington, North Pit, the Alluvial Lands, and Riverview and Cheshunt Pits located south of the Hunter River in accordance with a range of development consents. ROM coal is generally transported to HVCPP by truck however consent has been granted for a conveyor to transfer ROM coal from south of the Hunter River to the HVCPP. Product coal from HVCPP is transported by conveyor to the HVLP. Product coal can also be taken by road to a transfer station north of the New England Highway for conveyor transport to Liddell CPP, although since the sale of this CPP in 1989, this no longer occurs.

Fine and coarse rejects are permitted to be disposed in North Pit and in the North Pit Tailings Dam. Coal reject generated from the processing of West Pit coal at the HVCPP is permitted to be disposed in West Pit.

The operation of HVCPP has been subject to a number of consents and modifications. Those of direct relevance are summarised in Table 3.4 below.

Works that have been approved but are yet to be commenced at HVCPP are summarised in Table 3.5 and shown in Figure 5 of Volume 4.

Table 3.5 Summary of Works Approved at HVCPP but Not Yet Commenced

Consent No.	Summary of Approved Activity
85/27	▪ Extension of HVCPP product stockpiles and associated stacking and reclaiming conveyors
106-6-99	▪ Surge bin, ROM coal stockpile, reclaimer, coal receival hopper, short conveyor sections and haul roads
114-12-98	▪ Conveyor from HVO south of the Hunter River

3.3.3 NCPP/NLP

NLP was originally installed to service Foybrook Coal. It is currently approved for a washing capacity of 750 tph and a loading rate 3,300 tph. Currently the plant is only used as a loading point under Development Consent No. 9/96 although consent still exists for the operation of the washing facilities under this consent.

NCPP commenced operation prior to the introduction of the *EP&A Act* and operated for many years under existing use rights. Subsequent development consents and modifications are summarised in Table 3.6.

A modification to the consent for the haulage of 2 Mtpa product coal between the HVLP and the NLP was recently approved. The modification was for a period of 9 months.

Activities that are approved but yet to commence include the progressive decommissioning of the washing facilities at NCPP, construction of a conveyor from

Table 3.4 Summary of Approvals for HVCPP

Consent No.	Issue Date	Consent Authority	Summary of Approved Activity
79/50	23/1/1980	SSC	▪ Increase production at Hunter Valley No. 1 as part of Stage 2 to 4 Mtpa ▪ Construction of HVCPP with a capacity of 900 tph ▪ Construction of overland conveyor (in Singleton LGA only) to HVLP
85/27	6/5/1986	DEP(1)	▪ Augment HVCPP to 1,500 tph and increase ROM and product stockpiles at Hunter Valley No. 2
114-12-98	15/3/2000	DUAP(2)	▪ Expansion of mining in Cheshunt and Riverview Pits south of Hunter River to 8 Mtpa ROM coal ▪ All coal to HVCPP ▪ Construct conveyor to HVCPP
9/96 M1	14/4/2000	DUAP(2)	▪ Allow HVCPP to receive 8 Mtpa of coal from West Pit
106-6-99	15/8/2000	DUAP(2)	▪ Establishment of Carrington Pit ▪ Increase throughput of HVCPP to approved capacity of 13 Mtpa

Notes: (1) DEP = Department of Environment and Planning which is now known as DIPNR
(2) DUAP = Department of Urban Affairs and Planning which is now known as DIPNR

Table 3.6 Summary of Approvals for NCPP/NLP

Consent No.	Issue Date	Consent Authority	Summary of Approved Activity
Existing use rights (pre *EP&A Act*)			▪ Operation of NCPP
89/158	7/5/1990	SSC	▪ Increased washing days to 250 days per year
9/96	27/7/1996	DUAP(1)	▪ Continued operation of NCPP
			▪ Extension of stockpiles facilities and construction of conveyor from WPCPP (only in Singleton LGA)
9/96 M1	4/2000	DUAP	▪ Progressive decommissioning of NCPP
			▪ Construction of conveyor from WPCPP to NCPP/NLP as a loadout facility (approved in Singleton LGA only)
			▪ Construction of a 400,000 t capacity stockpile at NCPP/NLP
9/96 M2	18/8/2003	DIPNR	▪ Haulage of 2 Mtpa product coal between HVLP and NLP

Notes: (1) DUAP = Department of Urban Affairs and Planning which is now known as DIPNR

WPCPP to NLP (only approved in Singleton LGA) and construction of a 400,000 t capacity stockpile at NLP, Figure 5 of Volume 4.

3.3.4 HVLP

Consent for HVLP was granted on 8 September 1981. It was subsequently constructed in 1982. Existing approvals for the HVLP include delivery of product coal via overland conveyor at a rate of 2,000 tph, storage of up to 530,000 t, loading capacity of 4,000 tph and rail transport to the Port of Newcastle. Since its construction, the HVLP has been the primary rail loading facility for HVO. Figure 5 of Volume 4 shows the consent boundary for HVLP.

A modification to the consent for the haulage of 2 Mtpa product coal between the HVLP and the NLP was recently approved.

PART B

the proposal

B

CHAPTER 4

proposal description

4 Proposal Description

4.1 Project Alternatives

A number of alternatives were investigated in developing the proposal. These alternatives included:

- extension of West Pit only;
- consolidation of consents including the extension of West Pit;
- consolidation of consents excluding the extension of West Pit; and
- the 'do nothing' alternative.

The West Pit extension project involves the extension of West Pit into ML 1406 and EL 5243 only and would see an improvement in the efficiency of mining at West Pit. West Pit would continue as an open cut mine as coal in the extension area is in multiple seams, many of which are thin or banded or of high in situ ash. Underground mining of the extension area is not economically feasible as it would result in only a small percentage of the resource being recovered with the remainder being sterilised. Applying for the extension of West Pit only would result in an additional consent adding further complication to the existing approvals platform.

The second alternative considered included the extension of West Pit, some additional activities to fully integrate West Pit into HVO and the consolidation of the existing consents within HVO north of the Hunter River into a single consent. This option would increase the flexibility of operations within HVO north of the Hunter River by allowing ROM coal, overburden, and reject to be transported between any mining area and any CPP within HVO. In addition, the consolidation of consents would streamline the administration of the approvals for both CNA and the consent authority.

The third alternative considered included the consolidation of consents and minor modifications without the extension of West Pit. This alternative would have all the benefits associated with the consolidation as outlined above while maintaining an inefficient mine plan within West Pit. In addition, mining at West Pit and within HVO north of the Hunter River would finish eight years earlier than with the proposed extension.

Were none of these alternatives adopted, West Pit would continue to operate until 2017 under the 1996 approval and mine plan design. There would be no improvement in the efficiency of mining and HVO north of the Hunter River would not become an efficiently integrated operation. Consent authorities and CNA would continue to have 18 approvals to administer.

The preferred option was chosen based on the above alternatives and included the West Pit extension, additional activities and consolidation of consents. This option takes advantage of an opportunity to streamline the administration of conditions of consent for HVO north of the Hunter River for both CNA and the Minister for Infrastructure and Planning.

4.2 Overview of Proposed Extension and Associated Modifications

The proposal continues all aspects of HVO north of the Hunter River as it presently operates and extends or alters them as described in this document. This includes extending West Pit to the east, with the Belt Line Road forming the eastern boundary of the extension. The following sections describe the new activities proposed as part of the project as well as the existing operations to provide an understanding of how HVO north of the Hunter River will operate as a whole under one planning approval.

4.2.1 New Activities

A number of new activities including the West Pit extension form the proposal. Mining in the West Pit extension area is proposed to occur within ML 1406, as well as EL 5243 for which a new ML is required. The new ML will include ML 1406, EL 5243 and parts of Authorisation 72. The pit will continue to operate as a multi-seam open cut mine operating 24 hours a day, seven days a week.

To fully integrate the extension of West Pit and existing operations, as well as maximise resource recovery and ensure best practice environmental controls and management, the following new activities are proposed:

- intermittent transport of product coal between the HVLP, NLP and RCT;
- intermittent haulage of coal from the HVCPP to the HVLP along the privately owned Belt Line Road;
- establishment of a location for the intermittent transfer of heavy equipment across the Hunter River; and
- construction of a conveyor between the HVLP and NLP.

Approval for the following consent modifications will also be sought:

- increase in capacity of the HVCPP from 13 to 20 Mtpa ROM;
- increase in haulage of coal from mining areas south of the Hunter River to HVCPP from 8 to 16 Mtpa ROM coal;

- allowing the HVCPP and WPCPP to process coal from any of the mining areas in HVO (including south of the Hunter River) and the ability to dispose of reject from any CPP in any approved disposal area within HVO;
- upgrading the Belt Line Conveyor which transfers coal from the HVCPP to the HVLP along the Belt Line Road; and
- increasing production rates at Carrington within its existing approved footprint from 6 Mtpa to 10 Mtpa.

A flowchart of the proposed operations across HVO north of the Hunter River is provided in Figure 6 of Volume 4.

In addition to the above minor activities and consent modifications, the extension of West Pit also provides CNA with the opportunity to consolidate the 18 approvals which currently exist over HVO north of the Hunter River. These consents have resulted from the acquisition of facilities and the expansion of HVO since its beginnings in 1979. The consolidation of these consents will greatly decrease the difficulty experienced by both CNA and the consent authorities in administration of the consents and mining operations in general. It will also provide clarity to the community and other stakeholders on approved activities at HVO north of the Hunter River.

4.3 HVO North of the Hunter River

The proposed operation of HVO north of the Hunter River is described below including the proposed changes in mining operations, transport of overburden, ROM coal and product coal as well as proposed changes to the HVCPP.

4.3.1 Mining Operations

West Pit

The mining operations at HVO north of the Hunter River will continue to operate under the existing operational practices described in Chapter 2. The proposal involves extending the existing West Pit in a south easterly direction along the length of its existing boundary to the Belt Line Road in the east and Lemington Road in the south. As part of this process, the northern haul route will be reduced by infilling the N1 and C1 haul roads. This will result in shortened hauls potentially allowing increased rehabilitation rates through increased availability of trucks.

Mining will continue under current operational practices, using the existing draglines, shovels, loaders and dozers within West Pit and the HVO equipment fleets. Graders will be used to maintain roads, dozers will clean up stockpiles and water trucks will control dust on active haul roads and working areas. As earth moving technology develops over the life of the mine plan, new equipment may be introduced to the site.

The proposed extension of West Pit will make efficient use of existing site facilities and no new mine infrastructure will be required as part of the extension which is planned to have a life of 21 years from the date of approval.

It should be noted that as part of the continued operations of West Pit, which includes the proposed extension area in the east, mining in the Mitchell Pit, which is located in the southern part of the lease, will commence in Year 14.

Figures 7 to 11 of Volume 4 show the progress of the mine for Years, 1, 3, 8, 14 and 20.

Carrington

In addition to extending West Pit, it is also proposed to increase the rate of mining at Carrington. Carrington is currently a truck and shovel open cut pit which has approval for a maximum rate of mining of 6 Mtpa. As part of the proposal it is proposed to increase the rate of mining to 10 Mtpa within the existing approved mine footprint, which could potentially shorten the life of the pit. However, at this time, Carrington is planned to have a life of six years in accordance with the conditions of consent for the Carrington approval. Figures 7 and 8 show the proposed progress of Carrington in Year 1 and 3.

No change in the approved footprint of the pit or the method of mining is proposed, only the rate at which coal is extracted. In addition, the infrastructure and equipment to be used for mining will be substantially the same, with the exception that two additional trucks will be required to transport coal from the pit. These additional trucks will be sourced from the HVO truck fleet and will not represent an overall increase in the amount of equipment used across HVO north of the Hunter River. The existing workforce within HVO will be utilised to achieve this increase in the rate of mining. Carrington uses infrastructure associated with North Pit and the Alluvial Lands. No change in infrastructure is required as part of the increase in the rate of mining.

North Pit and the Alluvial Lands

Mining in the Alluvial Lands will finish at the end of 2003. Activities occurring at North Pit and the Alluvial Lands will be limited to rehabilitation and support functions for Carrington. The fill material used to return the Alluvial Lands area to pre mining levels will be sourced from mining areas within HVO.

Activities associated with rehabilitation in this area will be complete by the end of 2008. Figure 4.1 is a timeline showing the anticipated start and finish of each mining operation within HVO north of the Hunter River.

4.3.2 Production Rates

An indicative schedule of production for pits within HVO north of the Hunter River has been prepared as a graph (Figure 4.2) which shows the volume of ROM coal produced at each pit and when production is expected to occur. It should be noted that these production rates are susceptible to prevailing market pressures and may change over time.

4.3.3 Equipment

The mobile equipment used across HVO north of the Hunter River will not change as a result of the proposal with the exception of two haul trucks which will be required for the increase in mining rate at

Figure 4.1 Indicative Timeline for Mining Operations

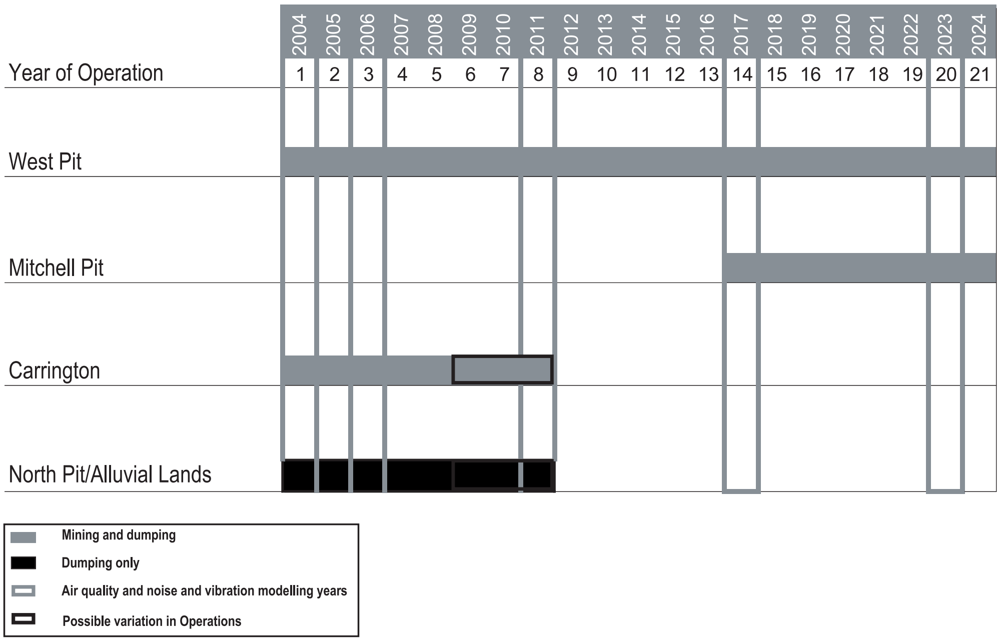
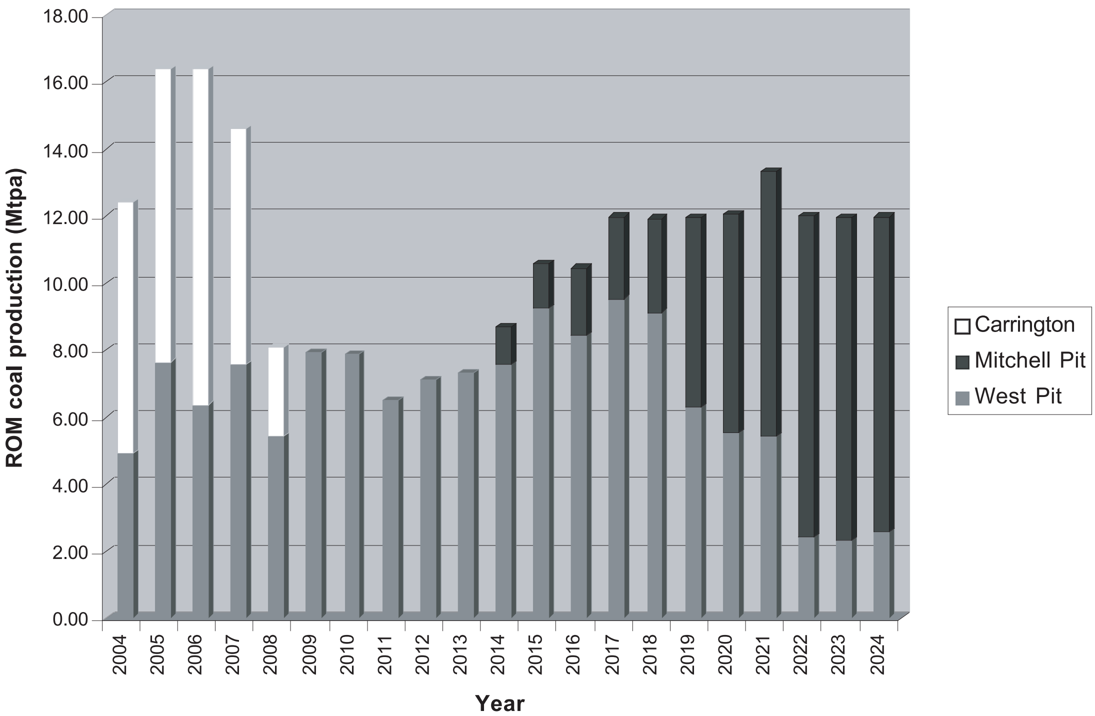


Figure 4.2 ROM Production Rates



Carrington. Table 4.1 and Table 4.2 provide lists of typical mining equipment that may be used at West Pit and Carrington and the Alluvial Lands respectively over the life of the mine.

4.3.4 Haulage of ROM Coal, Overburden and Reject

To fully integrate the operations within HVO north of the Hunter River, and HVO as a whole, it is proposed that ROM coal, overburden and reject be able to be hauled between any pit, CPP and reject emplacement area within HVO as required on existing private haul roads.

In addition, it is proposed to increase the limit on the haulage of coal between mining areas south of the Hunter River and the HVCPP from 8 to 16 Mtpa. The proposed coal movements around HVO north of the Hunter River and the interactions with HVO south of the Hunter River are shown in Figure 12 of Volume 4.

All overburden and waste haulage will be conducted using the existing truck fleet on existing private haul roads within HVO. ROM coal may also be transported from mining areas south of the Hunter River to the HVCPP via a conveyor which has been approved under a consent approval for the Riverview and Cheshunt pits, but not yet constructed.

4.3.5 Coal Preparation

Coal preparation and handling will continue under the basic operational practices described in Chapter 2. Two CPPs (WPCPP and HVCPP) will be used within HVO north of the Hunter River. WPCPP will operate at its existing capacity of 6 Mtpa of ROM coal; however, it is proposed to increase the washing capacity of HVCPP from 13 to 20 Mtpa of ROM coal. This increase in capacity will be obtained by internal modification including installation of larger, more modern versions of the centrifuges, replacing pairs of existing low head screens with single larger banana screens.

New teeter bed separators, tailings thickener and extensions to Stockpile 3 may also be required in the future as part of the increase in capacity at HVCPP. A small extension to the plant footprint may be required to accommodate the new separators. It is proposed that reject from the plant be disposed of to any approved tailings dam or waste emplacement area within HVO.

Table 4.1 West Pit - Indicative Mining Equipment Schedule

	Description	Proposal Year				
		Year 1	**Year 3**	**Year 8**	**Year 14**	**Year 20**
West Pit	Loader	2	2	1	2	2
	Loader	1	1	0	0	0
	Excavator	0	0	0	3	3
	Coal shovel	1	1	2	2	3
	CAT cable reeler	1	1	1	1	1
	Coal haul to HVCPP	6	6	6	8	6
	Coal haul to WPCPP	6	6	7	19	37
	Diesel pump	4	4	4	4	0
	Dragline	1	1	1	1	0
	Drill	2	2	3	4	5
	Dozer	5	6	6	10	10
	Electric pump	9	9	8	8	0
	Grader	2	2	2	4	5
	Coal from WPCPP to NLP	6	6	6	6	6
	Lighting plant	8	7	8	13	13
	West Pit reject	1	1	1	1	1
	Rubber tyred dozer	1	1	1	1	1
	Scraper	1	1	1	0	1
	Water truck	2	2	2	4	5
	Waste truck	14	14	19	19	14
Total		**73**	**73**	**79**	**110**	**113**

Table 4.2 Indicative Mining Equipment Schedule – Carrington and The Alluvial Lands

	Description	Proposal Year		
		Year 1	**Year 3**	**Year 8**
The Alluvial Lands	Haul truck (240 T)	5	5	5
	Haul truck (830 E)	5	5	5
	Dozer	2	2	2
	Lighting plant	2	2	2
TOTAL		**14**	**14**	**14**
Carrington	Haul truck	19	21	21
	Water truck	2	2	2
	Scraper	2	2	2
	Grader	2	2	2
	Dozer	5	5	5
	Lube truck	1	1	1
	Large drill	1	1	1
	Fuel truck	1	1	1
	Front end loader	2	2	2
	Rubber tyred dozer	1	1	1
	Excavator/Shovels	3	3	3
	Medium drill	2	2	2
TOTAL		**41**	**43**	**43**

4.3.6 Transport of Product Coal

Product coal from the WPCPP is currently transported by:

- by a 2.5 Mtpa conveyor to the Bayswater Power Station; and
- truck along the Pikes Gully Road to the HVLP and NLP for export via the Port of Newcastle.

Product coal from the HVCPP is transported to the HVLP by the conveyor along Belt Line Road. To accommodate the increase in the proposed washing capacity of the HVCPP, it is proposed to upgrade the conveyor from 2,000 tph to 2,500 tph by upgrading the existing gear boxes and increasing the speed of the belt.

Intermittent haulage of product coal is proposed along the Belt Line Road between the HVCPP and load points at NLP, HVLP and the RCT to provide back-up should the conveyor break-down or require routine maintenance. Highway rated trucks will be used to haul product coal at the rate of 25,000 t/d during these circumstances.

Intermittent haulage is also proposed to occur between the HVLP, NLP and RCT. The same trucks as those proposed for the Belt Line Road haulage will be used, together with a haul rate of 25,000 t/d between the HVLP and NLP and a haul rate of 15,000 t/d between either the HVLP or the NLP and the RCT. Proposed transport routes are shown in Figure 13 of Volume 4. This intermittent haulage may be replaced by a conveyor between the HVLP and NLP if its construction is considered to be economically viable.

Coal loading and transport from the load points will be conducted in accordance with existing approvals.

4.3.7 Workforce and Operating Hours

Workforce

HVO currently has nearly 600 employees, with additional contractor resources equal to around 400 people. Given that HVO north and south of the Hunter River operates as an integrated operation (subject to current approvals), which includes the sharing of resources, such as personnel, it is difficult to differentiate between the number of people that work north or south of the Hunter River. However, the figures available suggest that:

- approximately 494 people principally work at HVO north of the Hunter River, including people that work within the pits, CPPs and loading points;
- approximately 186 people principally work at HVO south of the Hunter River, including people that work within the pits; and
- approximately 350 people work across both north and south of the Hunter River, including management, office staff and maintenance staff. Of these staff approximately 225 work at HVO north of the Hunter River.

Excluding the people that principally work at HVO south of the Hunter River, approximately 719 people work principally or partly at HVO north of the Hunter River.

The previously approved workforce across HVO is 1435 employees. This is comprised of 714 employees at North Pit and the Alluvial Lands, (Mitchell McCotter 1992), 405 employees at West Pit (Novacoal 1996) and 356 employees, less 40 positions that were made redundant by changes at Lemington (SKM, 1997). Similarly, the previously approved workforce at HVO north of the Hunter River was 868 employees. This is comprised of 405 employees at West Pit (Novacoal, 1996), 228 employees (ERM 1998) and 235 employees at Carrington (ERM, 1999). Based on these figures the existing approved workforce exceeds the workforce proposed for this project. Table 4.3 summarises the existing, approved and proposed workforce across HVO, HVO North of the Hunter River and West Pit.

Table 4.3 Existing, Approved and Proposed Workforce at HVO, HVO North of the Hunter River and West Pit

Case	Existing	Approved	*Proposed
All HVO	1030	1435	1246
HVO North	719	868	858
West Pit	249	405	290

* Maximum proposed workforce in peak production year in the event the future market conditions favour maximum approved production rates.

Employment predictions indicate that over the next 21 years, employment levels at HVO will increase from current levels. The figures indicate that a peak of 1,246 people will be employed at HVO in 2020 (Year 17), if favourable market conditions prevail at that time. This equates to an increase of 216 people over current employment levels. Of these 216 additional employees, approximately 139 are expected to work principally or partly at HVO north of the Hunter River.

Hours Of Operation

HVO will continue to operate 24 hours per day, 364 days per year.

4.4 Water Management System

The proposed water management system across HVO north of the Hunter River has been divided into two sections, West Pit and HVO north of the Hunter River excluding West Pit. The two systems are connected via a pipeline between Parnells Dam within West Pit and Dam 9 N which is located at Carrington. The following sections and Figures 14 and 15 of Volume 4 provide descriptions of each system.

4.4.1 West Pit

Since mining commenced at West Pit, the water management system has operated with both a deficit and a surplus in supply depending upon the prevailing climatic conditions. Any deficit in supply has been met by drawing water from Dam 13 at Liddell to the north of West Pit while surpluses have been generally contained on site or discharged from Parnells Dam to the south of West Pit in accordance with the HRSTS.

Figure 14 of Volume 4 provides a simplified schematic giving an overview of the mine (dirty) water system with catchments identified on Figure 13 of the Surface and Groundwater Management Study (Part H of Volume 2) being assigned to specific storages.

4.4.2 HVO North of the Hunter River (Excluding West Pit)

Water management at North Pit has been previously assessed (MER 1999, MER 2000). Simulations addressed a number of scenarios including the Alluvial Lands, Carrington and inclusion of West Pit coal processing through HVCPP. This system is summarised on Figure 15 of Volume 4.

A pipeline between Dam 9N and Parnells Dam at West Pit has been constructed and will provide increased flexibility in water sharing and water storage between the two systems.

4.5 Rehabilitation

4.5.1 Regulatory Requirements

The *Mining Act 1992* includes provisions for rehabilitating mined areas, which are included as conditions of a ML. A general policy requirement of the DMR is that after rehabilitation, land should have the same land capability as before mining. Detailed rehabilitation plans must be submitted to the DMR before a surface mining approval is granted. These plans include suitability of topsoil for rehabilitation purposes, reshaped land contours, surface drainage and erosion control and revegetation species to be used. Rehabilitation reports are prepared annually, fulfilling the requirements for a number of agencies including:

- SSC;
- MSC;
- EPA;
- DMR;
- DIPNR; and
- HVO CCC.

Security deposits, usually in the form of a bank guarantee, must be lodged with the DMR to ensure that the rehabilitation is undertaken. These deposits are either progressively released as areas are rehabilitated or credited towards future works. Releases or credits follow reshaping, topsoiling and successful revegetation.

4.5.2 Rehabilitation Planning

Rehabilitation objectives were integrated into early mine planning to ensure compatibility with site constraints and mining operations. The rehabilitation plan also incorporates other considerations such as conservation objectives, community expectations, pre-mining land use, final land use, drainage, stability, soils, erosion control and visual compatibility. The shaping of emplacements and rehabilitation will follow the active mining areas, within Carrington and West Pit minimising the area of disturbance at any point in time throughout the mine plan. Mining within North Pit and the Alluvial Lands is expected to be complete by the end of 2003. Rehabilitation in this area will continue under the existing mine plan to restore pre-mining and in some instances improved land capabilities.

Rehabilitation designs for the final landform in HVO north of the Hunter River have been designed to follow the principles and strategies outlined in the DMR's *Synoptic Plan: Integrated Landscapes for Coal Mine Rehabilitation in the Hunter Valley of New South Wales*. Rehabilitation will be undertaken in consultation with the DMR.

The aim of rehabilitation will be to:

- rehabilitate all mined land to its original land capability class or better;
- restore 70 % of mined land for grazing with native or introduced pasture crops, which will provide some biodiversity values for native fauna species that are able to persist in grazed or disturbed areas;
- restore 30 % the landscape to a state that provides potential habitat for populations of threatened species that are currently known to occur in and around HVO; and
- create an area of woodland vegetation that links with existing remnants, adding to a more uniform cover of vegetation throughout the Hunter Valley floor. Specifically, the aim will be to link up the rehabilitated and regenerated woodland in HVO north of the Hunter River with a patch of remnant woodland east of HVO and with the north south regional corridor outlined in the *Synoptic Plan*.

As part of this EIS, and to incorporate rehabilitation for HVO north of the Hunter River, the extent of rehabilitated woodland in Carrington has been expanded. This will link with regenerated woodland to the north of Carrington and ultimately to the patch of remnant woodland to the east of HVO.

Woodland will also be regenerated to the south of the West Pit extension to link up regional corridors. This will promote a north south corridor of rehabilitated and regenerated woodland and potentially link up with the regional north south corridor that runs to the west of HVO north of the Hunter River.

The existing areas of rehabilitated woodland in HVO north of the Hunter River will add to the 'refuge' and 'stepping stone' habitat in a mostly rehabilitated final landform. In addition, land used for final voids will be filled with water and will provide some potential habitat for water birds and common amphibians and reptiles.

Detailed rehabilitation plans will be submitted to the DMR as part of the Mine Operations Plan (MOP). Details of the type of rehabilitated and regenerated vegetation communities in HVO north of the Hunter River are provided in Chapter 9. Indicative mine rehabilitation plans are shown in Figure 16 to Figure 18 of Volume 4.

4.5.3 Landform Design

The proposed final landform at West Pit is shown in Figure 19 of Volume 4 and will consist of a series of hills, ridges and minor valley systems. Final landform slopes will vary according to erosion hazard, stability and drainage requirements. Maximum external slopes will be less than 10° (equivalent to a slope of one vertical to 5.7 horizontal). Internal slopes may be steepened to be greater than 10°. This will only occur with the permission of the DMR. Final landforms at Carrington and North Pit and the Alluvial Lands will reflect pre mining landscapes.

Drainage lines from the final landforms will be compatible with the surrounding drainage network. This will be achieved using a combination of controls such as graded banks, designed channels and where necessary, water course reinforcement. Areas to be rehabilitated will initially be reshaped in accordance with the slopes given in the rehabilitation plan. They will then either be topsoiled and sown, or directly seeded. Where topsoil is used it will either be replaced directly from stripped areas or from stockpiles. The area will then be cultivated before sowing or planting. Grazing areas will have a minimum of 0.1 m of topsoil re-spread on the reformed surface.

4.5.4 Revegetation

The final landform will have a mix of rehabilitated and regenerated areas. This will include pasture areas for agriculture and grazing and woodland areas for both biodiversity and grazing. In areas rehabilitated for biodiversity, the re-vegetation strategy will incorporate a variety of local native forest species to promote regrowth and the re-establishment of local habitats.

The revegetation strategy in areas rehabilitated for agriculture and grazing will incorporate a variety of native and introduced pasture species.

Pasture Species

The existing revegetation program at HVO north of the Hunter River is currently aimed at creating pasture suited to cattle grazing as a future land use. The areas more suitable to grazing such as the flatter areas on less problematic soils and areas with access to stock water will continue to be sown for pasture. Local native grass species are predominantly used on site with a variety of native trees also planted within the pasture to give shade and shelter for stock. Species currently used at HVO for pasture and the rate at which they are applied are shown in Table 4.4.

Native Habitat

Approximately 30 % of rehabilitated areas in HVO north of the Hunter River will be planted with a mix of native trees, shrubs and groundcover. Local and regional wildlife corridors will be constructed to allow flora and fauna to disperse between patches of wildlife habitat. Preserving or establishing corridors to link habitats are practical conservation measures, which can ameliorate habitat loss and fragmentation effects. Native species will be selected to match the existing vegetation on HVO north of the Hunter River. Details of the species and vegetation communities are provide in Chapter 9.

4.5.5 Rehabilitation Techniques

CNA has undertaken extensive research into rehabilitating open cut mines in the Hunter Valley. The research was undertaken in conjunction with organisations such as the NSW Soil Conservation Service (now DIPNR), the Forestry Commission (now NSW State Forests) and the NSW Minerals Council. A number of techniques were developed that will be applied across HVO north of the Hunter River including:

- establishing forests by direct seeding. These have been successfully grown by directly seeding overburden emplacements or CPP reject without topsoil. Fertilisers are applied with the initial seeding;
- growing pastures on overburden emplacements with and without topsoil. An application of fertiliser is made with the initial seeding and further applications made annually;
- developing a pasture mix that provides year round grazing capacity; and
- managing rehabilitated areas so that viable grazing land is maintained.

More detailed pasture and tree planting techniques are described below.

Cultivation

All areas sown to pasture or planted with trees will be cultivated. This provides a seed bed and improves rainfall infiltration. Cultivation equipment will be selected to minimise stones on the surface, while erosion will be reduced by cultivating along topographic contours.

Pastures

Pasture will be sown into cultivated topsoil in spring or autumn, depending on rainfall. This gives the best opportunity for seeds to germinate and successfully grow. Seed will be mixed with fertiliser and spread from a tractor-mounted broadcaster working along contour where possible, allowing seeds to be uniformly distributed.

Native Habitat

Rehabilitation for biodiversity will be undertaken in conjunction with and draw upon successes with similar rehabilitation activities. Rehabilitation for biodiversity will be promoted by:

- using native endemic seeds (to match those already found on the subject site) where possible, for seeding and replanting programs;
- rehabilitate groundcover, understorey and canopy species by seeding and planting (planting understorey and tree species will be undertaken where grass competition restricts the use of direct seeding);

Table 4.4 Pasture Species at HVO North of the Hunter River

Autumn Sowing	kg/ha(1)	Spring Sowing	kg/ha(1)
Wimmera Rye	5	Callide Rhodes	8
Sirosa Phalaris	5	Couch (hulled)	1
Praneet/Callide Rhodes	4	Green Panic	3
Lucerne	4	Kikuya	4
Sephi Medic	3	Lucerne	4
Haifa White Clover	3	Setaria (Kazungula)	3
Seaton White Clover	2	Seaton White Clover	4
Kikuyu	4	Woolly Pod Vetch	4
Setaria (Kazungula)	4		

Source: 2002 HVO Annual Environmental Management Report
Notes: (1) kg/ha = kilograms per hectare

- planting a variety of species as opposed to a monoculture, especially species that flower at different times of the year or that provide foraging resources for affected species;
- creating a diversity of landforms and habitats such as woodland, regrowth and open forest on ridgetops and lower slopes;
- placement of habitat features such as logs, rocks, and dams; and
- linkage of areas rehabilitated with trees with adjacent remnant vegetation to promote regional corridors.

4.5.6 Final Land Use

Final land uses across the site will include grazing and land set aside for native habitat. A conceptual final rehabilitation plan which details land uses is shown in Figure 19 of Volume 4 while Figure 20 of Volume 4 shows final land capability. An unavoidable exception to rehabilitated land will be the loss of land associated with final voids. The proposed uses of the final voids are still under consideration in consultation with the DMR.

4.6 Temporary Hunter River Crossing

The proposal includes construction of temporary crossings over the Hunter River for equipment too heavy for the existing bridge, such as draglines and shovels. The temporary crossings will be located at a designated site immediately upstream of the existing bridge and will cross the bed of the river. The crossing will be constructed when required and be removed immediately after use. A similar crossing was constructed in 1997 and again in 2001 at the proposed location to relocate two shovels and a dragline. It is envisaged that a temporary crossing will be required no more than once a year.

A two stage construction process is proposed for the crossing as the Hunter River has a low flow and a high flow channel. In general the process will involve constructing the temporary crossing in the high flow channel that will include a culvert and diversion channel designed to take the flow of the low flow channel. These works would be completed 10 to 20 days before the proposed crossing. On the day of the crossing the low flow channel will be diverted through the culverts and the temporary crossing extended across the low flow channel. Following the relocation of the equipment, the temporary crossing will be removed.

Materials excavated during construction will be stockpiled ready for reinstatement of the river and revegetation of the site immediately after the crossing has taken place. Structures to protect water quality throughout the process will be installed and will include silt fences and sediment monitoring traps.

4.7 Consolidation of Consents

HVO's activities north of the Hunter River are covered by 18 separate approvals, which have resulted from the acquisition of assets, including West Pit, and the expansion of the operation since its conception in 1979. As Chapter 3 demonstrates, each mining area and CPP operate under its own approval, and in most cases multiple approvals, some of which were granted by SSC and MSC, and some by the State Government's Planning Minister (now Minister for Infrastructure and Planning). Also, each approval has different conditions and different approval periods.

Today there is a high degree of interaction between the mining areas and CPPs to the extent that they constitute a single mining complex.

The existence of 18 approvals from different consent authorities with varying conditions and different approval periods is an impediment to rational mining operations, consolidated environmental management and administrative practices.

The difficulty in administering the 18 approvals is not only experienced by CNA, but also the consent authorities, SSC, MSC and the Minister for Infrastructure and Planning (through DIPNR), and the community.

The proposal continues all aspects of HVO north of the Hunter River as it presently operates and extends or alters them as described in this document. It is envisaged that all 18 approvals that relate to operations at HVO north of the Hunter River will be surrendered after a single consent is authorised for all activities undertaken at HVO north of the Hunter River.

All of the mining areas are in close proximity to each other and are on land owned by CNA. The proposed extension of West Pit provides an opportunity to restructure and rationalise the approvals for HVO north of the Hunter River so that the operation is fully integrated ensuring the opportunity for best practice environmental controls and management.

CHAPTER 5

planning and regulatory framework

5 Planning and Regulatory Framework

5.1 General

The proposal requires development consent under the provisions of the *EP&A Act*. Due to its significance to the State, the consent authority is the Minister for Infrastructure and Planning or the Minister Assisting the Minister for Infrastructure and Planning (Planning Administration).

The proposal is classified as designated development under the provisions of the *EP&A Act* and *EP&A Regulation* and requires the preparation of an EIS. The EIS must be submitted with the development application (DA) for assessment by officers from DIPNR, prior to the Minister making a determination.

A summary of the planning and regulatory framework can be seen in Figure 21 in Volume 4. The development application area is shown in Figure 22 of Volume 4.

It should be noted that both the Minister for Infrastructure and Planning and the Minister Assisting the Minister for Infrastructure and Planning (Planning Administration) has the authority to grant consent to any DA where the Minister is the consent authority. For the purposes of this EIS where the Minister for Infrastructure and Planning is described as the consent authority, this reference also refers to the Minister Assisting the Minister for Infrastructure and Planning (Planning Administration).

5.2 Commonwealth Legislation

The *Environmental Protection and Biodiversity Conservation Act (EPBC Act)* commenced on 16 July 2000. It prescribes the Commonwealth's role in environmental assessment, biodiversity conservation and the management of matters of national environmental significance (NES).

Under the *EPBC Act*, any action that has, or is likely to have, a significant impact on a matter of NES, may progress only with the approval of the Commonwealth Minister for the Environment. An action is defined as a project, development, undertaking, activity (or series of activities), or alteration to any of these. Matters of NES include:

- world heritage properties;
- Ramsar wetlands of international importance;
- listed threatened species and communities;
- internationally protected migratory species;
- Commonwealth marine areas; and
- nuclear actions.

The proposal will not have an impact on any of the above matters of NES and as such, does not require approval under the *EPBC Act*.

5.3 New South Wales Legislation

5.3.1 General

The proposal will be assessed in accordance with the framework established by the *EP&A Act*, *EP&A Regulation* and the *TSC Act*.

5.3.2 Requirement for Development Consent

Due to the development consent requirements for coal mines within the Rural 1(a) zones under the *Singleton Local Environmental Plan 1996 (Singleton LEP)* and the *Muswellbrook Local Environmental Plan 1996 (Muswellbrook LEP)*, Part 4 (known as development assessment) of the *EP&A Act* applies to the proposal.

5.3.3 State Significant Development

Under the *EP&A Act*, there are two types of development that require consent, namely local development and State significant development. Generally, local development is any development other than State significant development. State significant development is development that is, among other things, declared by a State Environmental Planning Policy (SEPP) or a Regional Environment Plan (REP) to be State significant development. As described in *Section 5.5.8*, under *SEPP 34 – Major Employment-Generating Industrial Development (SEPP 34)*, the proposal is classified as State significant development as it will continue to employ more that 100 persons on a full-time basis.

Under the provisions of both the *EP&A Act* and *SEPP 34*, the Minister for Infrastructure and Planning is the consent authority for State significant development. As such, the DA will be submitted to DIPNR for assessment prior to the Minister making a decision.

5.3.4 Designated Development

Schedule 3 of the *EP&A Regulation* sets out development that is defined as designated development. This includes, among other things:

"Coal Mines that mine process or handle coal, being:

(a) underground mines, or

(b) open cut mines:

(i) that produce or process more than 500 tonnes of coal or carbonaceous material per day, or

(ii) that disturb or will disturb a total surface area of more than 4 hectares of land (associated with a mining lease or mineral claim or subject to a notice under Section 8 of the Mining Act 1992) by clearing or excavating, by constructing dams, ponds, drains, roads, railways or conveyors or by storing or depositing overburden, coal or carbonaceous materials or tailings, or

(c) mines that are located:

(i) in or within 40 metres of a natural waterbody, wetland, a drinking water catchment or an environmentally sensitive area, or

(ii) within 200 metres of a coastline, or

(iii) on land that slopes at more than 18 degrees to the horizontal, or

(iv) if involving blasting, within 1000 metres of a residential zone or within 500 metres of a dwelling not associated with the mine."

Under the proposal, HVO north of the Hunter River, including the extension of West Pit, will continue to process more than 500 t of coal per day and will, over the life of the proposed operations, disturb more than 4 ha of land. Accordingly, the proposal is classified as designated development.

5.3.5 Requirement to Prepare an EIS

Pursuant to the *EP&A Act*, an EIS must accompany a DA in respect of designated development. As the proposal is classified as designated development, it must be accompanied by an EIS.

Division 4 of the *EP&A Regulation* provides general requirements for EISs, including what an EIS must contain and the need to obtain the requirements of the Director-General of DIPNR concerning the preparation of an EIS. In terms of obtaining Director-General requirements, the *EP&A Regulation* states that the applicant responsible for preparing an EIS must consult with the Director-General and, in completing the EIS, must have regard to the Director-General's requirements. In the case of integrated development (see below), the Director-General must request each relevant approval body to provide the Director-General with that approval body's requirements.

Director-General requirements were issued by the Director-General on 13 May 2003. A copy of the Director-General requirements is contained in Annex A of Volume 1.

5.3.6 Requirement to Prepare a Species Impact Statement

Pursuant to the *EP&A Act*, a DA in respect of development on land that is, or is part of, critical habitat or is likely to significantly affect threatened species, populations or ecological communities, or their habitats, must be accompanied by a species impact statement (SIS).

Flora and fauna surveys undertaken on the site in October, November and December 2002 and in January and February 2003, detected four threatened species listed as vulnerable under the *TSC Act*, including two woodland birds and two insectivorous bats. The four threatened species detected are as follows:

- Speckled Warbler *(Pyrrholaemus saggitata)*;
- Grey-crowned Babbler *(Pomatostomus temporalis temporalis)*;
- Large Bentwing-bat *(Miniopterus schreibersii oceanensis)*; and
- Eastern Freetail-bat *(Mormopterus norfolkensis)*.

Eight part tests prepared in accordance with Section 5A of the *EP&A Act* were prepared to determine whether the proposal is likely to affect these threatened species and as such, the requirement to prepare a SIS. The eight part tests concluded that the proposal is not likely to have a significant effect on these species, and therefore an SIS is not required.

A copy of the eight part tests was submitted to DIPNR prior to lodgment of this EIS. Following their review of the eight part tests, DIPNR confirmed that an SIS was not required to be prepared for the proposal.

The eight part tests are contained in the Flora and Fauna report, which is contained in Part G of Volume 2.

5.3.7 Integrated Development

General

Integrated development is defined under Section 91 of the *EP&A Act*. It includes projects that require development consent and one or more specified approvals under the following acts:

- *Fisheries Management Act 1994;*
- *Heritage Act 1977;*
- *Mine Subsidence Compensation Act 1961;*
- *National Parks and Wildlife Act 1974;*
- *Protection of the Environment Operations Act 1997;*
- *Rivers and Foreshores Improvement Act 1948;*
- *Roads Act 1993;*
- *Water Act 1912;* and
- *Rural Fires Act 1997.*

Where one of these approvals is required, the DA must be submitted to the relevant approval authority and the consent authority (in this case the Minister for Infrastructure and Planning) can not determine the application until that approval authority has provided General Terms of Approval.

In addition to the requirement to obtain development consent, the proposal will require a number of approvals under the abovementioned acts, including approvals under the *Fisheries Management Act 1994*, the *National Parks and Wildlife Act 1974*, the *Protection of the Environment Operations Act 1997*, the *Rivers and Foreshores Improvement Act 1948* and the *Water Act 1912*.

As such, the proposal will be classified as integrated development. The potential approvals relevant to the proposal are discussed below.

Fisheries Management Act 1994

Approval is required under the *Fisheries Management Act 1994* to carry out dredging or reclamation work. The proposal involves the construction of temporary earthworks across the Hunter River, no more than once per year, to facilitate the crossing of heavy equipment. This temporary work can be defined as dredging and reclamation work under the Act.

As such, the proposal will require approval from the NSW Fisheries, which, under the integrated assessment provisions of the *EP&A Act*, becomes an approval body for the purposes of the assessment of the DA.

National Parks And Wildlife Act 1974

Under Section 90 of the *National Parks and Wildlife Act 1974*, consent is required to knowingly destroy, deface or damage or knowingly cause or permit destruction or defacement of or damage to, an object or Aboriginal Place.

Archaeological investigations have indicated that the proposed extension will have an impact on a number of Aboriginal sites. These sites are identified in the Aboriginal Heritage Study prepared by AMBS which is contained in Part K of Volume 3.

Under the integrated development provisions contained within the *EP&A Act*, NPWS becomes an approval body for the purposes of the assessment of the DA.

Protection of the Environment Operations Act 1997

The proposed extension will require modifications to HVO's existing Environment Protection Licence. As such, the proposal will require approval from the EPA.

Under the integrated development provisions within the *EP&A Act*, the EPA will be an approval body for the purposes of assessment of the DA.

Rivers and Foreshores Improvement Act 1948

Under Part 3A of the *Rivers and Foreshores Improvement Act 1948*, a permit must be obtained to:

- make an excavation on, in or under protected land, or
- remove material from protected land, or
- do anything which obstructs, or detrimentally affects, the flow of protected waters, or which is likely to do so.

Protected land is defined under the Act as:

(a) land that is the bank, shore or bed of protected waters, or

(b) land that is not more than 40 metres from the top of the bank or shore of protected waters (measured horizontally from the top of the bank or shore), or

(c) material at any time deposited, naturally or otherwise and whether or not in layers, on or under land referred to in paragraph (a) or (b).

Protected waters means a river, lake into or from which a river flows, coastal lake or lagoon.

The proposal for temporary crossings of the Hunter River (which is defined as protected waters under the Act) will temporarily affect the flows of the Hunter River. As such, the proposal will require approval from DIPNR for the purposes of a Part 3A permit. CNA will seek a separate Part 3A permit from DIPNR each time a crossing is constructed.

It should be noted that Part 3A of the *Rivers and Foreshores Improvement Act 1948* does not apply to land within a ML. As Figure 5 in Volume 4 indicates, the Hunter River is not included within any mining lease applying to HVO.

Water Act 1912

Under Section 116 of the *Water Act 1912*, a licence is required to commence sinking a bore, or to enlarge, deepen or alter a bore. Licences will be required to be obtained for additional observation piezometers that are proposed to be installed for continued monitoring of depressurisation and water quality in areas around the proposed extension of West Pit.

As such the new bores will require approval from DIPNR, which becomes an approval body for the purposes of the assessment of the DA.

5.4 Heritage Act 1977

The *Heritage Act 1977* was introduced to conserve the environmental heritage of New South Wales. Environmental heritage is defined as including buildings, works, relics or places which are of historic, scientific, cultural, social, archaeological, architectural, natural or aesthetic significance to the state.

A search of the following heritage registers was conducted to determine the significance of HVO north of the Hunter River and the surrounding area:

- Singleton LEP;
- Muswellbrook LEP;
- Hunter Heritage REP;
- State Heritage Inventory; and
- Register of the National Estate.

There were no listed items within or in the vicinity of HVO north of the Hunter River on any of the above registers that may be potentially impacted by the proposal.

Wollemi National Park is included in the World Heritage listing for the Greater Blue Mountains area. The proposal is not expected to impact upon the world heritage values of the Greater Blue Mountains area.

The *Heritage Act 1977* provides for the making of a variety of orders and permits to protect items of environmental heritage, including items classified as relics. The definition of a European relic under the Act states that a European relic:

> *"… means any deposit, object or material evidence:*
>
> *(a) which relates to settlement of the area that comprises New South Wales, not being aboriginal settlement; and*
>
> *(b) which is 50 or more years old."*

If any European relic is disturbed, an excavation permit is required under Section 140 of the *Heritage Act 1977*.

There are no known items of environmental heritage in HVO. Heritage Council approval is therefore not required for the proposed works. If any unidentified relics are discovered during the course of mining operations, the Heritage Office will be immediately notified.

5.5 Planning Instruments

5.5.1 General

The proposed extension will be subject to a number of local, regional and State environmental planning instruments (EPIs). Those EPIs relevant to the proposal are summarised below.

5.5.2 Singleton LEP

As shown on Figure 2 of Volume 4 with the exception of HVLP and NCPP/NLP, all of HVO is located within the Singleton LGA. Under the *Singleton LEP*, HVO and its surrounds are zoned Rural 1(a). Within this zone, mining is permissible with development consent. One of the objectives of the Rural 1(a) zone is:

> *"To allow mining where environmental impacts do not exceed acceptable limits and the land is satisfactorily rehabilitated after mining."*

Technical studies undertaken as part of this EIS conclude that the proposal, including the extension of West Pit, can be undertaken in a manner where environmental impacts do not exceed acceptable limits. Following completion of mining, with the exception of the final voids at West Pit and Carrington, all mined areas will be rehabilitated. Rehabilitation will be undertaken progressively in accordance with rehabilitation plans approved by the Minister for Mineral Resources.

Clauses 22 to 30 of the *Singleton LEP* refer to heritage items of local, regional and State significance, which are separately listed in Schedule 3 of the LEP. As indicated above, review of this schedule indicates that there will be no heritage items affected by the proposal.

5.5.3 Muswellbrook LEP

As indicated above, HVLP and NCPP/NLP are located within the Muswellbrook LGA. Under the *Muswellbrook LEP*, HVLP and NCPP/NLP and their surrounds are zoned Rural 1(a). Within this zone, mining (including ancillary uses to mining such as the two loading points) is permissible with development consent.

Similarly to the objective in the *Singleton LEP*, one of the objectives of the Rural 1(a) zone is:

> *"To enable mining to occur in an environmentally acceptable manner."*

As described above, technical studies undertaken as part of this EIS conclude that the proposal, including those works within the Muswellbrook LGA such as the transfer of coal between the HVLP, NLP and RCT, can be undertaken in an environmentally acceptable manner.

5.5.4 Hunter REP

General

The *Hunter REP* sets a policy framework for development in the Hunter Region between 1989 and 2009. The plan guides the preparation of local EPIs and the processing of DAs in accordance with regional objectives.

The parts of the *Hunter REP* with direct relevance to coal mining include:

- Division 1 of Part 4 – Land Use and Settlement;
- Division 1 of Part 5 – Transport;
- Division 1 of Part 6 – Natural Resources; and
- Division 1 of Part 7 – Environmental Protection.

The requirements of each of these parts are discussed below.

Division 1 of Part 4 – Land Use and Settlement

Division 1 of Part 4 relates to rural land. The objective of the *Hunter REP* in relation to rural land is to protect prime crop and pasture land from alienation, fragmentation, degradation and sterilisation. Prime crop and pasture land is defined as land which is classified by the Department of

Agriculture as being Class 1, 2 or 3, or special purpose land.

As part of the proposal, the only land to be disturbed that is not already the subject of an existing development consent, is the extension area of West Pit.

All other land that has been disturbed (such as North Pit and the Alluvial Lands) or is to be disturbed (such Carrington) at HVO north of the Hunter River has development consent for that disturbance. Land within the proposed extension area does not contain any prime crop or pasture land, being land classified as either Class 4, 5 or 6.

Division 1 of Part 5 – Transport

Division 1 of Part 5 of the *Hunter REP* seeks to maximise accessibility and facilitate the movement of people and goods throughout the region in a manner which recognises social, economic, environmental and safety considerations. The REP encourages the transport of goods, especially coal and other bulk materials, by rail and other non-road modes where practicable. To achieve this, clause 34 of the *Hunter REP* states that:

> *"… consent must not be granted for a development which involves the storage or handling of goods or material which are likely to be delivered by heavy transport vehicles, unless it has been considered whether use could be made of a transport mode other than road which is economically practicable."*

Other than the transfer of coal to HVO's rail loading points at HVLP and NLP and RCT, coal will continue to be transported by rail from HVO to the Port of Newcastle.

Division 1 of Part 6 – Natural Resources

Division 1 of Part 6 of the *Hunter REP* relates to planning strategies for mineral resources and extractive materials. Clause 41 of the REP lists a range of matters that a consent authority must consider when considering applications for mining. Each of these matters is listed below followed by a comment on the proposal's compliance with each matter.

Matter

> *"should consider the conservation value of the land concerned and apply conditions which are relevant to the appropriate post-mining or extraction land use;"*

Comment

As part of the proposal, the only land to be disturbed that is not already the subject of an existing development consent, is the extension area of West Pit. The conservation value of land within the proposed extension area has been considered in various chapters of this EIS, including the chapters on flora and fauna, Aboriginal archaeology, Aboriginal cultural heritage and visual amenity.

Matter

> *"should consult with officers of the Department of Water Resources in respect of extraction from river banks or channels to ensure that instability and erosion are avoided;"*

Comment

The proposal will not result in the further extraction of mineral resources from river banks, including the banks of the Hunter River and Wollombi Brook. By the end of 2003, mining within the Alluvial Lands will be completed. Following this, the pit will be filled and shaped to pre-mining levels.

Matter

> *"should consult with officers of the Department, the Departments of Minerals and Energy, Lands (as appropriate) and Agriculture and Fisheries, the Soil Conservation Service and the Forestry Commission to determine appropriate post-mining or extraction land uses;"*

Comment

The Minister for Infrastructure and Planning will be required to consult with the above government authorities prior to determination of the proposal.

Matter

> *"should ensure the progressive rehabilitation of mined or extracted areas;"*

Comment

With the exception of final voids, all mined areas within HVO north of the Hunter River will be progressively rehabilitated in accordance with rehabilitation plans.

Matter

> *"should minimise the likelihood and extent of a final void and the impact of any final void, or facilitate other appropriate options for use of any final void;"*

Comment

The proposed rehabilitation plans have been designed to minimise the extent and impact of final voids. All viable options for the future use and rehabilitation of final voids will be considered in consultation with the DMR in future mine planning.

Matter

> *"should minimise any adverse effect of the proposed development on groundwater and surface water quality and flow characteristics;"*

Comment

The proposals impact on groundwater and surface water quality and flow characteristics has been addressed in Chapter 10 of this volume and in the Surface and Groundwater Management Study contained in Part H of Volume 2.

Matter

> *"should consider any likely impacts on air quality and the acoustical environment;"*

Comment

The proposed extension's impact on air quality is addressed in Chapter 11 of this volume and the Air Quality Study contained in Part I of Volume 3. The impact on the acoustical environment is addressed in Chapter 12 of this volume and the Noise and Vibration Study contained in Part J of Volume 3.

Matter

> *"should be satisfied that an environmentally acceptable mode of transport is available;"*

Comment

As previously stated, coal will continue to be transported by rail from HVO to the Port of Newcastle.

Matter

> *"should have regard to any relevant Total Catchment Management Strategies."*

Comment

There are no Total Catchment Management Strategies relevant to the proposed extension.

Division 1 of Part 7 – Environmental Protection

Division 1 of Part 7 of the *Hunter REP* relates to pollution control, including the control of air, noise and water pollution. Clause 47 of the REP lists a range of matters that a consent authority must consider when considering applications for designated development (such as coal mines) or the expansion of designated development. Each of these matters is listed below followed by a comment on the proposal's compliance with each matter.

Matter

> *"topographic and meteorological conditions are such that air pollutants would have no significant adverse effect;"*

Comment

The Air Quality Study contained in Part I of Volume 3 concludes that the proposed operations at HVO north of the Hunter River will not have a significant impact upon the local environment. Dispersion modelling undertaken as part of the study indicates that no private residential properties not currently the subject of private land holders agreement or within an existing zone of affectation will experience dust levels above EPA guidelines during the proposed life of the operations.

Accordingly, topographical and meteorological conditions are such that air pollutants will not have a significant adverse effect on surrounding properties.

Matter

> *"an appropriate buffer zone can be provided to ensure that noise, dust and vibration are maintained at acceptable levels;"*

Comment

As mentioned above, the Air Quality Study concludes that no private residential properties not currently the subject of private land holders agreement or within an existing zone of affectation will experience dust levels above EPA guidelines. The noise and vibration study similarly concludes that under adverse weather conditions, no private residential properties not currently the subject of private land holders agreement or within an existing zone of affectation will experience noise at or above noise acquisition goals imposed by DIPNR on similar mining operations.

As such, an appropriate buffer can be provided to ensure that noise, dust and vibration levels will be maintained at acceptable levels.

Matter

> *"the best practicable technology for air, water and noise pollution control will be incorporated in the design and operation of the equipment and facilities to be used for the purposes of the industry;"*

Comment

CNA utilises best practice procedures and technology for the control of air, noise and water pollution. These procedures and technology, which are detailed throughout this EIS, have been incorporated into the design of the proposal.

Matter

> *"there will be no significant deterioration of air or water quality as a result of emissions from that equipment or those facilities; and"*

Comment

See above.

Matter

> *"the site will not become contaminated within the meaning of Part 5 of the Environmentally Hazardous Chemicals Act 1985."*

Comment

Part 5 of the *Environmentally Hazardous Chemicals Act 1985* has been repealed.

5.5.5 Hunter Heritage REP

As previously mentioned, a search of all relevant heritage registers, including the Hunter Heritage REP, was conducted to determine the significance of HVO north of the Hunter River and the surrounding area. There were no listed items within or in the vicinity of HVO north of the Hunter River on any of the registers that may be potentially impacted by the proposal.

5.5.6 SEPP 11 – Traffic Generating Developments

SEPP 11 aims to ensure that the RTA is made aware of, and given the opportunity to comment on DAs for developments that are likely to generate large volumes of traffic.

DAs for development specified in Schedules 1 and 2 of *SEPP 11* are required to be referred to the RTA. This includes any DA for extractive industry or mining. Accordingly, under *SEPP 11*, once a DA for the proposal is received by DIPNR, it must be referred to the RTA for their comment.

5.5.7 SEPP 26 – Littoral Rainforests

SEPP 26 provides a mechanism for the consideration of DAs that are likely to damage or destroy littoral rainforest areas with a view to the preservation of those areas in their natural state.

SEPP 26 states that a person shall not carry out work, disturb, change or alter any landform or disturb, remove, damage or destroy any native flora on land to which *SEPP 26* applies, except with the consent of the relevant council and concurrence of the Director-General. Such development is declared to be designated development and an EIS is required to be prepared.

A review of maps which identify the locations of *SEPP 26* littoral rainforests indicates that there are no littoral rainforests in or in close proximity to HVO north of the Hunter River.

5.5.8 SEPP 34 – Major Employment – Generating Industrial Development

SEPP 34 aims, among other things, to promote and coordinate the orderly and economic use and development of land and the economic welfare of the State and to facilitate certain types of major employment-generating industrial development of State significance.

SEPP 34 applies to a number of major industrial developments, including development for the purposes of mining, which would (after the construction stage) employ 100 persons or more on a full-time basis or have a capital investment value of $20 million or more. Such development is declared to be State significant development and the consent authority for the purposes of the development becomes the Minister for Infrastructure and Planning.

As part of the proposal, HVO north of the Hunter River will continue to employ more than 100 persons on a full-time basis. Accordingly, the proposal can be classified as State significant development and under both *SEPP 34* and the provisions of the *EP&A Act* the Minister for Infrastructure and Planning becomes the consent authority.

SEPP 34 also requires the Minister to give notice to a council of any DA to carry out development to which *SEPP 34* applies which is proposed to be carried out in the council's area. *SEPP 34* also requires the Minister to take into consideration any submissions made by that council in determining the DA. As such, the Minister will be required to notify SSC and MSC of the DA once it has been lodged and to take into consideration any submission made by them in respect of the proposal.

5.5.9 SEPP 44 – Koala Habitat Protection

SEPP 44 aims to encourage the proper conservation and management of areas of natural vegetation that provide habitat for koalas to ensure a permanent free-living population over their present range and reverse the current trend of koala population decline.

Clause 7 of *SEPP 44* states that, before a council can grant development consent to an application for consent to carry out development on land to which the SEPP applies, the consent authority must satisfy itself (based on information obtained by a person who is qualified and experienced in tree identification) that the land is or is not potential koala habitat. If the land is not potential koala habitat, the council is not prevented (because of *SEPP 44*) from granting development consent. Potential koala habitat is defined as areas of vegetation where koala feed tree species constitute at least 15 % of the total number of trees in the upper or lower strata of the tree component.

The only part of the proposal that will require the removal of trees is the extension of West Pit. Surveys undertaken on the site of the proposed extension indicate that while the site contains scatters of one feed tree species, Forest Red Gum *(E. tereticornis)*, this tree species constitute less than 15 % of the total number of trees on the site. As such, the site does not contain potential koala habitat.

5.5.10 Upper Hunter Cumulative Impact Study

The *Upper Hunter Cumulative Impact Study* sets a framework for monitoring the cumulative impacts of development, including mining. It aims to:

- establish the cumulative impacts of various existing and proposed land uses and activities;
- provide the basis for coordinated environmental monitoring and enhanced environmental management practices; and
- to assist future strategic land use and development planning at the local and regional levels.

The study concluded that there are currently no major cumulative impacts in the Hunter Region which warranted additional regulatory intervention. However, large projects should still include an assessment of cumulative environmental impacts. The potential for the proposal to interact cumulatively with surrounding mining operations is outlined throughout this EIS.

5.5.11 Singleton Council Section 94 Contributions Plan No. 1

General

Section 94 of the *EP&A Act* allows for consent authorities to levy monetary contributions or require the dedication of land free of cost where the consent authority is satisfied that a development, subject of a DA, will or is likely to require the provision of or increase the demand for public amenities and public services within the area.

In 1993, SSC adopted *Singleton Council Section 94 Contributions Plan No. 1 (Singleton Section 94 Plan)*. The primary purpose of the plan is to establish a determination of developer contributions towards the costs of providing public facilities funded in whole or part by SSC. The *Singleton Section 94 Plan* states that the time period adopted for the plan is 1993 to 2001. Enquiries with Council officers indicate that as no other plan has been subsequently prepared and adopted by Council, the *Singleton Section 94 Plan* is still used for the calculation of Section 94 contributions.

Contribution Rates for Coal Mining

Part A1 of the *Singleton Section 94 Plan* sets out the contributions schedules for a range of developments, including coal mining, including rates for the provision or improvement of water, sewerage, rural roads, community facilities and Section 94 studies. These include:

- water (where applicable) - $1,270 per Existing Tenant (ET);
- sewer (where applicable) - $600 per ET;
- rural roads (where applicable) - based on dwelling equivalent under road contributions under rural and rural/residential subdivision;
- community facilities - $900 per employee; and
- Section 94 studies - $18 per approval.

In terms of rural roads, the contribution rates for rural and rural/residential subdivision are as follows:

- $1,500 per lot or dwelling with access to Council maintained sealed road; and
- $2,500 per lot or dwelling with access to Council maintained unsealed road.

It further states that road contributions may not apply to applications where road construction is required as a condition of development consent.

Each of these contribution rates are discussed below.

Contributions for Water

HVO north of the Hunter River is not serviced by town water. All water required by the operations is sourced by HVO itself.

Contributions for Sewer

HVO north of the Hunter River is not serviced by town sewer. All sewage generated by the operations is treated on-site.

Contributions for Rural Roads

General

The contribution for rural roads is applicable to development generated vehicle movements, including employees and service vehicles. It does not apply to construction related traffic and is calculated based on a fixed rate of $1,719 (sealed) and $2,864 (unsealed) per seven vehicle movements per day.

As discussed under Section 4.1.2 there will be no increase in employees above the already consented numbers for any of the cases examined. Additionally there is no reason to believe that there would be any change in the current distribution or place of residence as a result of the proposed West Pit extension.

Heavy Vehicle Haulage

Currently, the only heavy vehicle haulage on public roads within Singleton LGA is between WPCPP and NLP along Pikes Gully Road. In accordance with the existing approvals (DA 9/96 cl.XI(1) & DA 89/158 cl.12(b)), CNA and SSC have reached an agreement for maintenance of Pikes Gully Road.

Part of Pikes Gully Road traverses a small portion of Muswellbrook LGA Figure 13 of Volume 4, however it is assumed by virtue of DA 9/96 & DA 89/158 that SSC and MSC have reached an agreement whereby SSC are responsible for the entire subject length of Pikes Gully Road that is publicly owned.

As part of the proposed West Pit extension there will be continued haulage along Pikes Gully Road between WPCPP and NLP. This heavy vehicle haulage will continue to be subject to the maintenance agreement discussed above.

A new heavy vehicle haulage route between HVLP and RCT is proposed. The proposal involves the intermittent haulage of up to 15,000 t per day as needed. The proposed haulage route will involve heavy vehicle haulage along Liddell Station Road Figure 13 of Volume 4, which is publicly owned within the Singleton LGA.

Therefore, maintenance contributions will be negotiated with SSC for the proposed haulage along Liddell Station Road, and will be consistent with the existing agreement for Pikes Gully Road.

All other proposed and existing haulage routes within Singleton LGA are along privately owned roads.

Community Facilities

The levy for community facilities relates to employee numbers. As described in Chapter 4, the number of employees resulting from the proposal will not increase above that which have already been approved.

Section 94 Studies

In accordance with the *Singleton Section 94 Plan*, $18 can be levied for the contribution to future Section 94 studies.

5.5.12 Muswellbrook Section 94 Contributions Plan

Rural Roads Maintenance

Heavy Vehicle Haulage

As discussed in Section 4.1.3, there is currently existing heavy vehicle haulage along Pikes Gully Road, and proposed heavy vehicle haulage along Liddell Station Road. The proposed haulage route along Liddell Station Road is entirely within Singleton LGA and is therefore not subject to any contributions under the *Muswellbrook Section 94 Contributions Plan*. All other proposed and existing haulage routes within Muswellbrook LGA are along privately owned roads.

The existing haulage along Pikes Gully Road is subject to an existing maintenance agreement with SSC, whom it is understood are responsible for the length of public road subject to haulage, including the short section that traverses Muswellbrook LGA.

Community Facilities

This contribution, known as the Community Enhancement Program (CEP) is based upon a percentage of the capital cost and value of annual outputs of the development. The model for coal mines and major industry is:

> *"Financial and/or In Kind Contribution to Muswellbrook Shire Council for Community Enhancement.*
>
> *Prior to the commencement of construction, the Applicant shall enter into a legally binding agreement with Muswellbrook Shire Council for financial and/or in kind contribution to Council for the purpose of community enhancement to mitigate the social, amenity and associated community infrastructure requirements emanating from the operation of the development."*

As part of the proposed West Pit extension the only proposed changes to existing approved infrastructure within the Muswellbrook LGA are summarised in Table 5.1.

Table 5.1 Summary of Proposed Changes Within Muswellbrook LGA

Proposed Works	Estimated Capital Cost ($)	Estimated Annual Output
New conveyor between HVLP and NLP	5 million	2, 700 tph
Minor modifications to NLP	2.5 million	No change

Upon examination of Section 1 of the *Muswellbrook Section 94 Contributions Plan*, it would appear that there are no readily identifiable categories for Section 94 contributions relevant to the above works. The nearest relevant categories are Coal Mines and Major Industry.

The annual output of the proposed conveyor essentially constitutes the movement of an existing approved product, is not *"new or additional"* output and as such it is envisaged that the proposal should not be subject to any new or additional contributions.

5.6 Conclusion

Under the provisions of the *Singleton LEP* and *Muswellbrook LEP*, the proposal, for a mine, requires development consent. Due to the number of employees at HVO north of the Hunter River, the proposal is classified as State significant under *SEPP 34*, which makes the Minister for Infrastructure and Planning the consent authority.

Under the provisions of the *EP&A Act*, the proposal is also defined as both designated and integrated development. This classification requires that an EIS be prepared to address potential environmental, social and economic impacts of the proposal while its classification as integrated development requires the Minister to refer the proposal to stipulated government agencies for their comments prior to determination of any DA.

The proposal is consistent with the relevant provisions contained within relevant EPIs that affect the proposal, including the *Singleton LEP*, the *Muswellbrook LEP*, the *Hunter REP* and the *Hunter Heritage REP*.

Eight part tests prepared for the proposal indicate that the proposal will not have a significant impact on threatened species, populations or ecological communities and therefore, an SIS is not required under the provisions of the *TSC Act*.

Furthermore, the proposal will not effect any significant impacts on any matter of NES and therefore does not require approval under the *EPBC Act*.

CHAPTER 6

consultation

6 Consultation

6.1 Consultation Process

A consultation strategy was developed as a part of the EIA process to assist in the identification of key issues for consideration by CNA and the EIS project team. Consultation with a range of government and community stakeholders was incorporated into the strategy to both inform the stakeholders of the project and to allow any issues of concern to be raised at an early stage of the planning process and to allow them to be incorporated into the EIS.

6.2 Government Consultation

6.2.1 General

All levels of government were consulted in order to identify key issues. Consultation with government has been both formal and informal, and information obtained has been used to refine the EIS and project planning. In particular, extensive consultation has been conducted with DIPNR, SSC, MSC, NPWS, EPA and DMR.

It should be noted that DIPNR was formed during the preparation of this EIS, through an amalgamation of the Department of Sustainable and Natural Resources (DSNR), formerly known as the Department of Land and Water Conservation, and the Department of Urban and Transport Planning (DUTP), which was an amalgamation of the Department of Planning (or Planning NSW) and the Department of Transport.

As indicated in the following section, both departments were represented at the Planning Focus Meeting (PFM) for the project and both departments provided input into the Director-General requirements. Now the two former departments represent the two operating arms of DIPNR.

6.2.2 Planning Focus Meeting

A PFM was held at CNA's Technical Services' offices on 4 April 2003. The PFM is an essential component of the EIA process, facilitating information exchange between relevant government, non-government agencies and the proponent relating to the details of the proposal and potential issues relevant to each agency.

A background paper was prepared and distributed to all participants prior to the meeting.

The background paper provided an overview of the proposal, a description of the existing consents covering HVO north of the Hunter River, a summary of the planning framework, consultation strategy and likely environmental issues associated with the proposal.

The PFM included a series of presentations providing details of the proposal, followed by a period of open discussion and a site inspection of the West Pit extension area, HVCPP and HVLP to assist agencies in developing their requirements for the EIS.

The following agencies, both government and non-government, were in attendance at the PFM:

- DUTP (now DIPNR);
- DSNR (now also DIPNR);
- MSC;
- EPA;
- DMR;
- Mine Subsidence Board;
- NSW Agriculture;
- Wanaruah Local Aboriginal Land Council (WLALC);
- Upper Hunter Wonnarua Council (UHWC); and
- Combined Council of Hunter Valley Aboriginal Corporation (CCHVAC).

Following the PFM, DIPNR requested that all agencies prepare a list of issues and matters that they want to see addressed in the EIS. This list formed the basis of the Director-General's requirements. A summary of agency issues is provided in Table 6.1 which also provides a checklist identifying where each issue is addressed in the EIS.

6.2.3 State Government Agency Consultation

DIPNR

DIPNR were formally consulted on a number of occasions during preparation of the EIS, including:

- a meeting with DIPNR's planning arm on 4 June 2003 to discuss the results of initial noise and air quality modelling (this meeting was also attended by the EPA) and suggested approach to the assessment of the proposal;
- further consultation to confirm the proposed approach to the assessment of the proposal;
- a meeting with DIPNR's natural resource management arm on 6 August 2003 to discuss preliminary results of surface and groundwater modelling; and
- a progress meeting held with DIPNR on the 2 September 2003 to discuss the approach adopted for completing the EIS.

EPA

The EPA were consulted before the PFM regarding the approach to the noise assessment and, as discussed above, were in attendance at a meeting with DIPNR to discuss the results of initial noise and air quality modelling on 4 June 2003.

Table 6.1 Summary of Director General's Requirements

Agency	Summary of Issues	Relevant Section of the EIS
DUTP (now DIPNR)	▪ Describe and justify the proposal, clearly identifying the resource, the site, works, intensity of operations, likely inter-relationships between these proposed operations and existing or approved mining operations at HVO	Chapters 2,3 & 4
	▪ Demonstrate that the proposal is permissible with consent	Chapter 5
	▪ Assess the proposal against the relevant provision in SEPP 33, SEPP 44, Hunter REP, Hunter Heritage REP, Singleton LEP and relevant DCPs	Chapters 17, 9, 13 & 5
	▪ Assess potential impacts during construction and operation and describe measures to manage, mitigate or off-set impacts: ▪ noise ▪ blasting and vibration ▪ air quality/odour ▪ groundwater ▪ heritage, both Aboriginal and European ▪ fauna and flora, particularly on critical habitats, threatened species, populations, or ecological communities ▪ traffic and transport ▪ soil ▪ hazards ▪ visual ▪ waste management ▪ utilities and services; and ▪ social and economic	Chapter 9 to 16
	▪ Assess potential air, noise, surface and groundwater cumulative impacts of the proposal taking into account HVO, Ravensworth West-Narama and Cumnock mines	Chapter 18
	▪ Describe HVO north of the Hunter River as one complex	Chapter 2
	▪ Identify the interactions between HVO north and south of the Hunter River	Chapter 2
	▪ Assess the complex as a whole, rather than only assessing the proposed expansion of the West Pit and relying on previous approvals	Chapters 8 to 16
EPA	▪ The likelihood of increased noise impacts due to mining operation	Chapter 12
	▪ The potential for dust generation during earthworks and open cut mining operations	Chapter 11
	▪ The mine's water balance and water management systems	Chapter 10
	▪ The need to effectively manage cumulative impacts	Chapter 18 & 19
RTA	▪ The full implications of the rationalisation/integration of the mines activities to be addressed in relation to traffic and transport impacts on the road network	Chapter 15
NPWS	▪ Assess potential impacts on Green & Golden Bell Frog	Chapter 9
	▪ Survey area to the south and east of the lease boundary for potential 'refuge' habitat	
	▪ Explore opportunities to link remnant vegetation	
	▪ Assess impacts to vegetation communities, and threatened flora and fauna	
	▪ Assess impacts to known and potential Aboriginal heritage	Chapter 13
DSNR (now DIPNR)	▪ Surface water management	Chapter 10
	▪ Groundwater management	Chapter 10
	▪ EIS to provide a process to manage water and waste/rejects over the sites to lead to long term rehabilitation of HVO north of the Hunter River	Chapters 10 & 16
	▪ Identify water sources affected by the consent modification, environmentally sensitive groundwater zones, sites of known encapsulation of tailings and proximity to alluvial groundwater zones	Chapter 10
	▪ Identify the location and status of crown lands/roads	Chapter 8
	▪ Identify crown lands subject to mining leases	Chapter 8
	▪ Native Title rights or interests to be addressed	Chapter 13
NSW Fisheries	▪ Impacts to streams and fish passage	Chapter 9
NSW Agriculture	▪ A general description of the combined areas prior to mining	Chapter 9
	▪ The current status of lands within the combined leases including extent of disturbed, undisturbed and rehabilitated areas	Chapter 9
	▪ Existing monitoring of revegetation and agricultural use outcomes	Chapter 9
	▪ Current agricultural features and land use options within the lease areas	Chapter 8
	▪ Proposed rehabilitation and final land use objective	Chapter 4

Agency	Summary of Issues	Relevant Section of the EIS
	▪ Indicative final land form, land capability, voids, high walls, drainage and vegetation patterns ▪ Options for integrating proposed land forms, vegetation, water and land management with adjoining mines ▪ Proposed future monitoring of rehabilitation and land management including options for integration within existing EMS ▪ Assessment of cumulative future environmental impacts	Chapter 4 Chapter 4 Chapter 4 Chapter 18
Mine Subsidence Board	▪ The site falls within the Patrick Plains Mine Subsidence District ▪ Approval is required for all construction or relocation of infrastructure	
HCMT	▪ The presence of vegetation communities, fauna habitat, habitat linkages (corridors) and potential linkages both on and off the site to be mapped and documented ▪ Assess the presence of regionally significant flora and fauna and habitat ▪ Vegetation community to be adequately assessed ▪ Assess impacts to threatened flora and fauna species in a manner consistent with NPWS data collection systems ▪ Offset package be developed to address clearing impacts to include restoration of forest and woodland at a ratio of 2:1, revegetation to occur as soon as possible, protect an area of similar or larger area and appropriate revegetation of post mined area without the use of exotic species ▪ Assess cumulative impacts and other approved and proposed mines as well as the opportunities to establish regional corridors and protected areas	Chapter 9
DMR	▪ Rehabilitation plans to be updated for North Pit, Carrington as well as West Pit ▪ Schedule of tailings dams construction, closure and rehabilitation is required ▪ Conceptual plans on how drainage from the rehabilitated overburden dumps is kept out of the mine water system is required ▪ Visual and safety issues relating to highwall next to Lemington Road to be address ▪ Measures to treat runoff from the Belt Line Road need to be developed ▪ A brief summary of the resource/reserve to be included in the EIS	Chapter 4 Chapter 16 Chapter 10 Chapter 14 Chapter 10 Chapter 8
SSC	▪ No existing residence should be further impacted by updated conditions which may allow a more 'generous' performance criteria especially with regard to EPA INP ▪ Cumulative impacts associated with air quality, noise, vibration and blasting ▪ Benefits of higher rail haulage versus road ▪ Impact of increased rail coal haulage through the Singleton township ▪ Negotiation of an appropriate community enhancement project ▪ Clarification of implication for Council's public roads in terms of closures or works or traffic	Chapter 12 Chapter 18 Chapter 15 Chapter 13 Chapter 15

NPWS

A meeting was held with officers from the NPWS on 11 December 2002 to discuss and agree on the archaeological survey methodology for the West Pit extension area. At this meeting the consultation undertaken with the local Aboriginal groups was also discussed.

A second meeting was held with managers from NPWS on 13 August 2003 to discuss the progress of the consultation undertaken with the local Aboriginal groups and detail how the NPWS's draft *Guidelines for Aboriginal Heritage Impact Assessment* had been applied to the project.

DMR

A presentation of the proposal was made to the DMR in March 2003. The purpose of the presentation was to provide the DMR details on the mine plan and environmental impacts of the proposal to enable them to endorse the conceptual project development plan prior to the PFM.

6.2.4 Local Government

Singleton Shire Council

CNA representatives met with senior planning officers of SSC on the 18 March 2003 and the Mayor of SSC on the 10 June 2003. The objective of the meetings was to brief Council on all aspects of the proposed development and to obtain feedback at an early stage of the EIA process. The Council was supportive of the proposal particularly on the consolidation of development consents. Council expressed their concern that no additional private properties should have their amenity impacted. The Council were also interested in the future management of Pikes Gully Road.

Muswellbrook Shire Council

CNA representatives met the senior planning officers of MSC on the 25 March 2003. The objective of the meeting was to brief Council on all aspects of the proposed development and to obtain feedback at an early stage of the EIA process.

The Council was supportive of the proposal and understood that only the NCPP/NLP and a small area containing part of the HVLP is located within the Muswellbrook LGA.

A meeting was also held with MSC on 15 July 2003 to discuss a development application modification to allow the intermittent haulage of coal between the HVLP and NLP. At this meeting the EIS was discussed and it was agreed that this haulage would be incorporated into the EIS and following approval the modification will be surrendered.

6.3 Community Consultation

6.3.1 Overall Strategy

Community consultation was recognised to be an integral component of the proposed development and crucial to the process of identifying issues described in this chapter.

A consultation strategy was developed to promote open and transparent communication with the local community, throughout the EIA process. Key elements of the strategy were to ensure:

- the community was fully aware of all aspects of the proposal and the EIA process;
- there were multiple mechanisms for community participation and for ongoing communication and feedback;
- opportunities provided for any queries to be addressed directly by the project team to minimise the effects of incorrect information being passed through the community;
- community issues and concerns in relation to the proposal were identified at an early stage of the EIS;
- issues raised by the community were pro-actively assessed and managed throughout the project; and
- appropriate solutions and mitigation strategies were developed to minimise the negative impacts associated with the proposal.

6.3.2 HVO Mine Employees

CNA employees have been informed of the proposed development through presentations, monthly reports and newsletters. Ongoing progress and results of studies have been presented to the employees throughout the EIA process.

6.3.3 Nearest Neighbours

CNA have a consultation strategy known as *INCRS* that forms part of the EMS. The strategy includes liasing with the neighbours located immediately adjacent to CNA operations including private landowners and major lessees of CNA owned land. The immediate neighbours are visited regularly by HVO's General Manager and environmental services representatives.

Five residents located around HVO north of the Hunter River were visited as part of the *INCRS* and were provided with the details of the proposed development. The visits provided residents with an opportunity to raise issues of concern with the proposal directly with the mine representatives for incorporation into the EIS.

6.3.4 Newsletters

A series of three newsletters were prepared and distributed to the wider community throughout the preparation of the EIS. The newsletters were designed to provide the wider community with an overview of the proposal and the EIA process and ensure the community was kept up to date with the progress of the EIS and project development.

The first newsletter was distributed in the week beginning 23 March 2003 throughout the local community including the village of Jerrys Plains and rural residential properties in the area. The newsletter provided an overview of the proposal, the planning framework and details of the environmental issues that will be assessed in the EIS. The newsletter also provided details of opportunities for the public to provide input into the preparation of the EIS and advertised the date, time and location for forthcoming information days which were held at Jerrys Plains.

A second newsletter was produced and distributed in the week beginning 8 September 2003. This newsletter provided an outline of the progress of the various technical studies being undertaken and issues that have arisen during the preparation of the EIS. Copies of Newsletters 1 and 2 are provided in Annex C of Volume 1.

A third newsletter will be produced and distributed while the EIS is on public exhibition. The newsletter will provide an outline of the key findings of the EIS, together with the details of public exhibition of the EIS and community information days, which will be held within the first two weeks of the exhibition period.

6.3.5 Information Days

The first round of community information days was held at the Jerrys Plains Community Hall on 4 and 5 April 2003.

The aim of the information days was to provide an opportunity for the wider community to obtain information regarding the proposal, view maps and aerial photographs of the site and surrounding locality and provide the opportunity for residents to discuss issues of concern directly with the EIS project team.

The first round of information days were held early in the planning process, prior to the commencement of technical studies, to allow input and feedback from the community to be used to identify and prioritise issues for assessment. Representatives from both CNA and ERM were available on each occasion to discuss the project.

The information days were attended by a total of 13 groups of residents, who were appreciative of the opportunity to gain information on the proposal and discuss issues of concern.

In general, most of these residents who attended the information days were sensitive to mining due to the proposed extension of Wambo to the east of Jerrys Plains. The main community concerns related to noise and vibration and dust.

Residents also understood the desire to consolidate HVOs development consents north of the Hunter River to reduce the complexity of the approvals.

No requests for additional information were received following the community information days.

As previously discussed, a second round of community information days will be held during the first two weeks of the exhibition period to provide a forum for members of the community and other stakeholders to express their views and obtain information about the project after viewing the completed EIS. The information days and EIS exhibition will be advertised in the third newsletter to all surrounding residents and landowners and in the local newspaper.

6.3.6 Community Consultative Committees

HVO has one CCC for all of its operations which meets two to four times a year to monitor compliance with conditions of consent and provide a forum for important community discussion. The committee is comprised of members from the community and representatives from CNA, SSC, MSC, DMR, DIPNR and the EPA.

Members of the CCC were briefed about the proposal and a site inspection was undertaken in July 2003.

6.3.7 Consultation with Surrounding Mines & Power Stations

Representatives from the mines in the vicinity of HVO north of the Hunter River were contacted by CNA employees and informed of the proposal. The mines and power stations were also sent newsletters to keep them informed of the progress of the EIS.

6.3.8 Consultation with Indigenous Stakeholders

Consultation with the local Aboriginal community was commenced in November 2002, prior to any fieldwork being undertaken and West Pit mine plans being finalised. An archaeological planning session was held at CNA's Technical Services' offices on 9 December 2002. The planning session was attended by representatives of the Wonnarua Nation Aborignal Corporation (WNAC), UHWC, Ungooroo Aboriginal Corporation (UAC) and WLALC. The Lower Wonnarua Tribal Council (LWTC) and NPWS were also invited to the session but could not attend.
The purpose of the session was to bring the groups together to discuss and gain input into the proposed fieldwork and inspect the site prior to the fieldwork commencing.

An Aboriginal stakeholder consultation strategy was developed to assist in the identification of the cultural significance of the site and the impact of the proposed extension of West Pit on the cultural value of the site. The consultation was undertaken in accordance with the draft *Guidelines for Aboriginal Heritage Impact Assessment* prepared by NPWS. It involved meetings and site inspections with representatives from seven local Aboriginal groups and was undertaken by an indigenous Aboriginal archaeologist from Australian Archaeological Survey Consultants (AASC). The seven groups consulted included:

- Wonnarua Nations Aboriginal Corporation
- Upper Hunter Tribal Council (UHTC)
- Lower Wonnarua Tribal Consultancy Pty Ltd
- Ungooroo Aboriginal Corporation
- Wanaruah Local Aboriginal Land Council (WLALC)
- Lower Hunter Wonnarua Council Inc
- Combined Council Hunter Valley Aboriginal Corporation

More details on the consultation with the local Aboriginal community are provided in Part K of Volume 3.

6.4 EIS Exhibition

The exhibition of the EIS and invitation for submissions is an important component of the consultation process.

The EIS will be lodged with DIPNR. The EIS will be placed on public exhibition for a period of at least 28 days. Any person may inspect the document and make a submission on the proposal during the exhibition period. Discussions with DIPNR prior to the production of this EIS, indicate that it will be available for viewing at the following locations.

- DIPNR's offices in Sydney;
- DIPNR's offices in Newcastle;
- NSW Conservation Council offices in Sydney;
- SSC offices; and
- MSC offices.

Any other exhibition locations will be advertised prior to the exhibition of the EIS.

Printed copies of the EIS will be available at a cost of $27.50 including the Goods and Services Tax (GST). During the exhibition period all members of the community, interest groups and government authorities are invited to view the EIS and accompanying documents and make a written submission on any aspect of the project.

6.4.1 Guidelines for Making a Submission

Submissions should include:

- the nature of the interest in the project;
- opinions on the project;
- suggestions about alternatives, or improvements to the project;
- additional measures considered necessary to adequately protect the environment;
- errors or omissions in the information presented in the documents;
- additional factual information (and its source); and
- other aspects that are relevant to this project and its determination.

So that the matters raised in submissions can be analysed and properly considered it is preferable to:

- list points wherever possible;
- refer each point to the relevant section (or subsection) of this document;
- include details such as name, address and date;
- state whether an acknowledgment is required (all submissions received with details of a return address are likely to be acknowledged); and
- make the submission as legible as possible.

All information in representations received may be published in subsequent assessment documents.

Where the person or group making the submission indicates the information should be kept confidential, DIPNR will attempt to do so, however, it may be deemed by DIPNR that there is legislative or legal justification for the release of some information. For example, under the *Freedom of Information Act 1989* or under subpoena or statutory instrument. Form letters are acceptable and will be considered.

6.5 Issues Summary

A consultation strategy was developed from an early stage of the EIA process, to allow issues raised in government, stakeholder and community consultation to be incorporated and addressed in the EIS. Consultation is planned to continue throughout the development of the project, to allow for ongoing communication and feedback with government authorities and the community.

Issues raised by government agencies were largely dependent upon the portfolios which they manage. For example, NSW Fisheries was concerned with the impact upon aquatic habitat and RTA raised issues associated with the potential impacts to roads and traffic. The major issues to arise through government consultation were the impacts from noise and vibration, dust, water management, the final land capabilities produced from the rehabilitation program, opportunities to link remnant vegetation and the need to manage cumulative impacts. These impacts and opportunities are assessed throughout this EIS.

Impacts raised by the community related mainly to the loss of amenity from noise and vibration and dust impacts.

PART C

environmental interactions

C

CHAPTER 7

socio-economics

7 Socioeconomics

7.1 Introduction

The purpose of this socioeconomic impact assessment (SIA) is to assess the potential impacts of the proposal on surrounding communities. The SIA has been written having regard to Section 79C(1)(b) of the *EP&A Act* which states, in part, that the likely social and economic impacts of the development in the locality should be assessed.

A SIA aims to:

- assess the social and economic conditions of the site area and surrounds;
- predict the social and economic impacts of the proposal;
- enhance the benefits of the proposal; and
- identify and address any potentially negative impacts.

This SIA is linked to many other technical aspects of the proposal which impact on individuals and communities. The proposed activities and modifications will primarily see HVO north of the Hunter River continue with business as usual in relation to impacts on the wider community, however, the changes will result in greater flexibility in relation to internal processes, which will facilitate improved economic activity.

The main aspect of the proposal is the extension of West Pit. Without this extension, the proposal, as described in Chapter 4, would not proceed. The extension of West Pit extends the life of HVO north of the Hunter River by eight years from 2017 as proposed under the 1996 approval for West Pit. As such, this chapter focuses on the proposed extension of West Pit and the likely socioeconomic impacts this will have on the local and wider community.

Therefore, two project outcomes have been developed in relation to the extension of West Pit. These are:

- Outcome 1 – no extension to mining operations at West Pit and subsequent early closure of the mine;
- Outcome 2 – an extension to mining operations at West Pit as proposed.

This chapter identifies, assesses and provides recommendations on the social and economic impacts of these two outcomes.

The proposed extension of West Pit will provide for the continuation of current economic benefits to the local and regional community, and on a broader scale at the state and national levels.

Should the extension not be granted, the current end of consent date will see the mine close in 2017 instead of 2025, which will have social and economic ramifications including loss of approximately 250 direct jobs, 750 indirect jobs and a loss of coal to local and international markets. The potential social and economic effects of the two outcomes are summarised in Table 7.1.

7.2 Methodology

This chapter has been prepared using publicly available information sourced from SSC, MSC, CNA *(Annual Report and Social and Environment Report)*, Australian Bureau of Statistics (ABS), various government agencies, research bodies and the wider community.

Previous studies and planning documents relating to community services, facilities, and employment in the area have been reviewed and utilised as appropriate. CNA has provided additional data on mine operations, financial analysis and proposed employment levels.

The study area includes the area covered by HVO north of the Hunter River extending to the locality of Jerrys Plains. The operation is primarily located within Singleton LGA, with some of the operation located in the Muswellbrook LGA. Due to the significance of the project, information is also provided on the Hunter Valley region which equates to the Hunter Statistical Division (SD).

Table 7.1 Future Scenarios and Their Implications for West Pit

Outcome 1 **No Extension of West Pit (Close 2017)**	**Outcome 2** **Extension of West Pit (Close 2025)**
Loss of approximately 250 direct jobs and up to 750 indirect jobs.	Maintain employment at West Pit, and indirect employment for a further eight years.
Loss of supply contracts to the operations.	Maintenance of ongoing supply contracts to the operations.
Partial reduction in the level of support for local community projects, employment of apprentices, training for local staff and sponsorship of local events.	Future injection of West Pit's social and financial contributions (as part of the HVO) to the local and regional economy.
Slightly reduced impacts on local residences in the form of noise, dust and visual amenity.	Continued impacts on local residences, with mitigation measures designed to minimise these.

A community consultation process has been undertaken during the preparation of the EIS and the findings of these consultations, where relevant, have been integrated and addressed in this chapter. The findings of the consultation process in conjunction with relevant data have been analysed to determine potential impacts from the alternatives. These impacts have been assessed for significance and mitigation measures outlined. Details of the consultation process can be found in Chapter 6.

It should be noted that the information provided in this chapter in relation to mining activities and economy is for HVO as a whole, which includes West Pit data, unless otherwise specified. West Pit is the largest pit within HVO north of the Hunter River and includes approximately one quarter of all of HVO's workforce.

It should also be noted that calculations regarding the future timeframe for the mine are based on the assumption that approval for the extension will be received in 2004.

7.3 Socioeconomic Profile

7.3.1 Hunter SD

The Hunter SD stretches from the Lake Macquarie area in the south, north to the Great Lakes and the Upper Hunter reaches at Murrurundi. The Hunter region consists of 13 LGAs including, Cessnock, Lake Macquarie, Maitland, Newcastle, Port Stephens, Dungog, Gloucester, Great Lakes, Merriwa, Murrurundi, Muswellbrook, Scone and Singleton. There are five LGAs in the Lower Hunter Valley and the five western LGAs (Merriwa, Murrundi, Muswellbrook, Singleton and Scone) are referred to as the Upper Hunter. West Pit is located in the Upper Hunter with the majority of the site located in the Singleton LGA, and the remainder of the site located in the Muswellbrook LGA.

Demographic Profile

The Lower Hunter is the sixth largest urban area in Australia and is the largest non capital urban area in Australia. More than 83 % of the Hunter's population reside in the Lower Hunter LGAs with over half the population of the Lower Hunter living in the two LGAs of Newcastle and Lake Macquarie.

According to the HVRF regional report, *Newcastle and the Hunter Region 2000-2001*, there has been a slight population increase in Newcastle, Gloucester, Muswellbrook and Singleton LGAs. This report states:

> *"Growth in the latter two LGAs has largely been due to the restructuring of the Hunter coal mining industry, changing from underground mining in the Lower Hunter to open cut in the Upper Hunter. The electricity generation industry and various businesses associated with its operation and maintenance have also stimulated growth in Muswellbrook and Singleton."*

At the time of the *2001 Census of Population and Housing (2001 Census)*, the Hunter SD, had an estimated population of 563,587 people. The Hunter's population is a little older than the NSW profile, with a slightly lower proportion of people of working age (15-59) at 60 % compared with NSW at 62 %.

Economic Profile

According to the HVRF *Hunter Region Economic Indicators* report for the March Quarter 2003 the most marked characteristic of the Hunter's labour force in early 2003 was employment growth, however, the likelihood of employment growth continuing throughout 2003 is not high (HVRF, 2003b, p1). The closure of many heavy manufacturing industries, such as BHP in Newcastle has shifted the economic focus of the Hunter region. Whilst the traditional manufacturing industries, such as mining, continue to account for a significant proportion of the Hunter economy, more focus has also been placed in the tertiary sector, such as tourism, health, education and information technology due to the lapse in the secondary sector.

The HVRF *Hunter Region Economic Indicators* report shows that there has been a large shift in the proportion of the population employed in the primary, secondary and tertiary sectors. Between 1981 and 2001, the proportion of the population working in the primary sector (agriculture and mining) has dropped from 10 % to 6 %, with an even greater reduction found in the secondary sector (manufacturing) which showed a drop from 23 % in 1981 to 12 % in 2001. A corresponding increase can be seen in the tertiary sector, from 67 % in 1981 to 82 % in 2001 (HVRF, 2003a, p53).

The largest sectors of employment for the Hunter region at the *2001 Census* were retail trade (17 %), manufacturing (12 %) and health and community services (11 %). The proportion of people employed in the retail trade and health and community service industries has increased since 1981, however the proportion of people employed in the manufacturing industry has decreased as described above. Other growth industries in the Hunter area are finance, property and business (increase from 7 % in 1981 to 11 % in 2001) and recreational and personal services (increase from 5 % in 1981 to 11 % in 2001) (HVRF, 2003a, p54).

At the time of the *2001 Census*, 33.2 % of the Hunter population earned between $120 and $299 per week, followed by the $300-$499 bracket per week (16.9 % of the population). This was higher than the NSW figure of 25.9 % of people in the \$120-\$299 bracket per week and 15.9 % of people in the \$300-\$499 bracket per week.

7.3.2 Singleton LGA

Demographic Profile

Singleton LGA covers an area of 4,896 km^2 and is comprised of Singleton, the larger villages of Broke, Bulga and Jerrys Plains and smaller surrounding communities. The LGA is bordered by the LGAs of Muswellbrook, Rylstone, Scone, Dungog, Maitland, Cessnock and Hawkesbury.

The demographic statistics that are considered to be relevant are outlined below and include population size, age structure, income, cultural composition, and labour force participation rates and sectors.

Population Growth

The Singleton LGA had a population of 20,384 people at the *2001 Census*. The population of the area grew rapidly between 1991 and 1996, with a 7.3 % increase in the number of persons residing in the area. Table 7.2 illustrates that the population growth for the Singleton LGA has slowed since the *1996 Census*. Between 1996 and 2001, the Singleton population grew by 1.2 % (244 people). In comparison to the Hunter region and NSW growth rates for the period 1996 to 2001, this growth rate was reasonably small.

Population projections produced by SSC have suggested that the population of the Singleton LGA will grow by a further 23.7 % between 2001 and 2021, to a total of 26,700 persons. This equates to an average growth rate of 1.1 % per annum.

Age Distribution

Table 7.3 illustrates the age characteristics of the Singleton LGA, as compared to the Hunter SD and NSW population. The Singleton LGA had 5,037 persons (24.8 % of the population) below 15 years of age in 2001. This is above the Hunter and NSW proportion of people aged 15 or below, of which there were 21 % and 20.8 % respectively. Similar to the Hunter and NSW, the age bracket with the largest concentration of persons was 35 to 44 years (16.3 % in Singleton LGA).

Table 7.2 Population Growth of the Singleton LGA Compared to Hunter Statistical Division and NSW 1991 to 2001

	Persons 1991	Persons 1996	Persons 2001	% Change 1991-1996	% Change 1996-2001
Singleton LGA	18,661	20,133	20,384	7.3	1.2
Hunter SD	513,693	540,491	563,587	5.0	4.1
NSW	5,732,032	6,038,696	6,371,745	5.1	5.6

Source: Singleton Demographic Profile 1998 and ABS 2001

Table 7.3 Age Distribution for Singleton LGA 2001

Age	Singleton LGA Persons(1)	Singleton LGA %	Hunter SD %	NSW %
0-4	1,589	7.8	6.6	6.7
5-14	3,448	17.0	14.4	14.1
15-24	2,782	13.7	13.0	13.4
25-34	2,913	14.4	12.8	14.5
35-44	3,308	16.3	14.6	15.3
45-54	2,850	14.0	13.5	13.5
55-64	1,550	7.6	10.0	9.4
65-74	1,053	5.2	8.1	7.1
75+	796	3.9	7.0	6.1
TOTAL	**20,289**	**100**	**100**	**100**

Source: ABS 2001
Notes: (1) Excludes overseas visitors

Tenure

As shown in Table 7.4 a high proportion of residents (65.8 %) residing within the Singleton LGA own their own home, although this is also characteristic of the Hunter and NSW populations. The proportion of home ownership illustrates a level of financial independence.

Labour Force

The importance of the mining industry to the local economy is illustrated in the proportion of employed persons working within the mining industry in 2001 as shown in Table 7.5. The main industries employing residents of Singleton LGA in 2001 were the mining industry (15.5 %) and retail (12.9 %).

The unemployment rate in Singleton (5.6 %) at the time of the *2001 Census* was slightly lower to that of NSW (7.2 %), and the Hunter SD (8.2 %). The lower unemployment rate in Singleton compared to the Hunter SD and NSW as a whole may be due to the dominance of mining and related businesses in the area.

Table 7.5 Labour Force Participation Rates for Singleton LGA

Employment Rate	Singleton LGA %	Hunter SD %	NSW %
Employment rate	94.4	91.8	92.8
Unemployment rate	5.6	8.2	7.2
TOTAL	**100**	**100**	**100**

Source: ABS 2001

Income

The Singleton LGA is reasonable wealthy in comparison to the Hunter SD and NSW as shown in Table 7.6. The proportion of those earning less than $499 in Singleton LGA equates to that of NSW (54 %), though is lower than the Hunter SD figure of 63 %.

However, 16.4 % of residents in the Singleton LGA (2,434 persons) earned in excess of $1,000 per week. This figure is higher than the Hunter SD (8.9 %) and NSW (12.3 %) proportions.

Table 7.4 Tenure Type for Singleton LGA 2001

Tenure Type(1)	Singleton LGA Number of dwellings	Singleton LGA %	Hunter SD %	NSW %
Fully owned or being purchased	4,603	65.8	68.0	63.7
Rented	1,797	25.7	25.4	28.2
Other tenure type	271	3.9	2.8	2.8
Not stated	322	4.6	3.8	5.3
TOTAL	**6,993**	**100**	**100**	**100**

Source: ABS 2001
Notes: (1) = Proportion of occupied private dwellings

Table 7.6 Weekly Individual Income for the Singleton LGA 2001

Weekly Income	Singleton Residents(1)	Singleton LGA %	Hunter SD %	NSW %
Negative or nil	1,194	7.8	5.7	6.7
$1-$119	1,247	8.2	6.8	6.2
$120-$299	3,456	22.6	33.2	25.9
$300-$499	2,418	15.8	16.9	15.9
$500-$699	1,736	11.4	12.0	13.2
$700-$999	1,527	10.0	9.6	11.6
$1,000-$1,499	1,250	8.2	6.1	7.6
$1,500+	1,254	8.2	2.8	4.7
Not Stated	1,180	7.7	6.9	8.2
TOTAL	**15,262**	**100**	**100**	**100**

Source: ABS 2001
Notes: (1) = Excludes overseas visitors

Economic Profile

Singleton LGA and the Hunter Valley consist of an economy dominated by mining, agriculture, power generation, tourism and defence. According to SSC, there were 21 mining operations in Singleton LGA in July 2003.

Agricultural products that are produced in the area include dairy (milk), beef cattle, grapes and vegetables. The annual sales value of these products is over $86 million per annum.

The other major employment sources were defence, particularly in association with the Singleton Army Base.

7.3.3 Muswellbrook LGA

Demographic Profile

Muswellbrook LGA covers an area of approximately 3,402 km^2 and is generally comprised of Muswellbrook and Denman. The LGA is bordered by the LGAs of Singleton, Merriwa, Rylstone, and Scone.

The demographic statistics that are considered to be relevant are outlined below and include population size, age structure, income, cultural composition, and labour force participation rates and sectors.

Population Growth

The Muswellbrook LGA had a population of 14,796 people at the *2001 Census*. The population of the area grew slightly between 1991 and 1996, with 2.3 % increase in the number of persons residing in the area. Table 7.7 illustrates that the population growth for the Muswellbrook LGA has reversed since the *1996 Census*. Between 1996 and 2001, the Muswellbrook population fell by 4.9 % (766 people) in contrast to the Hunter region and NSW growth rates for the same period 1996 to 2001.

Population projections produced by MSC indicate that the population of the Muswellbrook LGA should grow at an average rate of 0.1 % per annum until 2021 to reach a figure of 16,300 (*Muswellbrook Demographic Profile*, 1998, MSC).

Age Distribution

Table 7.8 illustrates the age characteristics of the Muswellbrook LGA, as compared to the Hunter SD and NSW population. The Muswellbrook LGA had 3,651 persons (24.7 % of the population) below 15 years of age in 2001. This is above the Hunter and NSW proportion of people aged 15 or below, of which there were 21 % and 20.8 % respectively, and similar to Singleton (24.8 %). In comparison to Singleton, the Hunter and NSW, the age bracket with

Table 7.7 Population Growth of the Muswellbrook LGA Compared to Hunter SD and NSW 1991 to 2001

	Persons 1991	Persons 1996	Persons 2001	% Change 1991-1996	% Change 1996-2001
Muswellbrook LGA	15,111	15,562	14,796	3.0	-4.9
Hunter SD	513,693	540,491	563,587	5.0	4.1
NSW	5,732,032	6,038,696	6,371,745	5.1	5.6

Source: Muswellbrook Demographic Profile 1998 and ABS 2001

Table 7.8 Age Distribution for Muswellbrook LGA 2001

Age	Muswellbrook LGA Persons(1)	Muswellbrook LGA %	Hunter SD %	NSW %
0-4	1181	8.0	6.6	6.7
5-14	2470	16.7	14.4	14.1
15-24	1939	13.1	13.0	13.4
25-34	2205	15.0	12.8	14.5
35-44	2309	15.6	14.6	15.3
45-54	1996	13.5	13.5	13.5
55-64	1275	8.6	10.0	9.4
65-74	804	5.5	8.1	7.1
75+	576	3.9	7.0	6.1
TOTAL	**14,755**	**100**	**100**	**100**

Source: ABS 2001
Notes: (1) = Excludes overseas visitors

the largest concentration of persons was not the 35 to 44 years, but the 5-14 years, with 16.7 %. The age bracket with the second largest concentration of persons was the 35-44 years (15.6 %).

Tenure

As shown in Table 7.9 more than half of residents living in the Muswellbrook LGA (58.8 %) own their own home, although this figure is not as high as the Singleton, Hunter and NSW populations.

Labour Force

While the mining industry was not the largest employer in Muswellbrook, the importance of the industry to the local economy is still apparent in the proportion of employed persons the mining industry employed in 2001 as shown in Table 7.10. The main industries employing residents of Muswellbrook LGA in 2001 were retail trade (13.9 %), mining (12.6 %), and agriculture, forestry and fishing (10.7 %).

The unemployment rate in Muswellbrook (7.9 %) at the time of the *2001 Census* was similar to that of NSW (7.2 %), and to the Hunter SD (8.2 %).

Table 7.10 Labour Force Participation Rates for Muswellbrook LGA

Employment Rate	Muswellbrook %	Hunter SD %	NSW %
Employment rate	92.1	91.8	92.8
Unemployment rate	7.9	8.2	7.2
TOTAL	**100**	**100**	**100**

Source: ABS 2001

Income

Table 7.11 describes the weekly individual income of the Muswellbrook LGA, in comparison to the Hunter SD and NSW. It shows that a higher proportion of Muswellbrook's population earned below $120 per week in comparison to the Hunter SD, but a lesser proportion earned between $121 and $999 per week. However, for income levels above $1,000 per week, a greater proportion of Muswellbrook residents (13.8 %) earned $1,000 or more per week than the Hunter SD (8.9 %) or NSW (12.3 %). This illustrates that the Muswellbrook LGA is characterised by low and high-income earners, with fewer middle income earners than the Hunter SD.

Table 7.9 Tenure Type for Muswellbrook LGA 2001

Tenure Type(1)	Muswellbrook LGA Number of dwellings	Muswellbrook LGA %	Hunter SD %	NSW %
Fully owned or being purchased	3,175	58.8	68.0	63.7
Rented	1,645	30.5	25.4	28.2
Other tenure type	272	5.0	2.8	2.8
Not stated	305	5.7	3.8	5.3
TOTAL	**5,397**	**100**	**100**	**100**

Source: ABS 2001
Notes: (1) = Occupied private dwellings

Table 7.11 Weekly Individual Income for the Muswellbrook LGA 2001

Weekly Income	Muswellbrook Residents(1)	Muswellbrook LGA %	Hunter SD %	NSW %
Negative or nil	748	6.7	5.7	6.7
$1-$119	834	7.5	6.8	6.2
$120-$299	2,810	25.3	33.2	25.9
$300-$499	1,703	15.3	16.9	15.9
$500-$699	1,285	11.6	12.0	13.2
$700-$999	1,048	9.4	9.6	11.6
$1,000-$1,499	809	7.3	6.1	7.6
$1,500+	725	6.5	2.8	4.7
Not Stated	1,150	10.3	6.9	8.2
TOTAL	**11,112**	**100**	**100**	**100**

Source: ABS 2001
Notes: (1) = Excludes overseas visitors

Economic Profile

The key industries within the Muswellbrook LGA include agriculture, coal, and power and energy which are similar to that of the Singleton LGA and Hunter region. According to MSC, coal mining has ensured that many residents of the shire have been, or are currently involved in, mine-related employment. Due to the increasing use of contractors over direct mine staff, many residents now work for companies that support the mine rather than work directly for the mine.

The agriculture industry is facing change, particularly in the well-established dairy and beef cattle industry, due to market forces such as the deregulation of the dairy industry. MSC has noted that the growth in the viticulture and equine industries has played an increasingly important role in the development of the area.

7.3.4 Jerrys Plains

The locale of Jerrys Plains incorporates the villages of Jerrys Plains, Appletree Flat, Glenmore Stud and Warkworth. The village of Jerrys Plains is the closest village to West Pit.

At the *2001 Census*, Jerrys Plains district had a population of 534 people, with 131 living in the village of Jerrys Plains. The age brackets with the largest concentration were in the 5-14 years bracket (19.6 %) and the 35-44 years bracket (16.1 %). These age brackets were also dominant in the village of Jerrys Plains, with 22.8 % and 17.6 % respectively, as well as the 55-64 years bracket with 17.6 %.

Almost half of the population (46.2 %) across the Jerrys Plains area earn less than $300 per week, while just over half (52.3 %) of the population of the village of Jerrys Plains earn less than $300 per week. Both the area of Jerrys Plains (73.7 %) and the village of Jerrys Plains (76 %) have a high number of properties owned or being purchased.

The unemployment rate is higher across Jerrys Plains with 14.5 % than the district with 5.9 %. The agriculture and mining industries were the largest employers for the wider Jerrys Plains district, with 22.4 % and 14.8 % respectively. In the village of Jerrys Plains, mining, manufacturing and construction were the main industries employing residents, with 23 % of the population each.

7.4 Value of the Coal Industry

Mining is Australia's largest export earner, resulting in Australia being the biggest coal exporter in the world and the world's fourth largest producer of hard coal (www.australiancoal.com.au).

In 1999 and 2000, minerals and metals exports totalled about $40 billion or one-third of total exports. Australia produces about 220 Mtpa of coal and exports to 35 countries.

According to the *Coal Industry Profile 2003*, coal mining accounted for $4.7 billion in export earnings for NSW (DMR, 2003, p1). At the end of June 2002, the coal mining industry provided direct employment for 10,052 people in the five coalfield regions of NSW. The industry also has indirect benefits to other industry sectors such as iron, steel and aluminium, which rely on high quality coal and the more competitive electricity prices offered in NSW.

Coal mining is fundamental to the regional economies of the Hunter Valley, Newcastle, Illawarra, Lithgow and Gunnedah areas.

According to the NSW Minerals Council, nationally, the mining industry generates three additional jobs in other industries for every job in mining. These additional 45,000 jobs cover mining equipment manufacture, transport, construction and service industries (www.nswmin.com.au/minerals).

The Minerals Council also notes that the minerals industry contributes to local, state and federal government revenues with approximately $800 million per year paid in royalties, payroll tax and land tax. A further $700 million is paid for major services including rail haulage, electricity, water and port services and the industry is the largest customer of the State owned rail network and the ports of Newcastle and Port Kembla (www.nswmin.com.au/minerals).

The Hunter Coalfield, where West Pit is located produces 93.6 Mt or 64.5 % of the State's total raw coal production in 2001-2002 (DMR, 2003, p7). Production in this coalfield has been growing over the past decade and it is the fastest growing area of coal production in the State, particularly in open cut operations (DMR, 2003, p47).

In 2002, HVO, including West Pit, had a saleable production of 12.6 Mt, which represents an increase when compared to the 12.2 Mt produced in 2001. (CNA, 2002a, p5).

7.5 Contribution of CNA and West Pit to Singleton LGA and the Hunter Region

7.5.1 General

CNA has made significant contributions to the Hunter Valley community. This has been achieved through ongoing consultation with the Singleton and Hunter region communities including keeping residents informed through face to face meetings and newsletters, community meetings, sponsorship programs and open days, all of which are discussed in the following sections.

7.5.2 CNA Consultation with the Community

CNA has increased the awareness of its activities and relationship with the community through a range of community consultation initiatives, which, in 2002 included:

- face-to-face meetings with neighbours, residents and interest groups;
- CCC meetings which consist of representatives from SSC and MSC, community representatives, EPA and the former DLWC (now DIPNR) and DMR;
- conducting family open days and community open days;
- providing site tours for schools, universities and social groups;
- distributing local media releases;
- providing new publications to stakeholders;
- sponsoring forums such as the Coal Discussion Day; and
- the preparation of an *Annual Social and Environment Report*.

CNA has also raised awareness of its operations through a community survey, which was undertaken in 2001 to assess the community's perception of CNA's performance in 2000 and 2001. The survey was undertaken at an important time in CNA's relationship with the community, such as when the Community Trust and the donation and sponsorship programs were being developed.

7.5.3 Contribution to the Local Community

CNA has contributed significant funds into the local community to assist with increasing job skills, education schemes, charity organisations, and emergency groups within the Singleton and Muswellbrook LGAs and the Hunter Valley.

The contributions made by CNA to the local and regional community can be divided into two elements. The first element is the sponsorship and donation program. This program is administered on an application basis, with priority being given to projects supported by employees. In 2002 alone, approximately $110,000 was donated to over 75 community groups in the area.

The second element is the ongoing partnerships with local and regional organisations that provide benefits to the community or special events. These partnerships include the Hunter Westpac Rescue Helicopter Service, the Hunter Medical Research Institute, the HVRF and the Hunter Export Awards. Total expenditure on corporate partnerships in 2002 was approximately $125,000. An ongoing commitment has been made to the sponsorship program for 2003.

CNA established a Community Trust in 1999 to assist community led initiatives which address long term local issues identified through consultation with community and business leaders in the areas of sustained education, social and economic development. The Trust has been the cornerstone in community relations activities, and has supported over 20 partnerships with a range of community and business organisations in the region. A further $3 million has been made available to continue and extend support for economic development, social and education projectsthrough to 2005.

HVO is also utilised by local and regional schools, through on-site visits for universities, teachers, and students. Tours have also included local community groups, visiting foreign delegations and conference delegates.

7.5.4 Assisting Employees

CNA provides its employees with training and helps develop new skills through programs conducted throughout the year. For example, CNA provides its supervisors with *Frontline Leadership* training programs to help build their skill base and team leadership abilities. In addition, CNA commenced a *Generating Positive Energy* program in 2003 with the aim of having all employees participate in this three day workshop.

Several compliance programs have been introduced, including a *Code of Conduct* and a supporting whistleblower program called *Speak Out*. *Speak Out* provides a facility for employees to anonymously report to senior managers any concerns regarding regulatory, criminal, community, ethical, environmental or safety issues that they feel are not being adequately addressed (CNA , 2002a, p4).

Through the Hunter Valley Training Company, CNA manages an apprentice program which is a four year program aimed to give the apprentices experience in organisations, whilst they complete their formal qualifications.

7.5.5 Complaint Handling Procedures

A complaint handling procedure is in place at all CNA operations, including operations at HVO and West Pit. CNA has a 24 hour environmental contact line for community issues which relate to the operations of the mine. A complaints handling procedure has been introduced, which states that if a complaint is made to the contact line, a company representative is notified, who immediately contacts the complainant to discuss the nature of the complaint

After a complaint is made, an environmental complaint form is completed, outlining the nature of the complaint, time, date, and site location. This information is then entered into the complaints database and an investigation is undertaken. The relevant site personnel are also notified to resolve the issue promptly and to make them aware of the issue. The Manager or General Manager may also be contacted to assist in resolving the issue. The original complainant is then notified of the resolved issue.

CNA has encouraged residents to report concerns by advertising the environmental contact line number in the local newspapers. Many ongoing issues that have been raised with CNA including dust and vibration from blasting are being addressed in major research projects or changes to the operations.

In 2002, 53 complaints were received regarding HVO, however, none of the complaints have been recorded as specific to West Pit. The complaints were primarily related to blasting, but also included light, dust and noise. No complaints have been received regarding West Pit in 2003.

The above mechanisms were noted when CNA was awarded the NSW Premier's *Mineral Export of the Year* award in 2001. This award stated that CNA has been a leader in helping to make coal extraction and transport more compatible with surrounding activities and communities.

7.6 Potential Impacts and Impact Assessment

This section discusses the potential social and economic impacts of two possible future scenarios for West Pit. Outcome 1 addresses the potential social and economic impacts should West Pit close early after reaching the limits of current consent boundaries in 2017. Outcome 2 looks at the potential impacts of the mine's continuing operation and extension under the proposal.

7.6.1 Outcome 1

General

If development consent is not granted, the mine will continue under existing mine plans, and then wind down and ultimately close when the current consent limit is reached. Outcome 1 addresses the potential social and economic impacts of the closure of the coal mine in 2017 rather than 2025.

Social Impacts

The potential early closure of West Pit may result in benefits and losses to the surrounding community. It is expected that benefits may stem from a small alleviation in environmental amenity issues such as noise, vibration and dust. The long term social disadvantages to the community will involve loss of revenue into the local economy, support for community organisations and projects, social impacts of unemployment, and loss of social networks.

Whilst the closure of West Pit may result in some improvement in environmental amenity issues through less noise and vibration, and improved air quality, it is expected that the other local coal mines will continue to contribute to these environmental issues.

Furthermore, given the consent modifications being addressed in this EIS, it is likely that the other mines in the area will increase their production in an effort to cater for the loss of output from West Pit.

Local quality of life may therefore be similar to the current situation, should the operations close. Furthermore, some properties that are in close proximity to the mine are located within a zone of affectation, and CNA already has agreements in place with the property owners to address these impacts. If West Pit extends its operations, best practice mitigation measures will be employed to minimise impacts on nearby residents from continued operation of the mine.

The closure of West Pit may place increased pressure on families in the area, due to the loss of income and job opportunities for residents who are currently employed at the mine. This is particularly the case with long term employees in the 40 to 50 year age group, who may experience difficulty in seeking alternative employment.

The future operations at West Pit also cannot be considered in isolation. The closure of the mine at the end of the current consent, in conjunction with the cessation of operations at North Pit/the Alluvial Lands and Carrington, may result in population loss in the surrounding towns and villages, and within time, a loss of social services and facilities in the smaller towns. The growth rate in the Singleton LGA slowed markedly between 1996 and 2001 and loss of employment may result in families leaving the town and create fewer opportunities for people to move into the district. Muswellbrook is experiencing a decline in population, with a minimal forecast growth in the future.

The mining industry has been an integral part of the Singleton LGA and Hunter Valley and has assisted in formulating the surrounding villages' identity. Mining within the Singleton LGA has existed since 1870 and has remained an important part of the economic and social system. Mining in Muswellbrook began in the 1890's, with large-scale mining developing recently. There are 21 operational mines within the Singleton LGA and six mines operating in the Muswellbrook area, with at least two new mining projects that had commenced or were at the DA stage.

West Pit has a number of long term employees, therefore the potential loss of the mine to the community may adversely impact upon the social networks, and sense of community formed between the employees at the mine. As most workers are shift workers with irregular hours, the social networks between miners often plays an important role as many have time off when families are working or sleeping.

Economic Impacts

Unemployment

The HVRF *Hunter Region Economic Indicators* report noted that the level of unemployment had moved below its long-term trend rate. While the recent improvement in unemployment rates suggests a healthy employment market, the Hunter area still suffers from a high proportion of long-term unemployed residents. The HVRF also notes that unemployment is still higher than the state average and more chronic, and the continuation of employment growth is unlikely to continue.

HVO currently has nearly 600 employees, with additional contractor resources equal to around 400 people. Many employees are long standing workers at the mine with an average length of service of 15 years and an average age of 46 years.

Given that HVO operates as an integrated operation (subject to current approvals), which includes the sharing of resources, such as people, it is difficult to differentiate between the number of people that work north or south of the Hunter River. However, figures provided by CNA suggest that currently:

- approximately 494 people principally work at HVO north of the Hunter River, including people that work within the pits, CPPs and loading points;
- approximately 186 people principally work at HVO south of the Hunter River, including people that work within the pits; and
- approximately 350 people work across both north and south of the Hunter River, including management, office staff and maintenance staff. Of these 225 work at HVO north of the Hunter River.

Excluding the people that principally work at HVO south of the Hunter River, approximately 719 people work principally or partly at HVO north of the Hunter River.

As indicated in Table 7.12, at its peak in 2020 (Year 17), in a favourable market environment, HVO is predicted to employ 1,246 people including contractors, a possible increase of 216 people over current employment levels. This compares with previously approved workforce numbers of 1435 (Section 4.3.7) employees across HVO.

Of the potential 216 additional employees, approximately 139 are expected to work principally or partly at HVO north of the Hunter River making a total of 858. This compares with previously approved workforce numbers of 868 employees at HVO north of the Hunter River. If the extension to West Pit is not granted, the future of at least 25 % of the existing jobs beyond 2017 is uncertain.

Table 7.12 HVO Workforce

Year		Number of Full Time Employee Equivalents (assuming favourable market conditions)
		Including Contractors
	2003	1,030
1	2004	1,121
2	2005	1,074
3	2006	1,095
4	2007	1,102
5	2008	1,107
6	2009	1,119
7	2010	1,116
8	2011	1,140
9	2012	1,140
10	2013	1,191
11	2014	1,231
12	2015	1,239
13	2016	1,238
14	2017	1,242
15	2018	1,237
16	2019	1,244
17	2020	1,246
18	2021	1,214
19	2023	1,106
20	2024	1,085
21	2025	1,052

Source: CNA 2002

Table 7.13 outlines HVO employee's current residential location, with approximately one third drawn from the Singleton LGA, and the remainder drawn from neighbouring LGAs.

Table 7.13 Residential Location of the HVO Workforce

LGA	Proportion of Workforce
Singleton	35.3 %
Cessnock	28.5 %
Muswellbrook	18.5 %
Maitland	10.7 %
Scone	2.2 %
Newcastle	1.7 %
Lake Macquarie	1.4 %
Port Stephens	0.7 %
Dungog	0.4 %
Merriwa	0.2 %
Murrurundi	0.2 %
Tamworth	0.2 %

Source: CNA 2002

Any mine closure will result in significant job losses for these areas. As previously mentioned, CNA has indicated that if approval is not granted for an extension, then the current consent boundaries will be reached by mid 2004. Following this, mining operations will have to be modified. Without the extension, West Pit will cease at the end of the current consent (2017), with the workforce being reduced as the reserves are exhausted. The estimated decline in workforce numbers over the subsequent shortened life of the mine will be significant. The potential loss of some 250 jobs in this area will have a significant impact on the local community.

The Minerals Council estimates that for every direct job in the coal sector nationally, another 3 jobs result in associated sectors. Due to concentration of mining in the Hunter, it will result in greater regional impacts than other areas. Using this multiplier, up to approximately 750 jobs could be affected by the closure of West Pit in 2017. This will include suppliers, rail and port operators and other contractors.

Financial Implications

CNA estimates sales revenue of $4.4 billion over the 20 year projected life of West Pit, if the extension is approved. If the coal resource in the extension area is not recovered, there will be an opportunity cost to the Australian economy, and potential export earnings and balance of trade over the eight years between 2017 and 2025. In addition, should the extension not proceed, royalties of approximately $54.75 million payable to the NSW Government will be lost, as will $58.5 million in taxes (these figures are based on 2002 rates and a consistent income over the twenty-one year period).

HVO is also likely to contribute $5.3 million to the Australian Coal Association Research Program (ACARP) between 2017 and 2025. ACARP's mission is to research, develop and demonstrate technologies that lead to the safe, sustainable production and utilisation of coal.

It is acknowledged that with the earlier closure of West Pit, other coal mines in the Hunter or other areas may be able to fulfill export contracts, however, there is no guarantee that the supply of coal could be maintained from the same coalfield. Therefore this may well result in significant lost revenue to the Singleton and Muswellbrook LGA's.

Flow on Effects into the Economy

In 2002, expenditure into the local economy from HVO included $219 million for payment to suppliers outside the business for materials, facilities and services. It is anticipated that between 2017 and 2025, an additional $1.7 billion will be spent in the local economy (this is a conservative estimate based on 2002 expenditure).

Purchases in the local area include tyres, plant parts and repair labour, explosives, magnetite, flocculant, equipment hire, plant and equipment purchase, consumables, safety goods and services, council rates, transportation of heavy equipment (excluding rail freight), fuel, lubricants and consultants (all disciplines). These figures do not include items such as electricity and telephone services which are paid from a central office off site.

A closure of operations at West Pit will impact greatest on smaller engineering firms and parts supply businesses and large suppliers in the Singleton LGA.

The continued operation of the mine as a result of the extension will contribute to the large expenditure made by HVO in the community.

Property Values

The early closure of West Pit and subsequent rehabilitation of the mine site may impact on surrounding property values. There may be a decrease due to lower demand as a result of local unemployment and population loss. This may be counterbalanced by improved amenity to those properties nearest the mine.

7.6.2 Outcome 2

General

The proposal will extend the life of West Pit and HVO north of the Hunter River to 2025. Therefore Outcome 2 addresses the social and economic impacts of the extension option. This is essentially the opposite of impacts outlined for the earlier mine closure.

Social Impacts

The potential social impacts of the extension of the mine include continued benefits to the local and regional community, as well as potential environmental amenity issues. The social impacts of the continuation and extension of the mine's operations incorporate the issues raised by the community during the community consultation process that occurred during the preparation of the EIS.

The potential environmental amenity issues associated with the extension of West Pit include noise and vibration, air quality issues, and reduction in archaeological resources. The prominent issues raised by the community included:

- noise and vibration impacts due to blasting; and
- dust emissions from the site, and their impacts on human health.

These issues have been thoroughly explored in the EIS and results indicate that the proposal will not affect any private property that is not already contained within a zone of affectation or subject to a private agreement with CNA. In addition, appropriate mitigation measures will be implemented to ensure that the community's quality of life is not significantly impacted. Mitigation measures that will be introduced to address environmental amenity issues are addressed in Chapter 19. A general summary of pertinent strategies to address the community's concerns is provided in Section 7.8.

The benefits to the community will be generated from the continued opportunities that are presented to the residents by CNA. HVO develops the skills of the employees through education and training programs, and provides donations to the local schools, charity groups and emergency services.

The continuation of social networks, and the unified identity of the area as a coal mining locality will continue to strengthen with the continuing and expanding operations of West Pit. The retention of employment will support the stability of the local population and therefore support the maintenance of services and industry.

Future increases in capacity in West Pit are likely to be achieved by relocating existing manning and equipment within HVO (particularly from North Pit/the Alluvial Lands and Carrington). As West Pit deepens over time there may be a small requirement for additional operators during times of peak production.

Economic Impacts

Local

The extension of West Pit will give the mine a 21 year time frame from the date of approval, which will result in a further eight years of production. At the peak of the proposal, HVO is predicted to employ up to 1,246 people (including contractor equivalents), a possible increase of 216 people over current employment levels if market conditions are favourable. Of the potential 216 additional employees, approximately 177 are expected to work principally or partly at HVO north of the Hunter River.

This continued level of employment will maintain the significant economic benefits to the community through expenditure on salaries and subsequent local expenditure.

Table 7.12 shows the expected workforce for HVO should the extension be approved.

The employment catchment area has a population of over 20,384 people in the Singleton LGA, 14,796 people in Muswellbrook and 563,587 people in the Hunter SD. Together these areas include a number of major centres such as Newcastle, as well as a range of towns, such as Maitland, Scone, Muswellbrook, Cessnock and Singleton. The population profile indicates a labour force with experience and characteristics, which are suited to the employment required for coal mining.

The additional workforce will be largely sourced from the existing CNA workforce. Therefore, there is no expected influx of employees from outside the region seeking accommodation, community facilities, and services.

In addition, the continued operations at West Pit will ensure that the current 250 employees will not be without employment and that they will not be concurrently seeking work in the region or drawing on other support services.

As outlined in Table 7.14, based on current rates, the proposed mine extension will make a significant economic contribution to the economy at a local, national and international level.

Table 7.14 Economic Contribution of West Pit

Item	2003-2024 (Forecast based on current rates)
Taxes payable	$234 million
Royalties	$219 million
Sales revenue	$4,420 million

Source: CNA 2003

Regional

CNA's mining operations employ over 1,500 people in the Hunter Valley. In addition to the personnel who are involved directly in the mining operations, personnel are also employed in the area of cleaning, electrical maintenance, mechanical maintenance, heritage, environmental, rehabilitation works, earthmoving, and information technology support. The majority of these personnel are employed from local contractors from the surrounding townships.

State and National

The public sector also receives benefits from the coal industry through taxes, state owned enterprises and royalties. The Federal Government receives revenue in the form of taxes (company, sales and income tax from employees), and excise on fuel and imported equipment and goods.

The State Government holds an interest in rail freight and port charges and in some consumers of coal (electricity). The State Government collects payroll tax on the wages of employees and some royalties.

Local Government

Local government benefits from rate revenues and the rates of employees living in the surrounding areas.

Key Economic Linkages

Coal mining in the Hunter Coalfields is an integral part of the regional economy, contributing to value added manufacturing carried out in the Newcastle area, and earning export income via the Port Waratah Coal Terminal.

The *Coal Industry Profile 2003*, predicts a continued growth in demand for thermal coal over the next decade. The NSW Government's strategic study of the coal sector predicted that 13 coal mines will close in the Hunter and Newcastle coalfields over the next 10 years, due to the depletion of reserves. The report goes on to predict that by 2007 to 2008, approximately 50 % of production could be from new mines and extensions, a significant proportion of which will come from open cut mines in the Upper Hunter Valley (DMR, 2003, pp3-4).

The HVRF has indicated that the main concern in the Hunter is job losses and high unemployment. The number of persons working in the region in 2001 was 266,000, which fell to 230,000 in February 2002. Job losses were reversed in the second half of 2002, however these were mainly part-time jobs. Unemployment in the Hunter Valley region is consistently higher than the state average

The average weekly earnings of coal miners in open cut mines in 2000 to 2001 was $1,776.10 equating to an annual salary of approximately $90,000. This provides for an annual after tax salary of approximately $60,000. Based on a potential maximum total integrated workforce of 1,246 at HVO in 2020, this equates to approximately $74.7 million in available annual household expenditure (a conservative estimate based on 2002 dollar values). Based on the *Mining Industry and Employee Survey* undertaken for the *Mount Arthur North EIS* in 2000, up to 85 % of household expenditure will be undertaken in the surrounding LGAs, 9 % in Newcastle and 6 % outside the region.

7.7 Mitigation

If Outcome 1 proceeds, then a complete mine closure plan will need to be developed with a significant component related to employment and structural adjustment to the wider economy. A plan will also need to eventually be developed for Outcome 2, however the second outcome provides for continued employment for a longer period. This will need to be developed by CNA in conjunction with local, state and federal government agencies and other relevant authorities.

The social and economic component of the plan will need to:

- identify and include a timeframe for the mine closure stating the scale down in employment by types of worker;
- identify all contractors, suppliers and associated industries linked to the mine operation and identify direct and indirect impacts;
- develop strategies which attempt to redeploy workers and full time contractors;
- work with coal marketing agencies to develop alternative sources of coal for the domestic and international market;
- identify alternative sources of support for the local community which currently benefits from sponsorship and financial support; and
- work with social services agencies to provide support for retrenched workers and their families.

The potential environmental amenity issues that may stem from Outcome 2 include ongoing issues with regards to noise and vibration, water quality, air quality, visual amenity, Aboriginal heritage resources and road safety. The mitigation measures for these issues have been discussed extensively in the relevant chapters.

As the employees utilised in the planned extension of West Pit will mainly consist of the existing West Pit workforce and a proportion of the HVO workforce, it is not expected that the extension of the mine will place pressure on the social infrastructure in the area, such as community services, housing and other social services.

HVO has an existing community consultation strategy, which ensures that CNA staff liaise with the local community, stakeholders and government authorities. In order to minimise the social impacts of the extension of the coal mine effectively, management strategies will be implemented including:

- throughout the operation of the mine, CNA staff will continue to have a pro-active community information program eg advertisements of the contact number in the local newspaper.
- the HVO CCC will continue to meet to discuss the mine's progress and compliance with conditions of development consent;
- newsletters will be distributed to inform residents in advance of significant activities within HVO taking place; and
- the 24 hour contact line will continue to operate in the format previously outlined.

Management strategies will be implemented to ensure that the community is informed of on-site works, as well as being able to contact CNA personnel to raise any issues of concern, make complaints or provide positive feedback.

7.8 Conclusion

The extension of West Pit will ensure that mining operations will continue until 2025. This additional resource will ultimately provide a benefit to the local and regional community and economy by:

- ensuring ongoing employment across HVO;
- an additional sales revenue of an estimated $1.1 billion;
- a further $54.75 million in royalties; and
- significant flow on effects into the regional, state and national economy.

To not progress with the mining of such a valuable coal resource to both domestic and international markets will result in a significant opportunity cost.

It should be noted that some neighbouring properties are impacted currently by West Pit and that this is predicted to continue under the proposed mine plan. However, mitigation strategies have been developed to minimise impacts and HVO is committed to ensuring all concerns are addressed as soon as they are brought to the attention of the mine.

CNA will continue throughout its operations to be socially responsible, as seen through the HVO CCC, Community Survey and comprehensive complaints handling procedure. The involvement and consultation with the community has also been evident through the community and family open days, meetings with residents and school site tours. Programs such as INCRS, the Community Trust, sponsorships, donations and the Aboriginal Development Consultative Committee have provided support to the local community. The extension of the mine will ensure that these efforts continue, and that the community is able to benefit from the operations of the mine.

The direct economic benefits of West Pit and the flow on effects into the local, regional and national economies are significant. The continued operation of the mine is important to the ongoing economic development of the region.

CHAPTER 8

land management

8 Land Management

8.1 Geology and Coal Resource

8.1.1 Regional Geology

General

The coalfields of the Hunter Valley were laid down in the Permian period and are the largest known coal bearing areas in NSW. They lie near the north eastern boundary of the Sydney Basin and outcrop in a belt up to 50 km wide extending from the coast to as far west as Murrurundi. The coal seams are terminated by the Hunter Thrust System which is a fault upthrust on the northern side of the coal fields extending south east from Murrurundi. The southern and western boundaries are determined by increasing thickness of overlying Triassic sandstones.

Three distinct measures characterise the coal deposits in the Hunter Valley:

- The early to middle Permian Greta Coal Measures;
- The late Permian Wittingham Coal Measures; and
- The overlying late Permian Wollombi Coal Measures.

The Singleton Super Group and the Greta Coal Measures can be found in the Upper Hunter.

The Singleton Super Group

The Singleton Super Group contains 28 named coal seams which have been divided into the Upper or Wollombi Coal Measures and the Lower or Wittingham Coal Measures. Of the two measures, the Wittingham contains about 15 seams of economic interest which could produce steaming and coking coals. By contrast, the Wollombi Coal measures contain few seams of economic significance with most of the seams being thin and excessively banded.

Regional stratigraphic nomenclature for the Singleton Super Group is shown in Figure 23 in Volume 4.

The Greta Coal Measures

The Greta Coal Measures are the next sequence of coal measures below the Singleton Super Group. They have been brought to the surface in the vicinity of major anticlines near Muswellbrook (Muswellbrook anticline) and Cessnock (Lochinvar anticline).

The Muswellbrook anticline runs through the south western corner of the West Pit mining area and has a significant impact on the geology of the region.

8.1.2 Geology of West Pit and Surrounds

General

West Pit is currently covered by CML 4 and ML1428. The proposed extension to West Pit is covered by ML 1406 and EL 5243, located to the east of CML 4.

West Pit is located within the Singleton Super Group. As mentioned above, this super group contains the Wollombi and Whittingham Coal Measures, each of which contain a number of subgroups which are further broken into coal formations and seams.

The Wittingham Coal Measures contain the Jerrys Plains and Vane Subgroups. The base of the Jerrys Plains Subgroup outcrops across the south eastern part of CML 4 and EL 5243 and the Vane Subgroup outcrops across the rest of the area covered by ML 1428, CML 4 and ML 1406.

8.1.3 Resources And Reserves

The West Pit mining area contains significant resources of thermal, soft and semisoft coking coal. A resource and reserve statement has been completed for the proposed extension area, which covers ML 1406 and EL 5243. The total resource within EL 5243 has been estimated at 54.74 Mt, which is made up of indicated resources within and outside the reserve area as well as inferred resource. The indicated resource within the reserve area was 26.92 Mt.

The total resource within ML 1406 was 14.57 Mt, which was made up of indicated resources within and outside the reserve area as well as beneath the endwall batter. The indicated resource within the reserve was 11.70 Mt.

8.1.4 Structure

The strata within West Pit dips to the south east, generally between 3° and 10°. Some localised dips up to 45° occur adjacent to large normal faults. There are several normal faults trending across the area in an east west orientation. One of these, the Wilton fault, is at the southern end of the main pit and is projected to continue through ML 1428 to the east. It has a vertical displacement of 15 to 20 m.

8.2 Topography

8.2.1 Regional Topography

The Hunter Valley has four landform units:

- Liverpool and Mount Royal Ranges (including Barrington Tops);
- Merriwa Plateau and Goulburn Valley;
- North Eastern Foothills; and
- Central Lowlands.

The Liverpool, Mount Royal and Barrington Tops in the north and north east of the valley form the headwaters of the Hunter River.

The Merriwa Plateau is derived from weathered basalt. The Goulburn Valley to the south has softer sandstones forming broad open valleys. A sandstone escarpment and plateau forming the Wollemi National Park defines the south western part of the Upper Hunter.

The north eastern part of the Upper Hunter is a hilly and low mountainous area derived from hard sedimentary rocks and lava. It extends from Mount Royal and Barrington Tops to the central part of the Valley.

The Central Lowlands extends from Murrurundi to Branxton and was formed from relatively weak Permian sediments. West Pit is located in the Central Lowlands of the Hunter Valley.

8.2.2 Local Topography

The landscape character of the West Pit extension area and HVO north of the Hunter River is dominated by moderate to gentle undulating slopes.

The terrain within the proposed extension slopes gently to the south east and to the south to south west along the southern boundary. A ridge, at approximately 200 m AHD, is located to the south west and separates HVO north of the Hunter River from the village of Jerrys Plains.

Directly to the south and south east the terrain slopes gently toward the Hunter River. The area of the proposed extension is characterised by moderate to gentle undulating slopes.

This topography is typical of the pre-mining topography within HVO north of Hunter River in which terrain generally sloped to the south east and to the south to south west. A low north east to south west trending ridge which traverses the middle of the existing lease area rises to a height of 200 m at the southern end before dropping away sharply to a wide flood plain which links up with the Hunter River (SKM, 1989). Carrington sits within this floodplain and gradually grades toward the Hunter River. The North Pit and The Alluvial Lands area was also characterised by gently sloping terrain grading toward the Hunter River bounded by the large meander in the Hunter River that forms the boundary of the Alluvial Lands today (Croft, 1979).

8.3 Land Use

8.3.1 Regional Land Use Patterns

The Upper Hunter has a strong historical association with the rural sector and has traditionally been dominated by a mixed grazing and cropping landscape, with dairy farms clustered along the Hunter River floodplain. The region is also a well established wine growing area with over 50 vineyards located throughout the Upper Hunter.

Coal mining was introduced to the Upper Hunter approximately 50 years ago and the region now has the highest proportion of coal mining production in NSW of which, 90 % is open cut. Open cut mining covers about 0.8 % of the available land in the region. The most recently available land use statistics are provided in Table 8.1.

Table 8.1 Land Use in the Upper Hunter

Land Use	Area (ha)	%
Grazing	874,750	47.8
Timber	769,500	42.0
Cropping	153,750	8.4
Mining	14,700	0.8
Water Bodies	6,000	0.3
Urban	4,450	0.2
Vineyard	4,250	0.2
Recreation	1,350	0.1
Vegetables	300	0.2
Quarrying	650	< 0.1
Utilities	450	< 0.1
Industrial	300	< 0.1
Orchards	250	< 0.1
Intensive Animal Production	250	< 0.1
TOTAL	**1,830,950**	**100**

Source: DUAP 1997

8.3.2 Local Setting

Prior to the establishment of mining within HVO north of the Hunter River, the main land use in the area was agricultural, with an emphasis on grazing and some cultivation along the Hunter River.

The existing local setting around HVO north of the Hunter River and West Pit is dominated by coal mining. Carrington, North Pit, The Alluvial Lands, Cheshunt and Riverview Pits are located south of West Pit, while Warkworth, Wambo, Mount Thorley Operations and Bulga Mine are located further south and to the south west. Cumnock No. 1 Colliery is located to the north east and Ravensworth-Narama is located to the east of West Pit.

In addition to coal mining, there are a number of rural and rural residential properties located to the south of West Pit. The distribution of agricultural properties and their activities is dependent upon location, with intensive agricultural activities such as dairy and beef cattle grazing, fodder cropping and the running of horses occurring on the rich alluvial soils within the floodplain of the Hunter River. Less intensive activities, such as grazing on non-improved pasture, occur on the undulating slopes of the surrounding areas.

Other activities in the area include power generation at the Bayswater and Liddell Power Stations located to the north and the village of Jerrys Plains, which is located to the south west behind the aforementioned ridge.

8.3.3 Land Status within HVO North of the Hunter River

The total area of land which will be encompassed by the consolidation of the 18 approvals across HVO north of the Hunter River is approximately 5,345 ha. This area will be made up of active mining areas including CPPs, dams, conveyors and loading points, rehabilitated land, land to be mined and buffer areas. Table 8.2 summarises the area of land currently within each of these categories expressed as an area and as a percentage of the total area covered by HVO north of the Hunter River.

Table 8.2 Summary of Current Land Status within HVO North of the Hunter River

Land Category	Area (ha)	% of Land Category within HVO north of the Hunter River
Active mining areas	1,697	32
Areas to be mined	1,414	26
Rehabilitated areas	1,428	27
Buffer areas	806	15
TOTAL	**5,345**	**100**

8.3.4 Land Ownership

CNA currently owns most of the land within the ML for HVO north of the Hunter River, including all land subject to the proposed extension of West Pit. Other interests in the surface land within the ML include:

- two small pockets of land owned by Macquarie Generation and Xstrata located in the north of the ML;
- land owned by Xstrata located in the east of the ML;
- a small pocket of privately owned property located in the east of the ML which is subject to a private land holder agreement with CNA and contained within a zone of affectation from Ravensworth-Narama; and
- privately owned properties located in the south west of the ML which are located within a zone of affectation from Carrington Pit and are subject to private land holder agreements with CNA.

Details of property ownership within and surrounding HVO north of the Hunter River's ML can be seen in Figure 24 in Volume 4 which details property ownership in the following categories:

- private property;
- all property owned by CNA;
- all property owned by other mining companies;
- private land, including private land subject to a private land holder agreement or contained within a zone of affectation; and
- Crown land.

8.4 Soils and Land Capability

Soils and land capability for the West Pit extension area were assessed by GSS. The full report on soils and land capability have been included in Part F of Volume 2 of this EIS. The soil and land capability of Carrington and North Pit/The Alluvial Lands has been sourced from previous assessments.

8.4.1 Soils

West Pit

The soil assessments for West Pit have occurred as the result of individual assessments for extensions to mining. Since the establishment of West Pit there have been two development applications for extensions, the first in 1989 and the second in 1996. As mining at West Pit began in 1952, information on soils for the original pit is not available. The following is a description of the soils obtained from the two extension applications which cover areas to the south east and south of the original pit. Figure 5 of Volume 4 shows the consent boundaries which correspond to the assessment areas for each extension. In addition, a new soil survey has been conducted for the proposed West Pit extension. The results of this survey are also discussed.

Soil types in the existing consent areas for West Pit were characterised by the EIS's prepared by SKM (1989) and Novacoal (1996). These assessments cover the majority of West Pit and use varying nomenclatures.

The soils assessed in the 1989 assessment were generally poor quality agricultural soils with shallow and erodible A horizons overlying a medium to heavy clay B horizon. Six soil associations were identified within the 1989 extension area of which the Duplex Yellow Clay Soils, the Duplex Red Clay Soils and the Duplex Yellow Mottled Clay Soils accounted for more than 90 % of the lease extension area. Soils making up the balance of the 1989 assessment area include Shallow Duplex Red Brown Clay, Alluvial Sandy Clay Loam and Duplex Gley Clay Soils.

The 1996 assessment area was characterised by five soil mapping units:

- hillslope soils;
- hillslope soils with no A2 horizon;
- dark hillslope soils;
- buried soils; and
- alluvial soils.

The dominant soil mapping unit, hillslope soil, covered 53 % of the area and was characterised by thin topsoil of dark brown acid, moderately porous clays grading to a brown to dull reddish brown, porous, earthy, stone clay loam or fine sandy clay loam.

The next most common mapping unit was the hillslope soil with no A2 horizon which covered over 33 % of the site. This soil type is generally a degraded dark reddish brown, slightly acid, porous soft clay loam or fine sandy clay loam.

Dark hillslope soils make up 7 % of the site. This surface soil is blacker and more friable than soils of the adjacent mapping units. It is characterised by a friable brown to dark brown clay loam topsoil grading to a dark reddish brown medium clay over a subsoil of reddish brown moderately structured light to light medium clay.

Buried soils make up 5 % of the extension area and are made up of dull reddish brown clay loam underlain by a number of depositional layers that vary in number with the terrain.

The alluvial soils occupy 3 % of the study area. The topsoil is a brownish black to darkish reddish brown, slightly acid, friable clay loam. The underlying depositional layer is a dull reddish brown to reddish brown slightly acid clay loam or light clay grading into a dark reddish brown to reddish brown light clay. This layer grades to a reddish brown moderately alkaline sandy clay.

The soils of the West Pit extension were assessed by GSS in January, 2003. The full report on soils has been included in Part F of Volume 2. The majority of the West Pit extension area is encompassed by the 'Liddell' Soil Landscape (Kovac and Lawrie, 1991). Soil unit classifications for the survey were based on the Northcote (1979) classification system.

The following soil units were identified within the proposed extension area:

- red duplex clay loam;
- yellow gradational loam; and
- brown duplex loam.

The red duplex clay loam dominates the extension area with a coverage of approximately 77 %. It is characterised by a greyish brown clay loam surface horizon grading to a bright reddish brown medium clay subsoil.

The yellow gradational loam is located within the major central drainage depression running west to east through the study area. The greyish brown sandy loam surface horizon grades to a dull orange loam and then to a dull reddish brown clay loam. This soil unit covers 11 % of the extension area.

The remaining 12 % of the extension area is covered by a brown duplex loam located on the footslope area south of the central drainage depression. The soil is characterised by a dark brown clay loam surface horizon and grades to a brown medium clay and a bright yellowish brown silty clay.

Carrington

Soil types at Carrington were classified in accordance with the Northcote (1992) system as part of the *Carrington Mine EIS* (ERM, 1999). Seven soil units were found including:

- black earth;
- non-calcic brown soil;
- brown solodic soils;
- red-brown earths;
- solodised solonetz;
- brown clays; and
- dark hillslope soils.

The black earth covered about 0.5 % of Carrington and consisted of a dark brown light clay topsoil which graded down to a brown light medium clay at depth. These earths were found on the alluvial flats and form good quality agricultural land.

The non-calcic brown soils were found in the western and central sections of Carrington and covered 22 % of the area. These soils consisted of brownish black hardsetting sandy clay loam topsoils grading down to a two layer subsoil of brown to dark brown light-medium to medium heavy clay in the top layer and brown light-medium clay with pH 9-9.5 in the bottom layer.

The brown solodic soils were found on the eastern boundary and near the central part of Carrington and covered 14 % of the area. They consist of a two layered topsoil of hardsetting dark brown fine sandy clay loam in the top layer and dark brown loam to silty clay loam in the bottom layer. The subsoil also had two layers, the first was a dark brown light to medium clay with a pH of 7.0-9.0 and the second layer was a bright brown medium clay with a pH of between 9.0 and 10.0.

Red brown earths cover 7 % of the area on the south west boundary of Carrington. This soil contained two topsoil layers and two sub-soil layers. The topsoil layers consisted of hardsetting dark brown loam to fine sandy clay loam containing fine gravels and ironstones. The lower topsoil layer comprised dark brown light sandy clay loam. The subsoil layers were a brown light to medium clay which graded to a reddish brown or dark brown massive light medium clay with abundant orange and grey mottles.

Solodised Sonetz cover the majority of Carrington (42 %) from the north east corner to the south west corner of the area. This soil consists of a two layered topsoil which is characterised by a hardsetting dark brown sandy loam to light sandy clay loam in the top most layer and a dull yellowish brown massive loamy sand to light sandy clay loam in the bottom layer. The subsoil was characterised as a dull yellowish brown sandy to medium clay with orange and yellow mottles.

Brown clays cover 9 % of the south west tip of Carrington. The topsoil is a dull yellowish brown sticky medium clay with a subsoil layer consisting of brown to yellowish brown plastic medium clay.

Dark hillslope soils were found on 5.5 % of the area in the north west corner of Carrington and are comprised of a brownish black clay loam topsoil and four layers of subsoil. The first of the subsoil layers was a brownish black light clay pH 6.5, the second a brown light clay, pH 8.5, the third a dark brown clay, 9.5 and the fourth a brown sandy medium clay, pH 9.5.

North Pit and the Alluvial Lands

Three environmental assessments were available for mining in North Pit and the Alluvial Lands. These assessments were prepared in 1979 (Croft and Associates), 1987 (Mitchell McCotter) and 1992 (Mitchell McCotter). The areas covered by these assessments can be seen on Figure 5 of Volume 4 which shows the consent boundaries of HVO north of the Hunter River.

The area assessed in the 1979 EIS covered North Pit. The soils in this area were characterised as duplex soils. Gravelly silts and sandy silts formed the surface horizons and sodic clays the subsoils. These soils were prone to dispersion when exposed and wetted.

The southern extension to North Pit was assessed in 1987. Soils in this area consisted of yellow and red duplex soils with some areas of gravel. The soils possessed reasonable structure, have moderately low salinity and are not highly sodic (Mitchell McCotter, 1987).

The Alluvial Lands were assessed in 1992 and six soil mapping units were identified including:

- floodplain loams;
- floodplain gravels;
- floodplain sands;
- terrace unit;
- hillslope unit; and
- backswamp unit.

The majority of theses units consist of the buildup of a number of sediment layers, each comprising relatively uniform soil material which are either buried overbank deposits or buried soils.

The floodplain loam unit covers 8.3 % of the area and contains four layers with a total depth of three metres. It is slightly erodible and slightly or non-dispersive. The topsoil has a clay loam texture and the buried soils vary from a sandy texture to a light medium clay.

The floodplain gravel unit has five layers and covers 37.2 % of the area. It contains an abundance of stones in the subsurface gravel layer. It is stable to slightly erodible and slightly or non-dispersive. The topsoil has a loamy sand or sandy clay loam texture with the other layers varying from gravels to a sandy medium light clay.

The floodplain sands unit has four layers and covers 44 % of the site. It has a sandy texture throughout and is slightly erodible and slightly non-dispersive.

The terrace unit covers 4.4 % of the area, is made up of five layers. The topsoil is a sandy clay loam structure with the remaining layers ranging from fine sandy loam to light clay. It is slightly erodible. Layer two is moderately dispersible while the remaining layers are non-dispersible.

The hillslope unit covers 3.7 % of the area and consists of an A and B horizon overlaying bedrock rather than buried soil material. The A horizon is a light sandy clay loam which is slightly erodible while the B horizon is a heavy clay and is severely erodible and dispersible.

The backswamp unit covers 2.4 % of the area and is usually inundated with water. It has three layers, a light medium clay textured topsoil, a loamy sand textured second layer and a heavy clay as the third layer. It is considered to be unsuitable for rehabilitation work because of its texture and structure.

8.4.2 Land Capability

General

Pre-mining land capability data is available over part of HVO north of the Hunter River. Exceptions include areas in which mining was established before 1989. A brief description of the land capability classes found across HVO north of the Hunter River is provided below together with the land capability for West Pit, Carrington and North Pit/The Alluvial Lands where it is available.

Class I

Land of low soil erosion hazard, where no special soil conservation works or practices are necessary. Prime agricultural land, suitable for a wide variety of uses.

Class II

Land of moderate soil erosion hazard, where simple soil conservation practices are necessary, including contour cultivation, crop rotation and good soil management. Usually gently sloping land suitable for a wide variety of agricultural uses.

Class III

Class III land is characterised as being of moderate to high soil erosion hazard, subject to rill and gully erosion where the soil erosion can be controlled by the use of structural soil conservation measures. Sloping land suitable for cropping on a rotational basis generally fair to good agricultural land.

Class IV

Class IV comprises the better classes of grazing land. Whilst this land could be used to cultivate an occasional crop, it is not suitable for cultivation on a regular basis owing to limitations of slope and erosion potential.

Classes V

Class V land is characterised by moderate to high soil erosion hazard and subject to severe sheet, rill and gully erosion. This land can be cultivated fro an occasional crop, but is predominantly suited to grazing.

Class VI

Class VI land is not suitable for cultivation and is best used for grazing. Soil erosion hazard varies from nil to high and the land is subject to varying degrees of soil erosion. The recommended soil conservation practices for these land classifications include structural soil conservation works.

Class VII

Class VII land has a high soil erosion hazard and severe site limitations and should remain under green timber. It generally comprises areas of steep slopes, shallow soils and/or rock outcrops. Adequate ground protection must be maintained by limiting or totally excluding grazing.

Class VIII

Class VIII is land unsuitable for agricultural or pastoral production because of severe physical limitations to the land. These may include cliffs, lakes, swamps and other land unusable for agricultural or grazing purposes.

West Pit

Land capability classes for West Pit have been described for the 1989 (SKM) and 1996 extension areas (Novacoal) and the proposed West Pit extension area. Table 8.4 outlines the land capability information available for existing consent areas at West Pit and the proposed West Pit extension as well as Carrington, North Pit and the Alluvial Lands. The proportion of land covered by each land capability class is expressed as a percentage of the individual consent area or proposed extension area.

Table 8.4 Land Capability Classes Within Existing Consent Areas at West Pit and Proposed West Pit Extension Area

	Land Capability Classes							
	I	II	III	IV	V	VI	VII	VIII
West Pit Consents								
1989[(1)]			✓	✓	✓			
1996[(2)]				51.7 %	36 %	2.6 %	9.3 %	
Proposed Extension[(3)]				18 %	50 %	32 %		
Carrington 1999				87 %		9 %		4 %
Alluvial Lands	10 %	18.1 %		34.7 %				37.2 %

Notes: (1) = SKM (1989) – no information relating to specific areas covered by each class was available
(2) = Novacoal (1996)
(3) = GSS (2003)
✓ - indicates the presence of this land capability class over the area covered by the 1989 assessment

Land in West Pit predominantly falls within Classes IV and V based on Table 8.4 and the 1989 assessment which stated that mining would occur predominantly on land classified as Class IV and V. As such this land is generally unsuitable for long term cultivation and is suitable for grazing land.

Carrington

The pre mining land capability of Carrington was assessed in the Carrington EIS (ERM, 1999). Three land capability classes were found within the Carrington disturbance boundary.

The majority of the area was characterised by Class IV which takes up about 87 % of the mining area. The other two land capability classes, VI and VIII cover almost 9 % and 4 % of the mining area. Like West Pit, the majority of land within Carrington was unsuitable for long term cultivation; however, it was suitable as grazing land.

North Pit and the Alluvial Lands

Land capability classes were not determined for North Pit or the southern extension. Four land capability classes were identified within the Alluvial Lands area. They included Classes I, II, IV and VIII, which covered 10 %, 18.1 %, 34.7 % and 37.2 % of the Alluvial Lands area respectively. Like most of the land classes identified for HVO north of the Hunter River, the Alluvial Lands was dominated by Class IV lands which are unsuitable for long term cultivation. However, these lands are suitable for grazing activities. Class VIII lands also cover a significant section of the Alluvial Lands. These lands are unsuitable for cultivation as they are subject to permanent or near permanent inundation. In addition, part of this land contains a high percentage of gravel material throughout the soil profile and at the surface, effectively prevented the land from being put to any viable agricultural or pastoral use.

8.5 Climate

8.5.1 General

The climate of the Upper Hunter Valley is characterised by warm, dry summers and cool, dry winters.

In summer, the weather is dominated by synoptic high pressure systems which alternate with low pressure systems. Rainfall is highest during the summer months. In winter, the climate is modified by the mid-latitude westerlies and high pressure systems alternating with cold fronts. Winter is drier than summer with regular frosts and fogs occurring from mid autumn to late spring.

The following sections provide general climatic data for the area surrounding HVO north of the Hunter River. More specific climatic data were used in the Surface and Groundwater Management, Noise and Vibration and Air Quality studies contained in Volumes 2 and 3.

8.5.2 Temperature

Temperature data has been obtained from the HVO's weather station for the 12 months from January to December 2002. The data indicates that the area experiences average monthly temperatures between 16.8 and 38.6°C during summer and 5.8 and 20.9°C during winter (see Table 8.5)

Table 8.5 Average Monthly Temperatures 2002

Month	Average Minimum Temperature (°C)	Average Maximum Temperature (°C)
January	18.1	38.6
February	18.2	27.9
March	16.1	28.2
April	14.6	25.5
May	10.5	20.6
June	8.2	18.3
July	5.8	18.7
August	7.7	20.9
September	10.1	24.3
October	13.1	29.0
November	16.4	32.0
December	16.8	30.3

8.5.3 Rainfall

The available long term rainfall data between 1884 and 2001 was obtained from a Bureau of Meteorology weather station at Jerrys Plains. The data indicates that the area experiences average monthly rainfall between 66.8 and 78.1 mm during summer and 36.5 and 46.2 mm during winter (see Table 8.6). The annual average rainfall between 1884 and 2000 is 642 mm.

8.5.4 Wind

Annual and seasonal wind roses for the HVO weather station are shown in the Air Quality Study contained in Part I of Volume 3. These roses show that, over a year, the prevailing winds are aligned along a north west to south east axis, which is common for the Hunter Valley as this corresponds to the orientation of the valley. However, the south easterly summer, and to a lesser extent autumn winds are generally distributed between the south east and south south east. During the winter and spring months winds tend to be from the north west and west north west.

Table 8.6 Average Rainfall (1884 – 2001)

Month	Average Rain (mm)	Average Rain Days	Minimum (mm)	Maximum (mm)
January	78.9	7.9	0	226.3
February	70.0	7.2	0	340.4
March	58.6	7.3	0	214.3
April	45.3	6.3	0	172.2
May	41.6	6.5	0	314.3
June	46.2	7.4	2.3	288.4
July	44.7	7.0	0.3	231.6
August	36.5	7.0	0	206.9
September	41.8	6.6	0	156.1
October	51.9	7.5	1.4	170.0
November	57.9	7.6	1.0	217.8
December	66.8	7.5	0.0	233.1

Source: HAS (2003)

8.6 Land Management

8.6.1 Weed Control

A number of weed species are known to occur within the local area of HVO north of the Hunter River as indicated in Table 8.7. Weeds are located primarily on areas that have been disturbed such as old cultivation lands, rehabilitation areas and spoil dump piles. Monitoring for weed growth is undertaken in line with usual landcare management practices. Most woody weeds are controlled by livestock grazing. Chemical control is used when stock are unable to compete with weed growth or when paddocks are not used for grazing.

Table 8.7 Weed Species Known to Occur Within HVO North of the Hunter River

Noxious Weeds	Non Noxious Weeds
African Boxthorn	Scotch Thistle
Noogoora Burr	Wild Turnip
Golden Dodder	Cobblers Peg
Galvanised Burr	Fennel
Green Cestrum	Galenia
Johnson Grass	Thornapple
Patersons Curse	Cathead
Star Thistle	Marshmallow
Pampas Grass	Khaki Weed

Source: CNA (2002)

8.6.2 Feral Animal Control

CNA have a feral animal control program for all of its operations including HVO north of the Hunter River. The program includes ongoing baiting to control the numbers of rabbits, hares, foxes, wild dogs and feral cats. Baiting or culling is carried out periodically as required. The area is monitored annually for threatening species by the Rural Lands Protection Board (RLPB) and the NPWS.

8.6.3 Bushfire Management

A bushfire management plan approved by the Rural Fire Service has been developed and implemented for all of HVO. This plan addresses fuel reduction programs and the requirements of the Lemington/ Jerrys Plains Rural Fire Service. The objective of the management plan is to minimise the risk of bushfires and rapidly control outbreaks should they occur.

A number of management procedures are used to minimise the potential for bushfire hazard including:

- maintenance of grazing practices to reduce fuel loads and maintain low grass levels in areas of high bushfire potential;
- slashing to reduce fuel sources in road reserves, infrastructure areas and sensitive and high risk growth areas where grazing cannot be used;
- provision of an adequate level of fire breaks and access trails throughout the lease area;
- regular maintenance and grading of access trails; and
- provision of sufficient on-site fire equipment.

Continuous monitoring enables relevant personnel to identify periods of high risk. When these periods are identified, appropriate measures such as pre burning, grading of fire trails and slashing are increased.

Bushfire management at HVO north of the Hunter River is achieved in conjunction with surrounding mines in HVO and the pastoral companies associated with each mine.

CHAPTER 9

ecology

9 Ecology

9.1 Introduction

This chapter is divided into two sections:

- assessment of impacts to flora and fauna as a result of the extension of West Pit; and
- a summary of the flora and fauna assessments conducted for those operations within HVO north of the Hunter River which are already covered under existing approvals.

The aim of the first section was to assess the impacts on flora and fauna within the West Pit extension area in a local, regional, state, and national context and develop appropriate mitigation measures. Full results of this flora and fauna assessment are provided in the Flora and Fauna Study in Part G of Volume 2.

The second section reviews and summarises the previous assessments for operations within HVO north of the Hunter River to provide an understanding of the flora and fauna issues over the entire site. No further assessment was conducted in these areas as approval has already been obtained based on these assessments and operations within HVO north of the Hunter River with the exception of the West Pit extension will remain substantially the same with respect to flora and fauna issues.

9.2 State Legislative Requirements

The flora and fauna assessment has been undertaken in accordance with the *EP&A Act*, *TSC Act* and the *EP&A Regulation* which provide the framework for the environmental impact assessment of developments in NSW. It has also been undertaken in accordance with requirements of the Director-General of the DIPNR, which were obtained for the EIS on 13 May 2003 (presented in Annex A of Volume 1).

9.3 Commonwealth Legislative Requirements

The *EPBC Act* commenced on 16 July 2000. It prescribes the Commonwealth's role in environmental assessment, biodiversity conservation and the management of matters of NES.

Under the *EPBC Act*, any action that has, or is likely to have, a significant impact on a matter of NES, may proceed only with the approval of the Commonwealth Minister for the Environment.

An action is defined as a project, development, undertaking, activity (or series of activities), or alteration to any of these. Matters of NES include:

- world heritage properties;
- Ramsar wetlands of international importance;
- listed threatened species and communities;
- internationally protected migratory species;
- Commonwealth marine areas; and
- nuclear actions.

This flora and fauna assessment includes an assessment of potential impacts to listed threatened species and communities, internationally protected migratory species and Ramsar wetlands.

9.4 Background

9.4.1 Locality

The locality is defined as a 10 km radius around the subject site and is shown in Figure 1.1 in the Flora and Fauna Study in Part G of Volume 2. It is situated within the mid Hunter Valley, between Singleton and Muswellbrook in the North Coast interim biogeographic region (Environment Australia 2000) and the botanical subdivision of the North Coast (Harden 2000).

It includes flat to undulating land in the east and a number of north south aligned ridges mostly in the west. Lake Liddell is located in the north and Plashett Reservoir in the west. The Rylstone Plateau landscape is located outside the locality to the north east and the Southern Mountains landscape to the south west.

Historically the locality has been used for intensive agriculture on the rich alluvial soils in narrow corridors along the floodplains of the Hunter River. Less intensive activities, such as grazing on non-improved pasture, occur on the undulating slopes of the surrounding areas. The predominant land uses in the locality are mining, cropping and grazing agriculture.

9.4.2 Study Area and Subject Site

The study area is defined as the area that will be directly and indirectly affected by the proposal.

The subject site is defined as the area that will be directly impacted by the proposal and includes two sites, identified as Site 1, which covers the extension area and Site 2, which was an area previously assessed in a survey undertaken in 1996 but not clearly identified as a site to be disturbed. Under the West Pit extension proposal, Site 2 will be mined in Year 14. The study area is shown in Figure 25 in Volume 4 and study area and subject site are together shown in Figure 26 in Volume 4.

The study area includes Site 1 and Site 2, the woodland between these two sites and the woodland south of Site 2. It is relatively fragmented by roads and other infrastructure and bounded by West Pit to the west, cleared land to the south, Carrington to the south west, HVCPP, North Pit and the Alluvial Lands to the south east, the Belt Line Road to the east and mining operations to the north.

Examination of historic aerial photos from 1958, 1967, 1982 and 1993 (Figures 27 to 30 of Volume 4) show that the study area and subject site were extensively cleared before 1958 and appear to have been continuously logged/cleared or grazed over the last 40 years. Some mature trees were retained in scattered locations and along creeklines and some woodland has regrown, probably in response to a reduced grazing pressure.

Site 1 is currently under cattle grazing. It contains cleared pasture and scattered trees, including a small patch of regrowth woodland that has been fenced off and has probably experience a less intensive grazing regime.

Site 2 is part of a larger area of remnant woodland that has retained more mature trees and is more steeply sloping than Site 1. This site supports a shrubby and grassy understorey and has experienced a lower level of grazing, which has resulted in woodland regrowth. Disturbed areas such as roads and fencelines support introduced shrubs, grasses and herbs.

The study area has the potential to be part of a regional corridor route for highly mobile and migratory species (Figure 1.1 in the Flora and Fauna Study in Part G of Volume 2). However, due to its isolated nature in the centre of the Hunter Valley, and surrounding land uses, it is unlikely to be significant for these types of species. It also provides local habitat for more sedentary or territorial species such as plants, ground and arboreal mammals, reptiles, amphibians and sedentary birds.

9.5 Methodology

9.5.1 Literature Review

EISs must assess the likely impacts of a proposed development on flora and fauna, including threatened species. In order to do this, information must be obtained about the distribution and abundance of such biota in the study area and their significance in the local, regional, state, national and international context.

This information typically comes from both published and unpublished information in reports and databases, and from flora and fauna surveys, including targeted flora and fauna surveys.

Database searches and literature reviews were completed to identify significant flora and fauna, including flora and fauna of regional significance, and threatened or significant biota listed under the *TSC Act* and *EPBC Act*, that have the potential to occur within the locality. Discussions were also held with HCMT, Birds Australia, NPWS and local ecologists.

9.5.2 Flora and Fauna Surveys

Flora and fauna survey methods and efforts are presented in section 3 of the Flora and Fauna Study in Part G of Volume 2.

Fauna and flora investigations were designed to:

- describe and map vegetation communities and habitats that may be directly or indirectly affected by the proposal;
- assess the significance of flora and fauna in the study area in a local, regional, state, national or international context, including the significance of habitat corridors and linkages in the study area;
- identify and describe the threatened species and communities known or likely to be present in the study area and assess which species or communities may be affected by the proposal; and
- describe the type, location, size and condition of habitat of species and communities that may be affected and provide details of the distribution and condition of similar habitats in the locality and region.

A targeted vegetation survey was undertaken over one day in October 2002. A five day and four night general field survey and targeted surveys for threatened species and communities were undertaken in November 2002. Supplementary vegetation surveys were undertaken in December 2002, and January and February 2003.

Survey techniques included targeted and general flora surveys, ground Elliott trapping (A-size traps), tree-trap Elliott trapping (B-size traps), ground hair funnels, spotlighting, ultrasonic bat detection, bird transect surveys during early morning and evening, owl and frog call playback and active reptile and amphibian searches. Flora and fauna were also recorded while driving and walking between sites.

9.6 Results

9.6.1 Vegetation Communities

General

The vegetation of the subject site and study area, and the location of the vegetation quadrats, is shown in Figure 31 in Volume 4. The area in hectares of each vegetation community on the subject site is provided in Table 9.1.

Vegetation types on the subject site and in the study area include cleared land, native pasture, areas of regrowth woodland with scattered mature trees and stands of Bulloak (*Casuarina leuhmannii*). The quality of this vegetation varies due to past disturbance regimes such as clearing, logging and different grazing regimes over the last 40 years. Other disturbances include roads, powerline easements and dirt tracks.

Aerial photographs from 1958, 1967, 1982, 1993 and 2003 show that most of the subject site has been cleared in the past (see Figure 27 to Figure 30 in Volume 4). The vegetation communities on the subject site are described below.

Table 9.1 Vegetation Communities and Approximate Areas

Vegetation Community	Subject Site (ha)		Total (ha)
	Site 1	Site 2	
Narrow-leaved Ironbark/ Grey Box Woodland	3.3		3.3
Narrow-leaved Ironbark/ Grey Box Woodland (regrowth)	3.7	52.7	56.4
Narrow-leaved Ironbark/ Kurrajong Woodland		13.3	13.3
Rough-barked Apple/ Narrow-leaved Ironbark Woodland	2.6		2.6
Swamp Oak Woodland	1.0		1.0
Bulloak Woodland (regrowth)		2.6	2.6
Native Pasture	220.4		220.4
Cleared Land		6.8	6.8
TOTAL	**230.9**	**75.5**	**306.4**

Narrow-Leaved Ironbark/Grey Box Woodland

This community occurs near the northern dam and in two small clumps in Site 1. It has been disturbed by past clearing and continued grazing for more than 40 years, dam construction, erosion, weed invasion, feral animals, tracks and soil disturbance. A portion of this community, near the northern dam, has been fenced off and contains regrowth grasses and some saplings. It is dominated by mature Narrow-leaved Ironbark (*Eucalyptus crebra*), Grey Box (*E. molucanna*) and Forest Red Gum (*E. tereticornis*). In grazed areas the ground layer is very sparse and dominated by both introduced and native grasses and herbs. The total weed cover in the community is estimated to be 20 %.

Narrow-Leaved Ironbark/Grey Box Woodland (Regrowth)

This community occurs within Site 2 on gently sloping land north of an east west track and also on flatter land in the south of this site. It also occurs on Site 1 near Lemington Road. It has been disturbed by past clearing, erosion, tracks, roads, and invasion of introduced plants and feral animals. It is a structurally and floristically variable community with scattered mature eucalypts but is generally dominated by younger and smaller trees of Narrow-leaved Ironbark and Grey Gum. In some places there is a shrub layer dominated by Native Olive (*Notelaea microcarpa var. microcarpa*) and Blackthorn (*Bursaria spinosa*), particularly along drainage lines. The ground layer is generally dense and grassy and dominated by native grasses and herbs. Introduced flora species are dominant in disturbed areas such as roads and tracks. The total weed cover in the community is estimated to be 5 %.

Narrow-Leaved Ironbark/Kurrajong Woodland

This community occurs on the south facing steeper slopes in Site 2. It has been disturbed by past clearing, erosion, tracks, roads, and invasion of introduced plants and feral animals. However, the past grazing and clearing regime appears to have been less frequent compared to the remainder of the subject site. It is a structurally and floristically variable community with scattered mature eucalypts but is generally dominated by Narrow-leaved Ironbark and Kurrajong (*Brachychiton populneus*). The shrub layer is dominated by a range of shrubs including Blackthorn and Native Olive. The ground layer is generally dense and grassy and dominated by native grasses and herbs. Introduced flora species are dominant in disturbed areas such as drainage lines and tracks. The total weed cover in the community is estimated to be 5 %.

Rough-Barked Apple/Narrow-Leaved Ironbark Woodland

This community occurs on more sandy soil in drainage lines on Site 1. It has been severely disturbed by past clearing, grazing and severe erosion and invasion of introduced plants and feral animals, to the point where there is no vegetative ground cover. It is generally dominated by Rough-barked Apple (*Angophora floribunda*) and in some cases by Narrow-leaved Ironbark and River Oak (*Casuarina cunninghamiana*). There is generally no shrub layer and very few grasses or ground layer species. Introduced flora species occur in disturbed areas and the total weed cover in the community is estimated to be 2 %.

Swamp Oak Woodland

This community occurs in small sections along Emu and Farrells Creeks. The creekbed has been severely disturbed by erosion and invasion of introduced sedges (*Juncus* spp.). However, some native riparian species still occur and provide habitat for fauna including the Clamorous Reed Warbler (*Acrocephalus stentoreus*). It is dominated by Swamp Oak (*Casuarina glauca*). Introduced flora species occur in disturbed areas and the total weed cover in the community is estimated to be 50 %.

Bulloak Woodland (Regrowth)

This community occurs in the south eastern section of Site 2. It has been disturbed by clearing, grazing, erosion and introduced flora and fauna species. It is dominated by young and mature Bulloaks and contains one or two scattered mature eucalypts. The shrub layer is sparse and the groundlayer has been suppressed in dense areas by the accumulation of Bulloak branchlets. In more open areas, the ground layer is usually thick and is dominated by native grasses. The total weed cover in the community is estimated to be 5 %.

Native Pasture

This community occurs throughout Site 1 and has been continually grazed for at least 40 years and has been highly disturbed by clearing, invasion of introduced flora and fauna species and erosion. It consists of pasture improved land that is dominated by native pasture species such as Pitted Blue Grass (*Bothriochloa decipiens*) and is regularly grazed by cattle. Introduced grasses such as Buffalo Grass (*Stenotaphrum secundatum*) and herbs dominate along areas that have been disturbed for track, dam and fence construction or erosion. The total weed cover in this community is estimated to be 30 %.

Cleared Land

Cleared Land has been mapped at Site 2 and consists of areas of highly disturbed soil from road construction through the middle of this site. It also occurs on smaller tracks and areas around dams that are too small to map. It is characterised by open earth and is dominated by a high diversity of weed species including Coastal Galenia (*Galenia pubescens*), *Solanum* spp. and thistles. The total weed cover in this community is 100 %.

9.6.2 Fauna

The varying degrees, age and types of past disturbances have created a range of fauna habitats that support a corresponding range of fauna species and assemblages across the study area. Roads and tracks are located across the subject site and sheet and gully erosion are also present on both sites.

Habitats range from regrowth woodland dominated by native plant species with microhabitats for a wide range of fauna species, to woodland, to open pastures dominated by introduced plant species that provide limited habitat for fauna. These habitats are also generally present within the study area, north, west and south of the subject site.

Habitat for arboreal mammals such as possums is relatively sparse and only present in the regrowth woodland on Site 2, which contains some sparse mature and dead trees with hollows. Resting and roosting habitat includes scattered trees with hollows, and native vegetation in the tree, shrub and ground layers, which provide foraging resources. Due to the scarcity and isolation of mature trees on Site 1 there is very limited habitat for native arboreal mammals.

On Site 2, fallen logs and branches in the ground layer in the regrowth woodland and Bulloak woodland provide ground-based refuge areas for small ground mammals such as Antechinus (*Antechinus* sp.). Introduced mice and rats are also present in these areas. Woodland also provides resources for macropods and introduced species such as wild dogs. On Site 1, there are very few resources such as logs and branches on the ground, and these are restricted to the woodland areas.

There is potential roosting and known foraging habitat for insectivorous bats within the woodland and regrowth habitats on both Site 1 and Site 2. Dams on Site 1 also provide foraging resources such as flying insects. There are no culverts or mines that would provide roosting habitat for bats on the subject site.

The native regrowth woodland on Site 2 provides habitat for a wide range of forest and woodland bird species. Woodland habitats support different bird species compared with the more open habitats on Site 1, where birds that prefer more open paddocks and grassy areas are found.

Habitats for reptiles and amphibians include native and introduced grasses, regrowth woodland habitat of varying quality, farm dams, drainage lines and associated riparian vegetation, dead trees, decorticating bark and logs and litter on the ground. Loose stones on the ground in the native pasture provide habitat for native skinks and legless lizards.

Fauna that were recorded in the study area include 46 birds, 20 mammals (including 5 introduced mammals), 6 reptiles and 5 amphibians (see Flora and Fauna Study in Part G of Volume 2).

9.7 Regionally Significant Flora and Fauna

Woodland on Site 2 may be regionally significant as local habitat for flora and sedentary or territorial birds, mammals, amphibians and reptiles.

Site 1 provides a very limited corridor or local habitat due to its cleared and highly disturbed nature and is unlikely to be regionally significant for flora and fauna.

No species listed in the *Hunter Rare Plants Database* or communities identified by Peake (2000) were recorded on the subject site. No regionally significant species of *Rare or Threatened Australian Plants* (RoTAP) (Briggs and Leigh 1995) were recorded on the subject site. Regionally significant plant species that may have the potential to occur in the locality, ie. *Isotropis foliosa* and *Macrozamia flexuosa*, were not recorded on the subject site and are unlikely to occur.

No fauna species of regional significance were recorded on the subject site. The subject site is likely to provide some regional corridor function for migrating/nomadic birds such as honeyeaters.

9.7.1 SEPP 44

One threatened species, the Koala (Phascolarctos cinereus), is also protected by *SEPP 44*. The main aim of *SEPP 44* is to:

> *"… encourage the proper conservation and management of areas of natural vegetation that provide habitat for Koalas, to ensure permanent free-living populations over their present range and to reverse the current trend of population decline …"*

Under *SEPP 44*, it is necessary to investigate potential and core Koala habitat before seeking development consent in scheduled LGAs. Scheduled LGAs are located within the known state-wide distribution of the Koala and SSC is a scheduled LGA.

Potential Koala habitat, defined as vegetation which incorporates a minimum of 15 % of tree species in the upper or lower strata of the tree component, is listed in Schedule 2 of *SEPP 44*. The consent authority may grant development consent if the subject land does not contain core Koala habitat.

The most recent record of the Koala is in the north west of the locality near Bayswater Power Station in 1954 (Figure 1.1 the Flora and Fauna Technical Report in Part G of Volume 2). One Schedule 2 feed tree species, Forest Red Gum (*E. tereticornis*), occurs in scattered locations on Site 1 and Site 2. However, it does not constitute more that 15 % of the total tree species on these sites. Consequently, these sites would not support potential Koala habitat. Koalas or signs of their presence such as scats, were not seen on the subject site and are not likely to occur there. Accordingly, the subject site does not constitute core habitat and the Koala is unlikely to occur.

9.7.2 Matters of National Environmental Significance

Matters of NES that have the potential to occur in the study area include listed threatened species and communities and listed migratory species. These are listed in Table 4.2 in the Flora and Fauna Study (Part G of Volume 2).

All of the species listed under the *EPBC Act* have been assessed as part of this EIS. Their potential abundance and distribution in the study area and potential impacts and mitigation measures are discussed in the following sections. Movement corridors for migratory species have also been discussed above.

9.7.3 Threatened Species

Table 9.2 shows threatened species that were recorded on the subject site during surveys and their status under the *TSC Act* and *EPBC Act*. Figure 32 in Volume 4 shows the locations of these.

Table 9.2 Threatened Species Recorded on the Subject Site

Common Name	Scientific Name	*TSC Act*	*EPBC Act*
Speckled Warbler	*Pyrrholaemus sagittata*	V	–
Grey-crowned Babbler	*Pomatostomus temporalis temporalis*	V	–
Large Bentwing-bat	*Miniopterus schreibersii oceanensis*	V	–
Eastern Freetail-bat	*Mormopterus norfolkensis*	V	–

Figure 1.1 in the Flora and Fauna Study (Part G of Volume 2) shows the locations of database records of threatened species within the locality. These records are from the *NPWS Wildlife Atlas Database* (December 2002) and Birds Australia database (November 2002). There were no records of threatened flora or fauna in the locality in the databases of the Australian Museum or Royal Botanic Gardens.

The likelihood that species that have been recorded in the locality would occur on the subject site was assessed based on the known habitat requirements of these species and the type and quality of the habitats on the subject site. This in turn was based on vegetation mapping, habitat assessments and flora and fauna surveys of the subject site.

The following species have some potential to occur on the subject site because there is some suitable habitat on the site, and their absence cannot be ruled out. These species are either wide-ranging and rare or cryptic species that are difficult to detect unless conditions are suitable (eg. season, temperature, rainfall):

- Lobed Blue Grass (*Bothriochloa biloba*);
- Illawarra Greenhood Orchid (*Pterostylis gibbosa*);
- *Diuris tricolor* (syn. *D. sheaffiana*);
- Glossy Black-cockatoo (*Calyptorhynchus lathami*);
- Masked Owl (*Tyto novaehollandiae*);
- Brown Treecreeper (*Climacteris picumnus victoriae*);
- Painted Honeyeater (*Grantiella picta*);
- Swift Parrot (*Lathamus discolor*);
- Diamond Firetail (*Stagonopleura guttata*);
- Black-chinned Honeyeater (*Melithreptus gularis gularis*);
- Regent Honeyeater (*Xanthomyza phrygia*).
- Large-eared Pied Bat (*Chalinolobus dwyeri*);
- Eastern Falsistrelle (*Falsistrellus tasmaniensis*);
- Little Bentwing-bat (*Miniopterus australis*);
- Large-footed Myotis (*Myotis adversus*);
- Yellow-bellied Sheathtail-bat (*Saccolaimus flaviventris*);
- Greater Broad-nosed Bat (*Scoteanax rueppellii*);
- Green and Golden Bell Frog (*Litoria aurea*);
- Pale-headed Snake (*Hoplocephalus bitorquatus*); and
- Pink-tailed Worm Lizard (*Aprasia parapulchella*).

The Flora and Fauna Study provides a discussion of the local and regional abundance, local and regional corridors, habitat assessment and conservation status of threatened species known to occur and with potential to occur on the subject site. Assessment of likely direct and indirect impacts on flora and fauna, including threatened species, is summarised below.

9.8 Impacts

9.8.1 General

The proposed extension will directly impact upon a relatively small area of remnant native vegetation within the locality.

Direct impacts include the gradual removal of over 20 years, of vegetation and habitat on the subject site that has regenerated after being almost totally cleared at least 40 years ago (Figure 27 to Figure 30 in Volume 4). The gradual removal of habitat as proposed is likely to allow flora and fauna species to disperse and colonise adjacent suitable habitat over the 20 years of mining.

Indirect impacts include habitat fragmentation and a small reduction in local connectivity. The proposal could potentially result in the spread and establishment of weeds and feral animals in the study area. Other potential indirect impacts such as changes to hydrology and water quality in the study area are unlikely to significantly affect flora and fauna. The significance of these impacts on flora and fauna in the study area at the local and regional level is discussed below.

9.8.2 Vegetation Clearance and Habitat Loss

Approximately 306 ha of land, including native pasture, cleared land and regrowth woodland, will be gradually removed over 20 years of the West Pit Extension.

Site 1 will be gradually cleared from Year 3 to Year 21 and Site 2 will be gradually cleared from Year 14 to Year 21 (Figures 7 to 11 in Volume 4). The remnant woodland surrounding the study area will also be cleared during this time under existing approvals. Therefore, once clearing of Site 2 commences, the value of this site for flora and fauna will be reduced because the size of the remnant of which it was a part will have been reduced under existing approvals.

This will result in the eventual loss of known and potential habitat for a range of flora and fauna including some threatened fauna. The removal of vegetation and habitat is listed as a key threatening process under the *TSC Act* and land clearance is listed as a key threatening process under the *EPBC Act*. However, it is unlikely that any flora or fauna species would be lost from HVO north of the Hunter River or the locality as a result of the proposal since they are known or are likely to occur in locations outside the proposed area of disturbance.

All of the vegetation communities are present within the locality and therefore will not be lost from the local area. These vegetation communities are well represented within the region. However, there will ultimately be a relatively small reduction in the total area of vegetation, which will potentially reduce the level of interactions between flora and fauna in the study area.

The proposed mitigation measures including rehabilitation, regeneration and linkages to regional corridors will ensure that these communities and habitat are retained and managed in HVO north of the Hunter River.

9.8.3 Habitat Fragmentation

Potential interactions between flora and fauna in the study area and in other remnants within the region include migration of highly mobile species (such as Yellow-faced Honeyeaters and White Throated Needletails) down and across the Hunter Valley and dispersal and colonisation of less mobile flora and fauna species.

Potential habitat fragmentation impacts on flora and fauna as a result of the proposal include the gradual removal of a patch of remnant vegetation within the study area (Site 2). As a result of the proposed extension, this area of remnant vegetation will become gradually smaller in size, which may decrease the size of populations of flora and fauna in the study area.

On the local level, clearing which has already been approved will result in a reduction in the value of the subject site as flora and fauna habitat and corridor function. The additional fragmentation of this site as a result of the proposal is therefore unlikely to significantly increase these impacts. On a regional scale, the proposal will fragment this remnant and modify the level of interactions of flora and fauna between this remnant and other remnants in the region.

Fragmentation can also change the edge to area ratio of a vegetated area. Changes in this ratio can cause changes in microclimate and increase susceptibility to invasion from non-indigenous species. The impacts of the changes in the edge to area ratio in the study area as a result of the proposed extension will be minimised by the gradual removal of vegetation over 20 years. Management of vegetation and habitat on the subject site and adjacent areas before it is cleared will also mitigate these impacts.

9.8.4 Regional Connectivity

The proposal is unlikely to increase the existing barriers to regional connectivity for flora and fauna in the Hunter region. As noted above, the current mine operation is a barrier to movement of species directly to the west and open land inhibits movement to the south. The likely regional migratory routes have been indicated in Figure 1.1 in the Flora and Fauna Study (Part G of Volume 2) and these are not likely to be significantly impacted by the proposal.

Migratory species are likely to have covered large areas of open land before they reach the study area and are likely to use it infrequently as a resting and foraging area. Non-migratory flora and fauna such as terrestrial and arboreal mammals, reptiles, amphibians and bird species avoid open habitats. These fauna groups in the study area are likely to disperse to the north and east of the study area if habitat is allowed to regenerate and corridors maintained over 20 years.

Overall impacts on regional connectivity are unlikely to be significant due to the proposed rehabilitation and regeneration of selected areas in HVO north of the Hunter River.

9.8.5 Other Indirect Impacts

Other indirect impacts that could arise from the proposal include:

- small microhabitat changes within habitats such as edge effects;
- weed infestation;
- alteration to the fire regime; and
- disturbances from noise and dust.

Weeds are a potential threat to any site that experiences soil disturbance and there is potential for weeds to spread and establish in areas that are cleared, prior to mining. Weeds may also establish on spoil piles or in areas that are to be rehabilitated.

However, proposed rehabilitation and weed control strategies will control and monitor any threats from weeds as a result of the proposal and provided these strategies are maintained, impacts from weeds as a result of the proposal are not likely to be significant.

The subject site and study area are likely to have received a high fire frequency in the past. Maintenance of the subject site, rehabilitation and regeneration areas will aim to reduce the fire frequency, which will benefit flora and fauna within the study area and in HVO north of the Hunter River.

Noise and dust are not expected to have a significant impact on adjacent flora and fauna since animals can become accustomed to noise and can remain in areas subject to noise, provided that the habitat is present.

Feral animals are already present on the subject site and in the study area. The management of regeneration and rehabilitation areas for native flora and fauna is likely to reduce the available habitat for these species. Control measures for feral animals within HVO north of the Hunter River will be undertaken.

9.8.6 Key Threatening Processes

The following key threatening processes are considered relevant to the proposal:

- clearing of native vegetation (*TSC Act*) and land clearance (*EPBC Act*);
- predation by the European Red Fox (*Vulpes vulpes*) (*TSC Act* and *EPBC Act*);
- predation by the Feral Cat (*Felis catus*) (*TSC Act* and *EPBC Act*);
- predation on tadpoles by the Plague Minnow (*Gambusia holbrooki*) (*TSC Act*); and
- inappropriate fire regimes (*TSC Act*).

These key threatening processes have been addressed in the Flora and Fauna Study (Part G of Volume 2) and are not likely to have a significant impact on biodiversity in the locality. Proposed management measures will ensure that the impact on flora and fauna and biodiversity within the region is minimised and that the threat from the key threatening process is reduced.

9.8.7 Regionally Significant Flora and Fauna

There is not likely to be any significant impact on regionally significant flora or fauna. The nature of the proposal means that potential impacts on native flora and fauna are unavoidable. However, in the long term, the final landform in HVO north of the Hunter River will include managed regenerated and rehabilitated habitat. This will provide some benefit for regionally significant species by promoting regional corridor function as well as local connectivity function.

9.8.8 Threatened Species

As described in section 9.7.3, a range of threatened species are known or are likely to occur on the subject site and in the study area and are likely or could be affected by the proposal.

As required under Section 5A of the *EP&A Act*, Eight Part Tests were completed for these threatened species to consider whether the proposal is likely to have a significant effect on these species or their habitat. These Eight Part Tests are provided in the Flora and Fauna Study in Part G of Volume 2. The results of these Eight Part Tests indicated that there will not be any significant impacts on affected species as a result of the proposal.

The removal of vegetation from the subject site will result in the loss of habitat for individuals or family groups that are part of local populations that occur in the study area, locality or region. Together with the current land uses and impacts from mining there is potential for this to result in a cumulative impact on these species.

However, the woodland surrounding the subject site has approval to be cleared for open cut mining and is therefore likely to be cleared under existing operations. This will result in a decrease in the area of remnant woodland of which Site 2 is a part. Therefore, by the time the subject site is mined, it is unlikely to be significant for those threatened species that are known to occur there.

The proposed consolidation of regeneration and rehabilitation on HVO north of the Hunter River will help ameliorate potential impacts on threatened species. This will conserve known and potential habitat for threatened woodland birds and bats and will allow threatened species to disperse and colonise adjacent areas. The final landform will include both regenerated and rehabilitated woodland and will enhance regional corridor connectivity in HVO north of the Hunter River.

Indirect impacts such as fragmentation at a local scale and a small reduction in regional connectivity corridor function are not expected to be significant for these species. This is because the proposed mitigation measures will maintain migratory, dispersal and colonisation habitat and key threatening processes, as well as grazing, will be managed. Other indirect impacts such as changes to water quality and hydrology are likely to be minimal and are not likely to significantly affect the potential habitat of these species on the subject site or in the study area.

9.9 Flora and Fauna Assessments of HVO North of the Hunter River

With the exception of the West Pit extension, all operations within HVO north of the Hunter River have received approval and will be substantially unchanged under the proposal. No further assessments were therefore conducted for impacts to flora and fauna.

The following sections are provided to summarise the results of relevant flora and fauna assessments that have been undertaken within HVO north of the Hunter River. This includes those assessments in which the proposal may have had an impact on flora and fauna. Other assessments and consents that did not affect flora and fauna were not included. Mitigation measures developed as part of these assessments have also been described.

Each relevant environmental assessment is listed in Table 9.3 together with the relevant areas in HVO north of the Hunter River that have been assessed, the nature of the surveys, and notes on the results.The assessments are discussed after Table 9.3.

Table 9.3 Summary of Flora and Fauna Assessments on HVO North of the Hunter River

Title	Author and Date	Relevant HVO north of the Hunter River Area Assessed	Surveys	Notes
Hunter Valley No. 1 Mine *Environmental Impact Statement*	James B. Croft and Associates (1978)	Hunter Valley No. 1 Mine	Flora and fauna inspection	Blakely's Red Gum and Slaty Box (*E. dawsonii*) recorded
Hunter Valley No. 1 Mine *Environmental Impact Statement* for the Proposal to Construct Coal Preparation and Handling Facilities and to Expand Mine Production to an Average of 4 Mtpy	James B. Croft and Associates (1979)	Hunter Valley No. 1 Mine and HVCPP	No survey methods provided	Vegetation map and discussion of fauna. No species lists. No threatened species
Hunter Valley No. 2 Mine *Environmental Impact Statement*	Croft and Associates (1984)	Road and conveyor corridor between Hunter Valley No. 1 and No. 2 mines	No surveys on HVO north of the Hunter River	Used James B. Croft and Associates (1978) for HVO north of the Hunter River. No threatened species were recorded in HVO north of the Hunter River
Howick Coal Preparation Plant *Environmental Impact Statement*	Sinclair Knight and Partners (1985)	Howick CPP	No surveys	Used various un-referenced feasibility reports from the 1980s. Cleared pasture. No threatened species recorded
Hunter Valley No. 1 Mine Southern Extension *Environmental Impact Statement*	Mitchell McCotter and Associates (1987)	Hunter Valley No. 1 Mine Southern Extension Area	No surveys. Reviewed Croft and Associated (1984)	Blakely's Red Gum recorded outside the area to mined
Proposed Extension to Howick *Environmental Impact Statement*	Sinclair, Knight and Partners (1989)	Extension of Howick to the south	Flora site inspection. No fauna survey	
Hunter Valley Mine Extension of Mining *Environmental Impact Statement*	Mitchell McCotter (1992)	The Alluvial Lands	No surveys	Used Croft and Associates (1984). Cited recording of Speckled Warbler
Howick Joint Venture Proposed Expansion of Howick Coal *Environmental Impact Statement*	Novacoal Australia (1996)	Extension to West Pit (Area ML 1428) and route of proposed conveyoe from West Pit to NLP	One day vegetation survey and targeted surveys for RoTAPs and the Pale-headed snake	Grey-crowned Babbler, Diamond Firetail and Speckled Warbler recorded
Hunter Valley No. 1 Mine South Pit Extension *Environmental Impact Statement*	ERM (1998)	Haul Road and Conveyor Belt Road	One week spring flora and fauna survey of HVO south of the Hunter River	No results that are relevant to HVO north of the Hunter River
Carrington Mine *Environmental Impact Statement*	ERM (1999a)	Carrington Mine	Ground truth and map vegetation. Plant surveys and record birds	Grey-crowned Babbler recorded. Ground truthed Novacoal Australia (1996) surveys
Hunter Valley Operations – Western Haul Road *Statement of Environmental Effects*	ERM (1999b)	Western Haul Road	One day site assessment	No threatened flora or fauna recorded. Eight Part Tests undertaken for a range of threatened species. No significant impacts

9.9.1 West Pit

No original environmental impact assessment was undertaken for West Pit, which was commenced in 1952 under existing use rights (pre *EP&A Act*).

1985 EIS

The earliest EIS prepared for the West Pit area was the EIS for the proposed Howick CPP in 1985 (Sinclair, Knight and Partners 1985). The site of the CPP was totally cleared pasture. The impact assessment concluded that there would not be any impact on ecology and the proposal was granted development consent in May 1986.

1989 EIS

The earliest impact assessment of the mine operations was the EIS for the proposed southern extension of Howick in 1989 (Sinclair, Knight and Partners 1989). No fauna survey was carried out. A site inspection (the number of days for this survey was not provided in the EIS) and examination of aerial photographs was undertaken. Vegetation consisted of scattered trees in pasture and regrowth Bulloak. The habitat value and ecological value of the site was considered low and of no appreciable conservation significance. Accordingly, the proposal was assessed as having no significant impact and consent was granted.

1996 EIS

An EIS was prepared in 1996 for the *Proposed Expansion of Howick Coal* (Novacoal Australia 1996). The study area included ML1428 (MLA 47) and surveys included a one day flora and habitat assessment, and included recording of fauna species seen during this assessment. A targeted field survey for RoTAPs and the Pale-headed Snake was also undertaken. Vegetation and fauna sightings were mapped. Nine vegetation types were identified, including cleared land, pasture (grassland), pasture with scattered trees, creek-line vegetation, mixed woodland/shrubland, eroded woodland/shrubland, woodland, allocasuarina regrowth and forest.

Threatened species that were listed as being recorded within a 10 minute (lat/long) radius of the project area include the Speckled Warbler. This species was not listed as threatened at the time of the survey. Other (currently listed) threatened species that were not recorded but were assessed as potentially occurring within a 10 minute radius of the project area included the Pale-headed Snake, Turquoise Parrot, Brown Treecreeper, Diamond Firetail, Glossy Black-cockatoo, Hooded Robin, Grey-crowned Babbler, Square-tailed Kite, Masked Owl and Regent Honeyeater.

Regionally significant plant species found include Slaty Box (*E. dawsonii*), Bead Bush (*Spartothanmella juncea*), Lamboto (*Canthium odoratum*) and Brush Wilga (*Geijera salicifolia*). Slaty Box is provisionally listed in the *Hunter Rare Plants Database* as regionally significant and is at its northern and eastern distributional limit in the Hunter Valley. Lamboto is provisionally listed in the *Hunter Rare Plants Database* as regionally significant and is at its southern distributional limit in the Hunter Valley. A provisional listing means that the regional listing status has yet to be assessed by the Hunter Rare Plants Committee of the Hunter Royal Botanic Gardens.

It was concluded that generally the flora and fauna on the site is of low conservation value and that few if any rare or endangered species are likely to occur. However, the biota was of regional (Hunter Valley) significance because of the extensive areas of vegetation clearance that had been undertaken in the Hunter Valley. It was recommended that if the area were to be mined that species from the vegetation on the escarpment be used in rehabilitation.

The then current rehabilitation and revegetation practices of West Pit were proposed to be continued. The aim of the rehabilitation was to produce an area of no lesser value to native fauna. Consent was issued for this extension on 27 July 1996.

As a supporting document to the EIS, an assessment of the proposed conveyor route from West Pit to NLP was undertaken in February 1996. The proposal was considered to have no significant impact on plant communities or fauna habitat of conservation value. The Diamond Firetail (which is now listed as threatened under the *TSC Act*) was recorded during this assessment. Mitigation measures include compensatory planting of trees and shrubs.

1999 Statement of Environment Effects (SEE)

A SEE was prepared in 1999 for a proposed haul road between the current West Pit, over Lemington Road to an existing haul road near the HVCPP. This was a modification of an existing consent for Howick. Surveys included a one day site vegetation and habitat assessment. Vegetation was classified as Ironbark Woodland, Grey Box Woodland, Regenerating Woodland and Pasture. No threatened flora or fauna were recorded.

Eight Part Test assessments were undertaken for the Common Bentwing-bat (*Miniopterus schreibersii*), Greater Broad-nosed Bat (*Scoteanax rueppellii*), Eastern Faslistrelle (*Falsistrellus tasmaniensis*), Eastern Little Mastiff Bat (*Mormopterus norfolkensis*), Yellow-bellied Sheathtail Bat (*Saccolaimus flaviventris*), Regent Honeyeater (*Xanthomyza phrygia*) and the Squirrel Glider (*Petaurus norfolcensis*). No significant impact was considered likely.

Mitigation measures included retention of Grey Box woodland vegetation where possible for tree hollows and placement of suitable nest boxes in the surrounding woodlands, particularly those suitable for insectivorous bats and the Squirrel Glider.

9.9.2 Carrington Mine

The EIS for Carrington Mine (ERM 1999a) involved broad vegetation, bird and habitat assessments and review of existing work for adjacent areas (Novacoal Australia 1996).

Fauna surveys included hair funnels, which were out for 15 nights. Other fauna survey techniques were undertaken during three nights in June and two nights in October and included, spotlighting, stagwatching, owl call playback, anabat detection, opportunistic bird surveys, searches for the Green and Golden Bell Frog and recording of scats, tracks and other signs and habitat features. No threatened flora or fauna species were recorded during surveys.

Five vegetation types were identified, including Grey Box Woodland, Slaty Box Woodland, Bulloak regrowth, open pasture with scattered trees and disturbed Narrow-leaved Ironbark open woodland. As noted above Slaty Box is provisionally listed as regionally significant on the *Hunter Rare Plants Database*.

Currently listed threatened species (under the *TSC Act*) that were recorded in the study area but which were not listed in 1999 at the time of assessment, include the Grey-crowned Babbler.

Eight Part Tests were under undertaken for the Glossy Black-cockatoo, Regent Honeyeater, Large-footed Mouse-eared Bat (*Myotis adversus*), Common Bentwing-bat (*Miniopterus schreibersii*), Great Pipestrelle (*Falsistrellus tasmaniensis*), Greater Broad-nosed Bat (*Scoteanax rueppellii*), Eastern Little Mastiff Bat (*Mormoptesus norfolkensis*), Yellow-bellied Sheathtail Bat (*Saccolaimus flaviventris*) and the Green and Golden Bell Frog (*Litoria aurea*). No significant impact was considered likely.

Rehabilitation would include plant species currently found on the site and will replace an equivalent area of thicker forest with shrub understorey. This would have a much higher species diversity than that found on the site. Other mitigation measures include installation of natural hollows or artificial nesting boxes in rehabilitate forest if such techniques were deemed successful for the Mount Owen Mine and other similar mitigation projects by the RTA on the New England Highway. Hollow logs would also be preserved and placed in rehabilitated areas. Consent was granted for Carrington by the then Minister for Planning on 15 August 2000.

9.9.3 North Pit and The Alluvial Lands

North Pit is an open cut mine that commenced in 1979 and has formerly been referred to as Hunter Valley Mine, Hunter Valley North and Hunter Valley No. 1 Colliery/Mine. The Alluvial Lands is an open-cut mine located within a large meander of the Hunter River.

1978 EIS

An EIS was prepared for the Hunter Valley No. 1 Mine in 1978. Blakely's Red and Slaty Box were recorded. Much of the original vegetation had been destroyed and there were relatively few areas of woodland. The impact on ecology was not considered to be significant. Consent was granted for commencement of mining in May 1979.

1979 EIS

An EIS was prepared for construction of the Coal Prepartion and Handling Facility and to expand production. The impact on ecology was not considered to be significant.

1980 EIS

An EIS was prepared for construction of coal preparation and handling facilities and expansion of the mine production in 1979 (James B. Croft and Associates 1979). The ecosystem of Farrells Creek was considered to be of local interest and a significant impact was expected on sedentary avifauna. However, the impact on ecology was not considered significant in the sub-regional context. No species or habitats were considered uncommon or endangered. Consent was granted in January 1980.

1984 EIS

An EIS was prepared for Hunter Valley Mine No. 2, which included assessment of the road and conveyor corridor between Hunter Valley No. 1 and No. 2 mines (Croft and Associates 1984). This EIS relied on earlier surveys (Croft and Associates 1978). No threatened species were recorded and the impact from the road and conveyor corridor on flora and fauna was not considered significant.

1987 EIS

An EIS was prepared for the southern extension of Hunter Valley No. 1 Mine (Mitchell McCotter and Associates 1987). The assessment relied on the Hunter Valley No. 2 Mine EIS (Croft and Associates 1984). The flora species on the site were considered to be well represented elsewhere in the region and the loss of flora from mining was considered to have minimal environmental consequences. It was considered that the mine would not have a significant impact on residual fauna due to the highly depauperate ecological status of the site. No threatened species were recorded in the area proposed for mining.

Blakely's Red Gum was recorded on the alluvial plains (Croft and Associates 1984).

1992 EIS

An EIS was prepared for the *Hunter Valley Mine Extension of Mining* (Alluvial Lands) (Mitchell McCotter 1992). Croft and Associates' (1984) EIS was reviewed and mapping was updated with 1991 aerial photographs.

Blakely's Red Gum was record as thinly scattered trees on the alluvial plain. The currently threatened Speckled Warbler and regionally significant Common Wombat (*Vombatus ursinus*) were recorded on the site.

The ecological value of the site was considered to be low and the mining to be of little impact on flora and fauna. Consent was granted in May 1993.

1998 EIS

An EIS was prepared for extension to Hunter Valley No. 1 South Pit (ERM 1998) which is located in HVO south of the Hunter River. Relevant areas that were assessed for impact on flora and fauna within HVO north of the Hunter River as a result of this project included the Haul Road and Conveyor Road. No significant impact was likely. Consent was granted in March 2000.

9.9.4 Summary of Past Assessments

The flora and fauna of HVO north of the Hunter River has been assessed in the past by a number of surveys and impact assessments since 1978. They have described sparse regrowth forest of Ironbark, Bulloak, Slaty Box, *Callitris* sp. or Bulloak on undulating land and Blakely's Red Gum and River Red Gum on alluvial flats near the Hunter River. No threatened species were recorded for any of these assessments.

The outcomes of these assessments was that the ecological value of these areas was considered low and mining was not considered to have a significant impact on flora and fauna. A number of threatened woodland birds have been recorded in HVO north of the Hunter River which were not listed under the *TSC Act* at the time, including the Brown Treecreeper, Speckled Warbler, Diamond Firetail and Grey-crowned Babbler. Consent has been granted on all of these proposals. Proposed mitigation measures included compensatory planting of trees and rehabilitation of mined sites.

9.10 Temporary Hunter River Crossing

The proposal includes construction of temporary crossings over the Hunter River for equipment too heavy for the existing bridge, such as draglines and shovels. The temporary crossings will be located at a designated site immediately upstream of the existing bridge and will cross the bed of the river. The crossing will be constructed when required and be removed immediately after use.

The temporary Hunter River crossing was assessed for impacts to both terrestrial and aquatic flora and fauna. An analysis of impacts to aquatic ecology and mitigation measures, was prepared by ERM 2001 as part of the Statement of Environmental Effects for the most recent crossing.

9.10.1 Aquatic Ecology

The bed of the Hunter River at the proposed crossing is approximately 100 m wide and has a mixed sand and coarse gravel substrate. The bed itself contains no vegetation, but a dense mat of couch grass (*Cynodon dactylon*) and the branches of occasional willows (*Salix babylonica*) tend to overhang the low flow channel where it approaches either bank. These provide the only fish refuge in the immediate vicinity of the crossing site. Further downstream, there are several small pools, rock ledges and reed beds. Rock ledges also occur approximately 250 m upstream.

The area of the temporary crossing is outside the known distribution of threatened species listed under the *Fisheries Management Act 1994*. The immediate area provides very minimal fish refuge and spawning sites, these being limited to areas of overhanging rhodes grass, couch and kikuyu growing on either bank. There are no undercut banks, snags or rock ledges in the immediate vicinity.

Fish passage is likely to be significantly restricted during the time the temporary crossings are in place. However, crossings will be constructed in accordance with the *NSW Fisheries Policy and Guidelines* (1999) so that fish passage is not totally prevented. Local species tend to migrate upstream during freshes in the River and predominantly in the summer months (December to February).

The measures proposed for protecting water quality and preventing contamination will minimise the impact on aquatic flora and fauna. Although fish passage will be restricted, the period of restriction will be limited.

Removal of the diversion channel and culverts and reshaping and re-vegetation of the bed and banks of the River will commence immediately after crossing by the equipment and all rehabilitation works will be completed within ten days. This will minimise the risk of erosion and sedimentation and will quickly return habitat and bank vegetation to its original condition.

9.10.2 Terrestrial Flora and Fauna

An assessment of the terrestrial flora and fauna at the proposed temporary crossing including analysis of impacts and identification of mitigation measures, was prepared by ERM in 2001 for the previous crossing.

Vegetation was assessed at the proposed crossing location as being dense with 100 % ground cover and grass height of 500-600 mm. The riverbanks are presently stable and are not subject to soil erosion during normal river flows. This vegetation has established as a result of rehabilitation work carried out immediately after the previous crossings.

Flora and fauna studies, which covered this area, were conducted for the Hunter Valley No. 2 Mine EIS in 1984, the Hunter Valley Mine Extension of Mining EIS in 1992 and the EIS for Modifications to the South Pit in 1998. These studies found no rare, endangered or unusual flora in the vicinity of the project.

Establishment of the temporary crossing will require the removal of topsoil and existing grass vegetation in some areas to create a 5° slope. In areas where cutting is not required, the topsoil and grasses will be left in place. Weeping willows will be lopped, but the trunks and root systems will be left in place to retain bank armouring and to promote early regeneration.

The following additional control measures will also be put in place:

- topsoil will be removed and stockpiled separately for topdressing of the disturbed area on completion of decommissioning work;
- on completion of the transfer, the banks will be reshaped and subsoil and topsoil materials will be replaced in their correct sequence;
- disturbed areas will be watered to consolidate disturbed soils;
- all disturbed areas will be immediately seeded with a grass and legume mixture, similar to that used for rehabilitation of mine overburden;
- the steeply sloping sides of the banks will be hydromulched;
- if necessary, seeded areas will be irrigated to encourage early vegetation establishment;
- all earthmoving equipment will be washed prior to conducting works to ensure it is weed and mud free to prevent the introduction of weeds; and
- weed infestation of revegetated areas will be managed.

As temporary crossings may need to be made during the remaining life of the mine the establishment of trees following each crossing is not practical. Tree establishment will be carried out as a part of the final mine closure and decommissioning process (CNA 2001).

9.11 Mitigation Measures

Mitigation measures for West Pit are designed to minimise the direct impact of the gradual clearance of native vegetation on the subject site and indirect impacts on the adjacent study area over 30 years. They include:

- vegetation and habitat clearance protocols;
- establishing corridor function;
- management of key threatening processes;
- progressive rehabilitation; and
- study area regeneration.

These mitigation measures will compliment the proposed integration of rehabilitation, regeneration and best practice environmental controls and management for HVO north of the Hunter River.

Rehabilitation planning will integrate rehabilitation and regeneration measures for all pits in HVO north of the Hunter River.

The rehabilitation planning for HVO north of the Hunter River will incorporate considerations such as conservation objectives, community expectations, pre-mining land use, final land use, drainage, stability, soils, erosion control and visual compatibility. It will also follow the principles and strategies outlined in the *Synoptic Plan: Integrated Landscapes for Coal Mine Rehabilitation in the Hunter Valley of New South Wales* (DMR 1999) and will be undertaken in consultation with the DMR.

The integration of rehabilitation and regeneration measures over HVO north of the Hunter River will have a greater beneficial effect in the long term for flora and fauna on West Pit and in HVO north of the Hunter River, compared to rehabilitation undertaken separately for each pit. This will also include regeneration of woodland for biodiversity on Carrington, which was not part of the original mine rehabilitation plans. Regeneration of woodland will help to mitigate against potential long term impacts on threatened woodland birds that were not listed at the time of the assessments of Carrington.

Other beneficial effects in the long term include an increase in areas of naturally regenerated woodland which will enhance biodiversity habitat and create an increase in connectivity across a landscape that is currently highly fragmented. Details of the mitigation measures for West Pit and rehabilitation of HVO north of the Hunter River are discussed in the Flora and Fauna Study in Part G of Volume 2.

CHAPTER 10

water resources

10 Water Resources

10.1 Introduction

This chapter provides a summary of the Surface and Groundwater Management Study prepared by MER. A copy of this study is contained in Part H of Volume 2.

The Surface and Groundwater Management Study provides an assessment of the groundwater impacts of the proposed extension of West Pit and an assessment of the surface water impacts of both the proposed West Pit extension and HVO north of the Hunter River. These assessments relate to:

- surface hydrology including watersheds, stored waters, changes to the local hydrology and management of runoff across HVO north of the Hunter River;
- groundwater aquifers including predicted hydrogeologic and hydrochemical impacts during and after mining; and
- mine water management including storage and details of the locations of structures that may be used in the future for discharge of mine water as part of the HRSTS.

This chapter also describes the groundwater impacts associated with operations within HVO north of the Hunter River assessed as part of previous development consents.

10.2 Surface Water Hydrology

Current operations at West Pit occur within a number of catchments that are affected by mining operations. These include Davis, Emu and Farrells Creeks on the eastern side of the pit and Parnells Creek to the south west. All of these creeks are ephemeral and first or second order.

Further catchment east of the pit within the catchments of Emu and Farrells Creeks will be consumed by the West Pit mine plan. Catchments situated on the western side of the pit and beyond rehabilitated areas will remain unaffected by mining. However, rehabilitated areas will progressively contribute to runoff in Parnells and Davis Creeks. Table 10.1 provides a summary of impacts on drainage catchments in 2003, 2017 and 2025. Runoff to Davis Creek will be impacted during development of Cumnock No. 1 Colliery's Stage 3 open cut operations. Most of this run-off will be reinstated during the course of mining at West Pit.

No creek diversions are proposed. However, a number of sedimentation dams will be relocated on the upper reaches of the eastward draining creeks between Years 5 and 10 of the mine plan. These sedimentation dams will be constructed in accordance with design criteria provided in *Managing Urban Stormwater* (Housing NSW, 1988).

Operations within Carrington are divided into three catchments, which are crossed by intermittent tributary watercourses that drain into the Hunter River.

The North Pit Southern Extension area which is located directly north of the Alluvial Lands was assessed as occupying a low ridge which grades east, south and west to the Hunter River. A shallow gully in the north eastern corner of the site and a second natural depression draining the eastern side of the Southern Extension area were also identified on the site. Drainage lengths were modest and a good proportion of the site drained directly to the Hunter River (Mitchell McCotter, 1987). The Alluvial Lands also drained directly to the Hunter River.

Table 10.1 Impact of Proposed Extension of Surface Drainage

	Watershed	Undisturbed (ha)	Rehabilitation (ha)	Total (ha)	Change %
2003	Davis Creek	1,088	68	1,156	0
	Emu Creek	912	0	912	0
	Farrells Creek	886	0	886	0
	Parnells Creek	78 + 163 + 902	53 + 65	1,261	0
2017	Davis Creek	1,071	306	1,377	+19.1
	Emu Creek	715	0	715	-21.6
	Farrells Creek	677	0	677	-23.5
	Parnells Creek	78 + 163 + 902	67 + 186	1,396	+10.7
2025	Davis Creek	1,329	107	1,436	+24.2
	Emu Creek	714	90	804	-11.8
	Farrells Creek	617	65	682	-23.0
	Parnells Creek	78 + 163 + 902	104 + 152	1,399	+10.9

Source: MER (2003)

10.3 Groundwater Hydrology

10.3.1 Introduction

The Upper Hunter Region hosts three recognised types of aquifer systems, including the coal measures, the shallow weathered zone or regolith, and the alluvial deposits adjacent to major drainages like the Hunter River.

The main aquifer systems in the area around West Pit include the low permeability coal measures often referred to as aquitards, and parts of the overlying weathered zone/regolith. Due to the relatively low order drainages in the area (first and second order), valley infill deposits comprising colluvial and alluvial materials are limited. As such, valley infill deposits do not constitute a significant aquifer resource in the area. Further to the west, south and south east occur alluvial deposits associated with the Hunter River and the Carrington palaeo-channel. Groundwater contained within the alluvial lands associated with the Hunter River is recognized as a significant resource while groundwater contained within the palaeo-channel is not, due to the relatively high salinity in that area.

Water tables in the low permeability coal measures aquifers/aquitards are sustained by rainfall percolation at a generally low rate with estimates of rainfall recharge varying from zero to no more than 2 % of annual rainfall based upon previous studies in the region. In contrast, the alluvial lands are recharged at much higher rates through infiltration of rainfall, downwards percolation of runoff, and lateral seepage from the river via extensive sand deposits. An exception is noted for the Carrington area paleo-channel deposits where the unconsolidated deposits are capped by several metres of impermeable clay. Historical monitoring in this area has indicated stable groundwater levels with negligible response to rainfall recharge (MER, 1999).

10.3.2 Groundwater Piezometric Surface

The groundwater pressure distribution within coal measures in the vicinity of West Pit has changed since mining commenced in 1952. Originally the regional piezometric surface reflected topography with elevated water levels/pressures in the area of mining and hydraulic gradients established towards the major drainages including Saltwater Creek to the west and north west, Bayswater Creek to the east and the Hunter River to the south and south west.

Pit development has now created a groundwater sink around the mine site. This depressurisation has been maintained essentially at the crest of a groundwater/drainage divide and has therefore had relatively little impact regionally. Underground operations at Cumnock No. 1 Colliery have also induced depressurisation of the Liddell and Arties seams and overlying strata. This depressurisation has merged with depressurisation around West Pit (northern end) to create a wider zone which has probably reduced groundwater seepage into both West Pit and Cumnock No. 1 Colliery. However, since groundwater observation piezometers are not established in the area, actual pressures cannot be determined. The approximate geometry of the water table can therefore only be estimated by interpolation of known levels in other areas and consideration of the recharge and groundwater migration processes occurring within the coal measures.

CNA currently maintains a network of observation piezometers within and around Carrington and North Pit. Regional piezometric data is also available from past studies. In particular MER (1997) provides a piezometric surface for the area between West Pit and Ravensworth-Narama as measured in 1997 while HLA (2001) provides more recent measurements in the same area.

The regional piezometric surface, which was modelled as a probable pressure distribution, shows groundwater sinks around West Pit, the Alluvial Lands, Carrington and Cumnock No. 1 Colliery. Elevated pressures (+60 m AHD) are noted beyond West Pit.

Depressurisation within low permeability strata associated with the Saltwater Creek Formation and the Mulbring Siltstone to the west and north west, is assumed to be minor.

10.3.3 Coal Measures Hydraulic Properties

Hydraulic properties for specific coal seams have not been measured within the immediate area of the West Pit extension. However data collected in adjacent areas over a number of years has been used to develop an understanding of the likely bulk permeability of coal measures. Table 10.2 provides a summary of measured seam permeabilities. Further details are provided in Part H of Volume 2.

Table 10.2 Coal Measures Hydraulic Conductivity Estimates

Strata	Horizontal permeability (m/day)
Pikes Gully seam	2.70E-02
Arties seam	2.60E-01
Liddell seam	5.70E-02
Barrett seam	4.19E-02
Sandstone	3.00E-05
Siltstone	2.00E-06
Shale	1.00E-07

Source: MER (2003)

10.3.4 Coal Measures Water Quality

Data relating to coal measures water quality at West Pit is sparse. Some data has been sourced from the current sampling/monitoring regime. This data reflects a composite of pit water and rainfall runoff (sampling at Parnells Dam) with increased salinity during dry and drought periods and decreased salinity during wet periods. Older data relating to Howick Open Cut before West Pit was developed has also been sourced (Elliot, 1987) and is summarised in Appendix D of the Surface and Groundwater Management Study in Part H of Volume 2. In general most data reflects a poor quality saline water in coal measures that has no identifiable beneficial use.

Established water quality guideline data are summarised in the following Table 10.3 together with typical mine water and groundwaters sampled in the region.

Table 10.3 Generalised Water Quality Criteria and Comparison with Pit Waters

TDS (mg/L)	Equivalent EC (μS/cm)	Beneficial use
1,000	1,540	Acceptable taste limit for humans
1,500	2,300	General upper limit based on taste
1,300	2,000	Approximate limit for lucerne on alluvial lands
3,000	4,600	Limit for poultry and pasture
4,000	6,100	Limit for dairy cattle
32,500	50,000	Sea water
2,387	3,673	Typical Parnells Creek Dam
2,036	3,133	Typical Dam 15N (HV North)
393	605	Typical Emu Creek Dam 12W
5,110	7,860	Average groundwater from Elliot (1987) data

Source: MER (2003)

Salinity data for dams and borehole locations across both West Pit and Carrington are shown on Figure 7 of the Surface and Groundwater Management Study in Part H of Volume 2. Since the data is both discrete (boreholes at specific seam depths) and composite (dam water) it is not feasible to develop a representative salinity distribution. The data indicates a range in salinity for coal measures piezometers from less than 2,000 to more than 11,000 μS/cm with salinities above 3,000 μS/cm dominating. Surface water sampling at Parnells Dam which is most representative of mine water, ranges from 2,400 to more than 6,300 μS/cm.

Water in the coal measures at Carrington is potable to brackish along the subcrop zone in the northern part of the lease area. The relatively shallow hydraulic gradients and low hydraulic conductivity of the gravels leads to a generally low flow groundwater regime without significant recent recharge. The poor quality in the alluvium is attributed to upward leakage of coal measures waters over a long period (ERM, 1999).

10.4 Groundwater Impacts

Continued mining of coal seams will expand the depressurisation surface around West Pit. In order to assess the likely impacts from depressurisation arising from continued mining, a computer aquifer model of the region has been development.

Details on the model, including properties and values assigned to the model, geographical extent of the model and timeframe of modelling are provided in the Surface and Groundwater Study contained in Part H of Volume 2.

10.4.1 Open Cut Depressurisation

The aquifer model has been used to simulate past and future depressurisation of the coal measures. Simulations have been conducted for a period of 24 years from 1980 to determine seepage and formation depressurisation to the present time. Simulations over a further 21 years (to 2025) were then conducted to generate estimates of aquifer depressurisation and pit seepage over the proposed mine life. The Alluvial Lands, Carrington and Cumnock No. 1 Colliery have each been simulated in a similar manner with 1 year of mine life remaining in the Alluvial Lands and about 8 years life remaining at Carrington. The model shows:

- a current depressurisation surface that extends about 1.5 km from West Pit and may connect with the depressurisation surface now emerging from Carrington Pit although piezometers near Carrington suggest minimal impact from West Pit at the present time. This surface is observed to gradually expand outwards as mining is conducted at increased pit depths down dip, merging with depressurisations from Carrington, North Pit and Cumnock No. 1 Colliery to create a regional cumulative pressure loss.
- present seepage rates attributed to depressurisation of the coal measures (2003) are estimated to be of the order of 0.35 ML per day. However since the pit wall and floor exposure is expansive, most seepage is lost to evaporation (average rate of 4 mm per day) leaving less than 0.1 ML per day to enter the pit.

- long term seepage is expected to rise to an estimated 0.54 ML per day at the completion of mining before evaporative losses accrue. The adjusted seepage entering the mine water system after evaporation, is estimated to remain less than 0.3 ML per day by the end of mining in 2025.

The quality of groundwater entering the mine pits will continue to reflect an average of water quality for the coal measures spoils (toe seepage and runoff), and contributions from the surrounding coal measures. The quality is expected to remain in the range 2,400 to 6,300 µS/cm as measured at Parnells Creek Dam. Future ionic speciation is expected to be similar since interburden is similar.

All pit water will remain within the mine water system as a result of the now developed inward flow regime or groundwater sink which will prevail at all times, mine water will not migrate beyond the pit area.

10.4.2 Recovery of Aquifer Pressures Post Mining

Following cessation of mining, regional water levels/ pressures will recover. The rate of recovery will depend upon the remaining water held in storage within the coal measures, the hydraulic properties of spoils, rainfall recharge through spoils and runoff entering the final void.

An estimate of the rate of recovery of pressures has been made using the aquifer simulation model. Based on the model, water level distributions show a recovery elevation of only –30 m AHD after 100 years based on groundwater seepage and spoils percolation.

Rainfall and runoff contributions to the void have also been calculated from the final landform. Allowing for a contribution of about 580 ML per annum from the catchment to the void and simultaneously considering evaporative losses, the period for equilibration of void water levels is estimated to be nearer 200 years with an equilibrated level below 50 m AHD. This level is below the regional water table and is therefore expected to maintain the void as an evaporative sink (MER, 2003).

For Carrington, more than 100 years is required to achieve greater than 80 % recovery of the water table in the vicinity of mining. The recovered water table in the mined area will retain a shallow hydraulic gradient toward the Hunter River (ERM, 1999).

10.4.3 Final Void Groundwater Quality

West Pit

The hydrochemistry of recovering groundwater within the West Pit void will reflect contributions from coal measures seepage, spoils seepage and rainfall runoff entering the void as noted above.

Void water is expected to remain largely isolated from the regional coal measures and surficial aquifers through the maintenance of inward hydraulic gradients during the recovery process and an evaporative sink condition that will continue to attract groundwater flow to the void (at a low rate) in the long term.

Estimates of the overall total dissolved solids and ionic speciation characteristics of void water have been made using recently developed techniques which facilitate reconstruction of fragmentation distributions and improved estimation of leachable salt load.

An average leachable and mobilisable load has been determined for two limiting spoils fragmentation distributions. A total mobilisable salt load of between 2.99 and 4.77 kg/m^3 of spoils has been determined based on projection of leachate trials to 100 years. An estimate of the void water quality has been made by assuming this salt mobilisation rate will prevail throughout all spoils (including those presently emplaced) which re-saturate during the recovery period. As noted, a final void recovery level is predicted to remain below 50 m AHD (+100 years post mining). This will result in about 320 million m^3 of spoil being re-saturated. If a final emplacement bulk porosity of 20 % is assumed, then the calculated mobilisable salt load is estimated to lie between 974,300 and 1,547,600 t. Using a mass balance approach and mixing this load with open void water derived from rainfall runoff and coal measures seepage water, leads to an 'instantaneous' void/spoil water quality in the range 14,550 to 22,910 mg/L.

In reality, the salt load will be generated over the full recovery time frame of more than 100 years. Hence the load is likely to vary with evaporative concentration or dilution from rainfall within the final voids governing the long term salinity. However, since an evaporative sink is the most likely pit closure scenario, void water can be expected to exhibit a steady increase in dissolved salts.

Speciation analyses of leachate samples indicates the overall quality of void groundwater will tend towards a sodium bicarbonate water with a pH in the range 7.5 to 8.5.

Carrington

After mining is complete at Carrington, the final void will accumulate water. Final void water quality was calculated from laboratory analyses of interburden leachable components. Long term leachate at Carrington is expected to be relatively benign with salinity being the main concern. The mobilisable salt load per cubic metre of overburden will be 0.5 kg/m^3.

Salts are expected to remobilise slowly as the pit overburden are re-saturated. Hydraulic gradients will be towards the mine pit and void for six years of mining and 33 years thereafter until water levels recover to the equivalent river levels. The base of the overburden and void will have a higher salinity through upward leakage from the coal measures and some evaporation when the base was exposed during mining. Current water quality in the alluvium apparently sourced from underlying coal measures is about 4,672 mg/L. Hence water quality will improve after mining. Dispersion and diffusion processes will give a blended water quality (ERM, 1999).

10.5 Mine Water Management

Future water management at West Pit will utilise the existing water management system with minor changes and provisions for water sharing with other operations within HVO north of the Hunter River. The main goals of the mine water management system include:

- diversion of natural catchment runoff around the mine site where practically feasible;
- capture and storage of pit seepage and disturbed area runoff in order to maintain site workability;
- efficient usage of stored water for process water supply at the WPCPP;
- watering for dust minimisation on haul roads, trafficable areas and stock piles;
- minimisation of river make up water during dry and drought periods; and
- maximisation of surplus water utilisation and re-cycling across all operations.

10.6 Mine Site Water Balance

The mine water balance is a representation of all inflows, outflows and changes in storage for the water management system. It provides an understanding of the need for storage and the impacts of seasonal and climate change.

In the current study, a computer based simulation model has been used to assess the dynamics of the system under conditions of varying rainfall and groundwater seepage rather than a simple wet and dry year water balance. The adopted approach provides a probabilistic outcome and is considered more accurate than a simple balance type model as the latter cannot easily address varying catchment areas, varying groundwater seepage or rainfall runoff accumulations over an extended period of time. A simple balance is however provided as a means of overviewing West Pit, North Pit, Carrington and HVO south of the Hunter River.

The model develops a daily water balance for West Pit for wide ranging climatic conditions by utilising historical rainfall and evaporation records to generate catchment runoff estimates. It also provides for pumping and accumulation of mine water, transfer of mine water between dams, losses related to WPCPP, dust suppression etc. and discharges to the Hunter River in compliance with the HRSTS if required.

10.6.1 WPCPP, Dust Suppression and other Water Usage Rates

System water usage can be attributed to two areas, the WPCPP and dust suppression including haul roads, other roadways and stockpile areas. Estimates of these usage rates have been either calculated indirectly or determined from monitoring data. Table 10.4 provides a summary of current and future usage rates.

Table 10.4 Summary of Current and Future Mine Water Usage Rates

Mine Water Usage	Usage Rates (ML/day)
WPCPP (4.5 Mtp) – future loss rate	1.80
Dust suppression on haul roads	1.15
Stockpile watering	0.04
Truck wash down	0.01

Source: MER (2003)

10.6.2 Assessment of Future System Response

Model simulations of the mine water management system has been conducted for projected future mine/pit catchments using historical rainfall records. Details of outputs and rates used in the model are provided in detail in the Surface and Groundwater Management Study contained in Part H of Volume 2.

Model simulations indicate the following:

- West Pit (North and South) are maintained in a dewatered state 90 to 95 % of the time for a modelled pit pumping capacity of 25 ML per day (290 L per second continuous operation) from the pit area. Wilton Pit is pumped at a rate of 8.6 ML per day and remains dry 97 % of the time although this assumes water concentrates within the sump(s) rapidly.

- Any non draining bench areas will of course present problems with short term ponding. During the remaining 5 to 10 % of the time, storage could rise above 200 ML if the more extreme rainfall periods are encountered like the third quarter in 1950. Increased pumping capacity would reduce the risk of impairing workability but additional storage would be required to contain pumped water;

- total mine storage is predicted to be mostly below 1,000 ML. For the remaining time the storage rises to a predicted maximum of about 2,000 ML during the 1910 to 1931 test period. A median response of 1,500 ML is demonstrated;
- Parnells Dam is predicted to be less than half full for 50 % of the time. This is attributed to an aggressive HRSTS discharge regime where all flood and high flow opportunities are utilised providing the stored water exceeds 50 % of capacity with high flow discharges ranging from zero to a maximum of 130 ML per day; and
- system make up water is required for up to 20 % of the time at a rate of 2.5 to 3.0 ML/day.

While the above provides predicted outcomes based on model parameters, in reality it is likely that some HRSTS discharge events will not be utilised, pumps may fail or Parnells Dam water quality may rise and reduce the high flow discharge rate in terms of salt tonnes exported from site. As a result it is likely that pit water storage may rise and be retained for longer periods. Additional HRSTS salinity credits may then need to be applied to boost high flow discharge rates and recover system balance. Since CNA retain more than 200 credits, sufficient flexibility should be available to counter imbalances.

10.6.3 West Pit Water Management

Since mining commenced at West Pit, the water management system has operated with both a deficit and a surplus in supply depending upon the prevailing climatic conditions. Any deficit in supply has been met by drawing water from Dam 13 at Liddell to the north of West Pit while surpluses have been generally contained on site or discharged from Parnells Creek Dam to the south of West Pit via the HRSTS. Figure 33 of Volume 4 shows the existing mine water elements. The operation of the proposed system is shown in Figure 14 of Volume 4 and is described below:

- Rainfall runoff on the western side of the main haul road (west of the pit) is either diverted off site or managed within the mine water system. A 4.7 km long contour drain system diverts runoff from undisturbed catchment lying above the drain (UD3 on Figure 14), in a south westerly direction into Parnells Creek. The drain also partly conveys runoff from the undisturbed catchment UD1 into Dam 18W. Dam 18W can either direct water into Parnells Dam or divert the water around the western side of the Parnells Dam into Parnells Creek.
- Runoff below the 4.7 km long contour drain is managed in a number of ways. Runoff from catchment UD2 migrates to the south east into Dam 3W from where it can be pumped back to the contour drain. Runoff from the hardstand area HS1 is directed to Dam 4W. Surplus can then be pumped to Dam 2W. Runoff within tailings dams TD1 and TD2 (Bobs Dump Tailings Dam) is contained within those dams and mixes with the supernatant tailings bleed water which is then pumped back to the WPCPP for re-use.
- Runoff from rehabilitated areas immediately east of the main haul road is mostly diverted off site. Runoff from RH1a enters the low lying sump area known as Dam 6W. Runoff from RH1b is managed through contour banks and drains to a diversion drain located adjacent to the haul road. This drain conveys runoff to a culvert at the southern end of the drain where it is conveyed beneath the haul road and along another rock lined channel to Dam 18W. Runoff from catchment RH2 is managed through contour banks and drains to a diversion drain located at the base of the rehabilitated area. This channel conveys runoff to a sump immediately north east of Dam 5W then through a culvert under the road to Dam 4W. Runoff from RH3 in the south west is managed through contour banks and drains to a diversion drain located at the base of the rehabilitated area which conveys runoff to a culvert opposite Parnells Creek Dam. This runoff is then diverted around the southern side of the dam into Parnells Creek. Rehabilitated areas further north (RH4, RH5, RH6) discharge into the headwaters of Davis Creek via a sedimentation dam;
- Rainfall runoff on lands east of the pit highwall flows away from the mine workings into the natural drainages of Davis Creek, Emu Creek and Farrells Creek.
- Rainfall runoff over the remainder of the area is generated from shaped spoils (SS1, SS2, SS3), unshaped spoils (US1, US2, US3, US4) and pit strip and bench areas (SB1, SB2, SB3). All runoff and percolation through spoils migrates to sumps situated in West Pit, and is contained within the mine water system.
- Mine water from the northern part of West Pit is either pumped eastward to Dam 15W then from Dam 15W to Dam 2W or westward to Dam 4W. Mine water from the southern part of West Pit is pumped up the centre or southern ramps into a common main (pipeline) located immediately west of the rehabilitated areas and adjacent to the haul road. This common pipeline then conveys the pit water to Dam 4W. Wilton Pit water is pumped up the pit ramp into Parnells Dam.
- Dam 4W water may be pumped to Dam 2W or to Parnells Dam where a large capacity of about 750 ML is available. Parnells Dam water may, in turn, be pumped to WPCPP or Dam 2W.

- WPCPP pumps water from Dam 2W or from the tailings decant water. If additional water is required in the system during dry or drought periods, it may be pumped from Dam 13 located at Liddell into Dam 2W. Dam 13 is normally maintained in a near full state and is supplied from water pumped from the old Liddell underground workings.
- Surplus mine water may be discharged from Parnells Dam via the HRSTS. The dam has a licensed discharge capacity of 130 ML per day.

In addition to the above and in order to maximise recycling, water will be transferred between West Pit and HVO north of the Hunter via a pipeline. This pipeline has been constructed to connect Dam 9N (Carrington) and the southern end of the common main (near Parnells Dam) noted above. This system is described below.

10.6.4 North Pit, the Alluvial Lands and Carrington Pit Water Management

Water management at North Pit has been previously assessed (MER 1999, MER 2000). Simulations addressed a number of scenarios including the Alluvial Lands, Carrington operations and inclusion of West Pit coal processing through HVCPP. This system is summarised on the water management schematic as shown in Figure 15 of Volume 4. The following is a summary of the system:

- Dam 15N serves as a central storage for distributing water to the various other HVCPP dams and directly to the WPCPP. Localised catchment runoff is ultimately pumped through the mine water system to Dam 15N or during wet periods, migrates as overflows from the other dams. Water levels in Dam 15N may oscillate during dry times primarily due to draw-off to feed HVCPP directly or through pumpage to the two 17 ML dams (Dam 17N), however, levels are generally maintained near capacity;
- Dam 16N receives water recycled from HVCPP. Water is also pumped from Dam 11 if levels are low;
- Dam 17N acts as a header dam for HVCPP and is maintained at relatively constant levels. The dam(s) receives mine water from North Pit via Dam 11 and makeup water during dry times is pumped in from the Hunter River. Similarly, the two 13 ML dams (Dam 18N) act as a header for both firewater purposes and HVCPP. Dam 18N sources water from the Dam 17N;
- The 10 ML Hardstand Dam (19N) receives runoff from the administration facilities and a small undisturbed catchment. It is maintained at near capacity except during dry periods. Overflows are directed to Dam 15N;
- Dam 9N situated between Carrington and North Pit, accepts groundwater from both Carrington and the dewatering slot constructed to the south east of the pit. Water is pumped from Dam 9N to the Eastern Dam. Water may be pumped from the Eastern Dam to Dam 11N;
- Dam 11N may discharge surplus water in accordance with HRSTS regulations. Dam 11N receives surplus water from Dam 15N and pumped water from the Eastern Dam. Make up water from the Hunter River has historically been required at an average rate of approximately 2 ML per day. However for the last three years the mine has operated in a self-sufficient manner by sourcing water from storage in the Eastern Dam and from HVO south of the Hunter River, and groundwater pumped from both Carrington and the Alluvial Lands; and
- rainfall runoff from the rehabilitated lands north of an imaginary line connecting the Central tailings and Eastern tailings dam accumulates in drains that flow into sedimentation dams before decanting offsite. Minor runoff from less significant areas of rehabilitation adjacent to and down gradient of this line is collected as mine water.

Water management system simulations (MER, 2000) assumed continued processing of coal from HVO north of the Hunter River and HVO south of the Hunter River through HVCPP over a term of 5 years indicated a reasonably balanced system for the first two years with a decline in storage thereafter. These scenarios included groundwater seepage at a rate of about 1.3 ML per day from the Alluvial Lands and utilisation of all available high and flood flow HRSTS discharges. The HVCPP loss rate was estimated at about 2.63 ML per day (150 L/t ROM) based on a throughput of 6.4 Mtpa. Cessation of HRSTS discharges would lead to an improvement in the water balance.

Inclusion of groundwater seepage to Carrington Pit at a rate of 3 ML per day and processing of coal from West Pit in the model indicated mine water storage would probably remain above 1,000 ML. If Carrington dewatering declined significantly, then an improved balance would result with surpluses expected during the more extreme wet periods and deficits occurring during dry and drought periods.

Seepage to Carrington has indeed declined and averages about 0.6 ML per day. Thus the system remains in reasonable balance.

Closure of the Alluvial Lands will facilitate a significant increase in available storage in spoil now emplaced within the pit. This staging capacity is likely to reduce demand on pumped water from the Hunter River and reduce the frequency of discharges of mine water to the river. The additional storage (if used) is also likely to lead to a reduction in mobilisable salts within the spoils through dissolution and export in product coal.

A pipeline between Dam 9N and Parnells Dam at West Pit has been constructed to provide increased flexibility in water sharing and water storage.

10.6.5 Water Balance for HVO North of the Hunter River

Dynamic water balance simulations discussed above, have been used to develop a water balance for HVO north of the Hunter River. This has also included results from dynamic simulations to assess mine water catchment runoff undertaken for Cheshunt (MER, 1998). A simplified 'static' balance has been used to assess the system for 10, 50 and 90 percentile wet years. Representative years have been extracted from the Jerrys Plains rainfall record and a balance or change in storage calculated. This change in storage has then been summed across the operations and the overall balance considered with varying input from Dam 13 (Liddell) or from the Hunter River.

Carrington and the Alluvial Lands are included in the HVO north of the Hunter River balance. Table 10.5 indicates a future balance can be reasonably achieved for a HVCPP throughput of 20 Mtpa ROM coal assuming Dam 13, or another source, can continue to provide system make up water at a rate of 2 ML per day. In addition, a continuing water supply from the Hunter River at a rate of 1.5 ML per day or 550 ML per annum (or additional water drawn from other sources) will be required. This rate will also be met in part by contributions from Carrington when future dewatering slots are constructed (maximum provision of 3 ML per day from Carrington previously assessed) thereby reducing the need to draw from the Hunter River. Approximately 2,000 ML of storage will be needed. The storage would need to be utilised during wet years (no HRSTS discharges) in order to store and provide a resource for the dry years. Significant storage in spoils will become available in 2004 when mining in the Alluvial Lands has ceased. This storage is estimated to be greater than 10,000 ML.

Table 10.5 HVO North of the Hunter River Water Balance for Dry, Average and Wet Years

Source-Use	10 % wet year (ML)	50 % wet year (ML)	90 % wet year (ML)
West Pit mine water runoff	+1,592	+1,193	+434
West Pit groundwater seepage	+120	+50	+10
West Pit make up water (Dam 13 Liddell)	+0	+20	+550
WPCPP – 4.5 Mtpa	-657	-657	-657
West Pit haul road dust suppression	-320	-360	-401
West Pit truck wash and other usage (fire etc)	-37	-37	-37
West Pit Change In Storage (Balance)	**+698**	**+209**	**-101**
HVO North mine water runoff	+1,238	+828	+275
HVO North groundwater seepage	+547	+500	+450
HVO North make up water (Dam 13 Liddell)	0	0	0
HVCPP – 20Mtpa	-2,920	-2,920	-2,920
HVO North haul road dust suppression	-219	-255	-300
HVO North truck was + other usage (fire etc)	-40	-40	-40
HVO North Change In Storage (Balance)	**-1,394**	**-1,887**	**-2,535**
HVO South mine water runoff	+860	+360	+120
HVO South groundwater seepage	+590	+501	+410
HVO South make up water	0	0	0
HVO South haul road dust suppression	-240	-290	-340
HVO South truck wash and other usage (fire etc)	-60	-60	-60
HVO South Change In Storage (Balance)	**+1,150**	**+511**	**+130**
TOTAL CHANGE IN STORAGE (BALANCE)	**454**	**-1,167**	**-2,506**
Add Dam 13 maximum input	730	710	180
Add Hunter River Draw Off	550	550	365
OPERATIONS BALANCE	**1,734**	**93**	**-1,773**

Source: MER (2003)

10.7 Environmental Impacts

The proposed extension of mining at West Pit will continue to induce change to the local groundwater and surface water environments. Potential impacts arising from the development will include:

- continuing loss of coal measures aquifer pressures;
- change in groundwater quality in coal measures;
- leakage of groundwater from shallow aquifers;
- loss of catchment runoff;
- change in runoff water quality;
- salinisation in the final void(s) following cessation of mining; and
- change in the site water balance;

These issues are addressed below.

10.7.1 Continuing Loss of Coal Measures Aquifer Pressures

Future mining will continue to induce loss of aquifer pressures in the seams and in formations overlying the seams with pressure losses sustained after cessation of mining for a period of more than 200 years. Coal measures pressures will never recover to pre mining levels since the area of mine development (including neighbouring mines), now retains different hydraulic properties with spoils permeability being three to four orders of magnitude higher than undisturbed coal measures. The net effect of changed properties will be a relatively flat water table over the mined area at a maximum elevation of about 50 m AHD or lower. Since the area of extended mining is located at the headwaters of a number of catchments, the overall impact is not considered to be significant.

Depressurisation of the coal measures and depressurisation impacts are predicted to extend between 2 and 3 km from the pit perimeter over the remaining mine life. Cumulative depressurisation arising from Carrington may extend the distance to about 3.5 km (south west).

Loss of aquifer pressures is not predicted to impact Hunter River alluvium nor any existing water supply bores or wells since all bores and wells are located within shallow alluvium.

10.7.2 Change in Groundwater Quality in Coal Measures

Groundwater within the coal measures is highly saline with salinity levels often observed to be above 10,000 EC. These elevated salinities may reflect deeper coal seams within which the monitoring piezometers have been located. Pumped pit water qualities reflect a composite but lower range from less than 3,000 to 6,500 EC suggesting mixing of improved quality coal measures water, seepage from the shallow regolith and rainfall runoff within the pit.

Continued mining is expected to sustain a similar groundwater quality range as has been observed since the commencement of mining many decades ago. It is highly improbable that coal measures groundwaters will exhibit a fall in salinity to the point where beneficial usage is increased.

10.7.3 Leakage of Groundwater from Shallow Aquifers

The Alluvial Lands associated with the Hunter River and other major drainages represent an important groundwater resource within the region. Numerical modelling of the groundwater system indicates coal measures pressure losses generated from continued mining of West Pit will not migrate beneath the Hunter River and as such, leakage losses from the alluvium will not occur.

No other shallow groundwater systems have been identified within the predicted zone of depressurisation.

10.7.4 Loss of Catchment Runoff

There will be a continuing loss of runoff in local catchments as they are consumed by West Pit. The main drainages impacted include Emu Creek and Farrells Creek where 12 % and 23 % of the catchment above Bayswater Creek totalling about 1,486 ha will be consumed. Rehabilitation of areas in the northern and western part of the mine site will re-instate runoff to Davis Creek and Parnells Creek where 24 % and 11 % of the catchment totalling about 2,835 ha will be reinstated. Thus a net increase in catchment runoff will occur by the completion of mining.

These drainages are ephemeral with catchment losses restricted to the head waters that tend to drain rapidly after rainfall events. As such, impacts on aquatic systems are considered to be negligible.

10.7.5 Change in Runoff Water Quality

Runoff water quality in rehabilitated areas is likely to exhibit a reduced salt load in the longer term compared to other local drainages unaffected by mining. This is mostly attributed to the removal of regional aquifer pressures within the coal measures that would otherwise contribute saline seepage to the drainages.

All areas planned to be returned to the natural catchment will need to be carefully monitored at the sedimentation dam exit points during early years of rehabilitation to ensure water qualities (suspended and dissolved constituents) are acceptable.

10.7.6 Salinisation in the Final Void

An open pit (free water) void is predicted to remain on completion of mining at West Pit and Carrington. Depending upon the final closure plan, the void will exhibit a salinity higher than existing pit water due to leaching of salts from spoils, and evaporative processes. Some cyclic variability is also predicted as runoff from adjacent rehabilitated areas dilutes salinity and evaporation concentrates salinity. The extent to which catchment runoff is directed to the voids, should be determined through runoff monitoring during the last seven years of the mine life and detailed design during closure planning.

For the current void design, the leachable salt load (over 100 years) is estimated to lie between 9.8×10^5 t and 1.5×10^6 t generating a void water quality of between 14,550 and 22,910 mg/L before any evaporative concentration is included.

The runoff area contributing to the void is sufficiently small to ensure that evaporation dominates and the void remains as a long term groundwater sink thereby attracting seepage from the surrounding strata (at a very low rate) and inhibiting advective dispersion of salinity back into the coal measures.

10.7.7 Change in the Site Water Balance

Simulation of the site water balances using a dynamic catchment modelling approach indicates near balanced systems providing HRSTS discharges (high and flood flows) are utilised and make up water remains available from Liddell Dam 13, other sources or from the Hunter River. The demand for make up water and the need for discharges will be reduced if storage within the Alluvial Lands is utilised. Connection of the mine water systems through the pipeline between Dam 9N and Parnells Dam will facilitate water transfers between the two systems and maximize use of this storage. Re-use of stored water is also expected to initiate a reduction in mobilisable salts within the Alluvial Lands spoils through coal washing and export of salts in product. Remobilisation will however only occur in spoils that are re-saturated.

10.8 Temporary Crossing of the Hunter River

A temporary crossing of the Hunter River has been previously constructed in 1997 and 2001 to facilitate movement of a dragline and shovel between mining operations on either side of the river. The crossing is required since the haul road bridge is not designed for the very heavy loads associated with this equipment. The crossing has previously been constructed immediately upstream of the bridge. In future years it may be required as often as once per year. The planning, construction and removal period is of the order of 10 to 20 days while movement of equipment is normally accomplished within a day.

A SEE was prepared for the 2001 crossing. This document provides construction details, assessment of the hydrology and geomorphology, and assessment of the likely impacts associated with the crossing. Key hydrological issues addressed included the probability of floodwaters overtopping the crossing, the ability of the crossing to withstand the impact of overtopping (scouring etc.), flood levels and flow velocities with and without the crossing, river bank stability, materials leachability and other water quality aspects.

Construction is undertaken in two stages due to the presence of a high and low flow channel at the crossing location. Construction begins in the high flow channel with the installation of culverts. Immediately prior to the planned movement of equipment, the low flow channel is diverted to the high flow channel and through the culverts and the temporary crossing extended across the entire river by selective materials emplacement. Equipment is then moved and the works removed.

River materials excavated in the course of construction are then carefully replaced and the banks re-instated and stabilized. During this process, weather patterns and river flows are carefully monitored.

Construction and removal of the crossing in 2001 has demonstrated that a temporary crossing can be undertaken without measurable impact on water qualities/flows or bank stability.

10.9 Conclusions

Water management studies have been conducted for the extension of mining at West Pit and the consolidation of consents across HVO north of the Hunter River. The studies have addressed groundwater and surface water issues together with an analysis of the mine water management across HVO north of the Hunter River. Within the constraints and limitations imposed by the available data base and analytical methods, the following conclusions can be drawn.

Loss of aquifer pressures in the seams and formations overlying the seams with continued mining will result in pressure losses for more than 200 years. The net effect will be a relatively flat water table over the mined area at a maximum elevation of about 50 m AHD. Depressurisation of coal measures and depressurisation impacts are predicted to extend between two and three kilometres from the pit perimeter over the remaining mine life. Cumulative depressurisation arising from Carrington Pit may extend the distance to about 3.5 km (south west). Groundwater quality is not expected to change as a result of continuing mining and coal measures groundwater may exhibit a drop in salinity. Leakage losses from the alluvium will not occur.

While some catchment run-off is expected to be lost as a result of the West Pit extension (1,486 ha), rehabilitation will lead to the reinstatement of 2,835 ha creating a net increase in catchment area. Drainage lines within these catchment areas are ephemeral with catchment losses restricted to the head waters resulting in negligible impacts on aquatic systems.

Water quality within rehabilitated catchments is expected to be less saline than other local drainages unaffected by mining due to the removal of regional aquifer pressures within the coal measures. Water quality within the final void is expected to be more saline than existing pit water due to leaching from spoil and evaporative processes. In addition, run-off levels to the void will be small enough to ensure that evaporation dominates and the void remains a groundwater sink.

CHAPTER 11

air quality

11 Air Quality

11.1 Introduction

This chapter provides a summary of an Air Quality Study prepared by HAS, which is contained in Part I of Volume 3.

The Air Quality Study provides an assessment of the likely air quality impacts of the proposed operations at HVO north of the Hunter River. The assessment was conducted using a computer based dust dispersion model which uses local meteorological data and estimates of dust emissions from mining operations to predict the concentration and deposition rate of particulate matter from both the proposal and other mines expected to be operating concurrently with HVO north of the Hunter River.

In summary, the issues dealt with in the Air Quality Study are:

- the impacts likely to arise from emissions of particulate matter (PM) from HVO north of the Hunter River;
- the impacts likely to arise from emissions of PM from the proposal including open cut mines at nearby mining operations; and
- greenhouse emissions.

11.2 Air Quality Assessment Criteria and Methods

Air quality assessment criteria are stipulated by the EPA in a document titled *Approved Methods and Guidance for the Modelling and Assessment of Air Pollutants in NSW*. The criteria contained in this document that are relevant for use in assessing impacts from mining using dispersion models are summarised in Table 11.1 and Table 11.2.

Table 11.2 Impact Assessment Criteria for Dust Fallout

Pollutant	Averaging Period	Maximum Increase g/m²/month(1)	Maximum Total g/m²/month(1)
Deposited Dust	Annual	2	4

Source: HAS (2003)
Notes: (1) = g/m²/month refers to grams per square metre per month

The main focus of the study is on the potential effects of PM emissions which have the capacity to affect health and to cause nuisance effects.

No detailed study of emissions of SO_2 from the mine were performed as the sulfur content of Australian diesel is too low and mining equipment is too widely

Table 11.1 Impact Assessment Criteria for Pollutants

Pollutant	Averaging Period	Concentration	
		pphm(1)	µg/m³(2)
PM_{10}(3)	24 Hour	–	50
	Annual	–	30
TSP(4)	Annual	–	90
SO_2(5)	10 Minutes	25	712
	1 Hour	20	570
	24 Hour	8	228
	Annual	2	60
NO_2(6)	1 Hour	12	246
	Annual	3	62
		ppm(7)	mg/m³(8)
CO(9)	15 Minutes	87	100
	1 Hour	25	30
	8 Hours	9	10

Source: HAS (2003)
Notes: (1) = pphm refers to parts per hundred million
(2) = µg/m³ refers to micrograms per cubic metre
(3) = PM_{10} refers to particulate matter with aerodynamic diameters less than 10 µm
(4) = TSP refers to total suspended particulate
(5) = SO_2 refers to sulphur dioxide
(6) = NO_2 refers to nitrogen dioxide
(7) = ppm refers to parts per million
(8) = mg/m³ refers to milligrams per cubic metre
(9) = CO refers to carbon monoxide

dispersed over mine sites to cause SO_2 goals to be exceeded even in mines that use large quantities of diesel. In addition, NO_2 and CO emissions are too small and too widely dispersed to require a detailed modelling assessment.

To assist in interpreting the significance of predicted PM concentration and deposition levels some background discussion on the potential harmful effects is provided in the following sections.

PM can be categorised by size and/or chemical composition. The potential harmful effects depend on both. The human respiratory system has in-built defensive systems that prevent particles larger than approximately 10 µm from reaching the more sensitive parts of the respiratory system. Particles with aerodynamic diameters less than 10 µm are referred to as PM_{10}.

Particles larger than 10 µm, while not able to affect health, can soil materials and generally degrade aesthetic elements of the environment. For this reason, air quality goals make reference to measures of the total mass of all particles suspended in the air. This is referred to as Total Suspended Particulates (TSP). In practice, particles larger than 30 to 50 µm settle out of the atmosphere too quickly to be regarded as air pollutants. The upper size range for TSP is usually taken to be 30 µm. TSP includes PM_{10}.

The National Environmental Protection Council (NEPC) has recently published an advisory National Environmental Protection Measure (NEPM) for $PM_{2.5}$. The numerical values for $PM_{2.5}$ in the advisory NEPM are 8 µg/m^3 annual average and 25 µg/m^3 over 24 hours. At this stage, the advisory $PM_{2.5}$ standards do not form part of the EPA's assessment criteria and therefore are not used to assess impacts. Notwithstanding this, predictions of $PM_{2.5}$ concentrations have been undertaken and provided in Appendix A of the Air Quality Study (Part I of Volume 3)

11.3 Existing Air Quality

11.3.1 Monitoring Networks

Data from dust monitoring stations operated by CNA provide measurements of 24 hour average concentrations of TSP and PM_{10} on a six-day cycle and monthly averages of dust fallout levels. Data from these stations are discussed below.

11.3.2 Concentration (TSP and PM_{10})

Twenty four hour average concentrations of TSP and PM_{10} (on a six-day cycle) have been measured over various periods at four monitoring stations identified as Cornfield, Warkworth, Cheshunt and Wandewoi. The location of these stations can be seen in the Air Quality Study.

When interpreting the data it should be noted that they include the effects of existing mining operations. The data cannot be used directly to determine the background levels that should be added to predicted concentrations of TSP and PM_{10} that arise from the proposal. This is because the project includes activities that are already occurring and thus adding predicted project concentrations to monitored levels would double count the effects of existing emissions.

The annual average concentrations of TSP at the Cornfield and Wandewoi monitoring stations have been below the 90 µg/m^3 annual criterion. The highest concentrations recorded at these sites occur in the summer period when winds typically blow from the south east. This indicates the extent to which mining is contributing to the TSP in the air at these sites.

Annual average concentrations of TSP at the Cheshunt monitoring station have exceeded the EPA criterion of 90 µg/m^3 on four out of the past six years. Air quality at this site is clearly affected by emissions from the Cheshunt Pit at HVO south of the Hunter River, which is only a few hundred metres to the east. The data are not representative of the wider area where most non-mine residences are located.

Information on concentrations of TSP and PM_{10} are available from the Warkworth monitoring station. At this stage only 29 24-hour average concentrations have been made (or are available). Further these data were collected at the end of one of the most severe droughts over the past 100 years and were affected by smoke from bushfires associated with the dry period. The data suggest that the annual average PM_{10} criterion of 30 µg/m^3 will be exceeded at Warkworth Village. The most recent data show extremely high TSP and PM_{10} concentrations (see 8 April and 8 May 2003). On 8 April 2003 winds were generally from the north west with speeds mostly in the range 0 to 6 m/s. On 8 May 2003 the wind direction was similar and wind speeds were lower in the range 0 to 4 m/s. The other monitoring site did not record extreme concentrations. This suggests that the source of PM was local and located in the north west of the monitor.

11.3.3 Deposition

There are a number of dust deposition gauges located in and around HVO. Many of the gauges are located within the mining lease close to areas where active mining is taking place. The data from these gauges can be used to show the rate at which dust deposition levels decrease with distance from actively mined areas. There are also a number of gauges located further away from active mining which are representative of conditions near surrounding residences.

The data from the dust deposition gauges indicate that the surrounding area could accommodate an increment of annual dust deposition of 2 g/m^2/month without causing the EPA's 4 g/m^2/month criterion to be exceeded.

It should be noted that the data includes the effect of existing mining operations. Continued mining under the proposal is unlikely to result in a significant change in the data readings.

11.4 Climate and Meteorology

11.4.1 Dispersion Meteorology

The computer-based dispersion model ISCST3 was used in the Air Quality Study to assess the dispersion of PM. The model requires meteorological data on wind speed, wind direction, atmospheric stability class and mixed-layer height.

Data are available from a number of different meteorological stations, including a meteorological station operated by CNA adjacent to the HVCPP. Data from this station are representative of the area and data covering the 12 month period from 1 January 2002 to 31 December 2002 were used for the study. A total of 8,736 hours of data were available for this period. This corresponds to 99.7 % of the data potentially available in a year.

The data show a pattern of seasonal winds that is typical of central regions of the Hunter Valley, where winds are generally aligned along a north west to south east axis. In summer, winds are generally from the south east and in winter from the north west.

11.4.2 Temperature and Humidity

Temperature and humidity data for the local area were obtained from the Bureau of Meteorology's weather station operated at the Jerrys Plains Post Office, which has collected data since 1884 and thus provides a useful historical record over the longer term.

The data shows that January is the warmest month, experiencing a mean monthly maximum temperature of 31.7 °C and that July is the coolest month, experiencing a mean monthly minimum temperature of 3.7 °C.

Annual average relative humidity at 9.00 am and 3.00 pm is 69 % and 47 %, respectively.

11.4.3 Rainfall and Evaporation

Rainfall data was also obtained from the Bureau of Meteorology's weather station operated at the Jerrys Plains Post Office. The data indicates that the mean annual rainfall has been 640.2 mm. In terms of averages, January is the wettest month and August is the month with lowest average rainfall. Jerrys Plains records 86 rain days per year.

Evaporation data are available from the Bureau of Meteorology's *Climatic Atlas of Australia*. Evaporation rates for Singleton for January, April, July and October are approximately 225, 125, 75 and 175 mm, respectively. Evaporation is well above the expected rainfall amount for all the months of the year.

11.4.4 Mixing Height and Stability Class

Information on hourly mixing height and stability class are required as input to the dispersion model. Studies of the upper atmosphere around the Liddell Power Station have been undertaken on behalf of the Electricity Commission of NSW (now Pacific Power). However, no long-term direct measurements on mixing height are available for the area and theoretically derived values were used. The theoretical values were estimated by assuming that the maximum mixing height reached during the day was 1,500 m, 1,200 m, 1,000 m and 1,200 m for summer, autumn, winter and spring, respectively. At night theoretical values based on wind speed and stability were derived.

Stability class is used by dispersion models to determine the rate at which the plume grows by the process of turbulent mixing. Each stability class is associated with a dispersion curve, which is used by the model to calculate the plume dimension and dust concentration at points downwind of the source. For this study, the Pasquill-Gifford dispersion curves were used.

The frequency of occurrence of particular stability classes in the 2002 meteorological station data set from HVO, which was used in the dispersion model, is shown in Table 11.3.

Table 11.3 Frequency of Occurrence of Stability Classes

Stability	Frequency of occurrence
A	12.6 %
B	8.1 %
C	12.7 %
D	40.9 %
E	13.3 %
F	12.3 %

11.5 Modelling Scenarios

To enable potential air quality impacts to be assessed the expected life and progression of each pit was examined to produce a timetable that indicated when each pit would be operating.

Based on this timetable it was found that North Pit and the Alluvial Lands will cease coal extraction operations in 2003, however, overburden dumping will continue in the Alluvial Lands up until Year 8 of the proposal. Carrington will continue over a similar period and West Pit, which includes Mitchell Pit will operate for the full 21 years of the proposal with Mitchell Pit commencing operations in Year 14 of the proposal.

A total of six mine scenarios were then developed and modelled to cover all of these operations. The first five scenarios cover different years in the life of the proposal and the sixth provides an alternative scenario for Year 8 which includes operation at Carrington and dumping in the Alluvial Lands. This scenario is referred to as Year 8 (with Carrington). It is a conservative scenario as CNA anticipate that these activities will cease by this time.

The mine plans present worst-case scenarios for the West Pit extension. This allows a conservative assessment to be made of potential impacts the proposal will have on the area surrounding the mine. The years modelled are Year 1, Year 3, Year 8, Year 14 and Year 20, calculated from an approval date in the first quarter of 2004. Table 11.4 details the operations modelled in each scenario.

Table 11.4 Operations Modelled in Each Scenario

Proposal Year	West Pit	Carrington	Alluvial Lands Dumps
Year 1	✓	✓	✓
Year 3	✓	✓	✓
Year 8	✓		
Year 8 (with Carrington)	✓	✓	✓
Year 14	✓		
Year 20	✓		

11.6 Estimated Emissions

11.6.1 Pre-Amble

The computer model requires estimates of PM emission rates for each activity associated with the mining operation. Emissions from all sources of dust generation have been determined in accordance with emission factors developed in both Australia and the United States.

11.6.2 Operations at HVO and Surrounding Mines

The mining plans for Years 1, 3, 8, 14 and 20 have been analysed and detailed emissions inventories have been prepared for each of these years. The inventories include both estimated emissions from all operations at HVO north of the Hunter River and emissions from other nearby mines, namely Wambo, United Colliery, Ravensworth-Narama, and Riverview and Cheshunt Pits at HVO south of the Hunter River.

Appendix C of the Air Quality Study provides details as to how dust emissions from each dust producing activity have been calculated including the effect of dust controls and the assumptions that have been made in estimating these emissions.

For Carrington, estimates of dust emissions have been taken from the Carrington EIS (ERM, 1999). The estimates have been increased by the factor 10/6 to account for the fact that Carrington may produce up to 10 Mtpa ROM coal compared with the 6 Mtpa assumed in the Carrington EIS. Carrington emissions have been included in the model runs for Years 1 and 3. Two Year 8 models have been run, the first excludes mining at Carrington and the second Year 8 (with Carrington) includes Carrington to take into account the possibility that this pit may still be in operation at this time.

Because the emissions from Carrington have been taken from the EIS no detailed calculations of the emissions are presented in Appendix C of the Air Quality Study. However, estimated emissions due to hauling ROM coal from Carrington to HVCPP and emissions due to wind erosion have been calculated separately.

11.6.3 Estimated Emissions from other local Mines Not Included in Modelling

Other mines and sources, in addition to those identified above, will contribute to $PM_{2.5}$, PM_{10}, TSP concentrations and dust deposition. In the past, the annual average concentration of particulate matter contributed by these more distant sources has been set at 5 $\mu g/m^3$ for PM_{10}, 10 $\mu g/m^3$ for TSP and 0.5 g/m^2/month for deposited dust.

In the cumulative modelling work each neighbouring mine has been treated as three volume sources. These have been located at the apparent points of major emission as estimated from the known locations of the pits and or major dust sources on the mine or facility. Sources have been considered in three classes, including:

- wind erosion sources where emissions vary with the hourly average wind speed according to the cube of the wind speed;

- loading and dumping operations where emissions vary as wind speed raised to the power of 1.3; and
- all other sources where emissions are assumed to be independent of wind speed.

For neighbouring mines the proportions of emissions in each of these categories has been assumed to be the same as applies at HVO north of the Hunter River, namely:

- 0.732 for emissions independent of wind speed;
- 0.135 for emissions that depend on wind speed (such as loading and dumping); and
- 0.133 for wind erosion sources.

11.7 Assessment Methodology

11.7.1 Modelling Approach

The short-term industrial source complex model (ISC3-ST - Version 02035) has been used in this study. The model is an advanced Gaussian dispersion model accepted by the EPA for assessing the dispersion of dust. It is one of the most widely used regulatory models in the world.

The model uses the Gaussian dispersion equation to simulate the dispersion of a plume from either point area or volume sources. The model takes account of dry and wet deposition and includes algorithms to account for retention of dust within an open pit and includes mechanisms for determining the effect of terrain on plume dispersion. The model works on an hourly time step. This means that it requires a meteorological file that provides wind speed, wind direction and other dispersion parameters on an hourly basis. For each hour the dispersion of plumes is determined using the conventional Gaussian model assumptions. These model assumptions have some limitations and it is worth noting some of these at this point.

One of the most significant limitations of the Gaussian model is that it assumes that a steady state dispersion condition is reached instantaneously. That is, if one were to imagine that the plume is simulating for a particular hour, one would see each source of dust producing a plume that extends indefinitely in the downwind direction to the edge of the prediction grid. In reality, under very light wind conditions, this is an inappropriate assumption.

Consider for example a condition where the wind speed is 0.5 m/s. At the end of one hour any emission that occurred at the beginning of the hour will have travelled approximately 1.8 km from the source (0.5 m/s x 3,600 s). Thus, under these light wind conditions, the dust will have travelled 1.8 km from the source. The model assumes the dust will have travelled to the edge of the prediction grid that in this case may be up to 10 km from the source. In the next hour the meteorological conditions may remain the same or, more likely, the wind direction will change and the light wind condition may still persist. The model then assumes that a new equilibrium is established instantaneously and the plume travels in the new downwind direction at the new wind speed.

Because for surface sources the worst-case dispersion conditions are associated with light winds, the model has the potential to significantly overstate impacts at long distances downwind from the source. Since this problem leads to an overstatement of impacts rather than an understatement of impacts, this does not create a significant problem for environmental impact assessment. However, it should be borne in mind that there is a potential to overstate impacts at more distant receptors.

11.7.2 Assessing Worst Case 24 Hour PM_{10} Concentrations

The model also has the capacity to take into account emissions that vary in time, or with meteorological conditions. This has proved particularly useful for simulating emissions on mining operations where wind speed is an important factor in determining the rate at which dust is generated.

For the Air Quality Study, HVO north of the Hunter River was represented by a series of 68 volume sources depending on which year is being simulated. Each volume source was a combination of all dust emissions from activities in the general area. Estimates of emissions for each volume were developed on an hourly time step. Thus, for each source, for each hour, an emission rate was determined which depended upon the level of mining activity and the wind speed. It is important to do this in the model to ensure that long-term average emission rates are not combined with worst-case dispersion conditions which are associated with light winds. Light winds in a mining area correspond with periods of low dust generation (because wind erosion and other wind dependent emissions rates will be low) and also correspond with periods of poor dispersion. If these measures are not taken then the model has the potential to significantly overstate impacts.

A calibration study was undertaken by HAS as part of the Air Quality Study in the EIS for the proposed extension of Warkworth Coal Mine. This was done by comparing the predicted maximum 24 hour average PM_{10} concentrations in the period 1 November 2000 to 31 October 2001 at four surrounding monitoring stations (identified as HV1, HV2, Bulga and Lot 543). The maximum measured PM_{10} concentration at the Bulga monitoring site and the maximum measured TSP concentrations at all four sites over the same period were then determined by inspection of the monitoring data records. The TSP concentrations have been converted to equivalent PM_{10} concentrations assuming that PM_{10} constitutes 40 % of the TSP in this area. The results are shown in Table 11.5.

The average extent of over prediction was a factor of 2.6. That is, unadjusted model predictions appear to over predict 24 hour PM_{10} concentrations by 260 %. This factor was used to adjust the model predictions for the Air Quality Study for Warkworth downwards to obtain a calibrated prediction of the worst case 24 hour PM_{10} concentrations for all five years that were assessed. This same factor has been used for this assessment.

11.8 Assessment of Impacts Due to Dust Emissions

11.8.1 Annual Average PM_{10}, TSP and Dust Deposition

This section provides an interpretation of the predicted contours of dust concentration and deposition levels provided within the Air Quality Study. Simulations were undertaken for Years 1, 3, 8, 14 and 20. As previously discussed, a simulation of an alternative scenario for Year 8, which includes both Carrington and the Alluvial Lands dumps still in operation, was also undertaken.

For all simulations, isopleth diagrams have been produced showing the following predicted annual average:

- PM_{10} concentration;
- TSP concentration; and
- dust deposition.

An assessment of 24 hour PM_{10} concentration under unfavourable conditions is presented later in this section.

Figure 34 to Figure 36 in Volume 4 show the model predictions which, are expressed as envelopes that enclose the indicated contour levels for the entire operation. For example, the annual average PM_{10} envelope shows the maximum size of the area affected by concentrations of PM_{10} 30 μg/m^3 and higher over the life of the proposal. The Figures also show the location of private residences in the vicinity of HVO north of the Hunter River.

The results in Figures 34 to 36 in Volume 4 show the cumulative impacts of the proposed operations and other mining sources surrounding HVO north of the Hunter River as discussed above. Examination of these Figures indicates that no private properties that are not already within an existing zone of affectation are predicted to be affected by dust above the EPA amenity goals.

11.8.2 Worst Case 24 Hour PM_{10} Concentrations (Episodic Dust)

The Air Quality Study predicted maximum 24 hour average PM_{10} concentrations due to emissions from HVO north of the Hunter River alone. These figures have been developed by calibrating the computer to adjust the model predictions downwards by a factor of 2.6 to obtain a calibrated prediction of the worst-case 24 hour PM_{10} concentrations for all mining scenarios that have been assessed as discussed in Section 11.7.2.

When this is done it can be seen that no private residences, not already within a zone of affectation, are predicted to be affected by dust above the EPA amenity goals. Three private residences, Property Nos. 8, 9, and 10, are predicted to experience exceedances of the EPA's 50 μg/m^3 24 hour PM_{10} criterion in Year 1 due to proposed operations at HVO north of the Hunter River. These exceedances continue for Property Nos. 9 and 10 in both Year 3 and Year 8 (with Carrington). However, if operations at Carrington and the Alluvial Lands are complete by

Table 11.5 Comparison of Maximum Measured (or Inferred) and Maximum Predicted 24 Hour PM_{10} Concentrations (1 November 2000 to 31 October 2001)

Site	Maximum Predicted 24 Hour PM_{10} (μg/m^3)	Maximum Measured or Inferred 24 Hour PM_{10} (μg/m^3)	Ratio of Predicted to Measured Concentration
HV1	100	170 x 0.4 = 68	1.5
HV2	140	140 x 0.4 = 56	2.5
Bulga PM_{10}	160	44 (Direct Measurement)	3.6
Bulga TSP	160	102 x 0.4 = 41	3.9
Lot 543	95	138 x 0.4 = 55	1.7
Average			**2.6**

Source: HAS (2003)

Year 8, then no private properties experience exceedances due to HVO north of the Hunter River after Year 8. In addition, all of these properties are currently inside a zone of affectation or subject to a private land holders agreement.

11.8.3 Cumulative Dust Impacts

Cumulative dust impacts were assessed by assessing dust emissions from surrounding mines including Ravensworth-Narama, Wambo, United Colliery and HVO south of the Hunter River (Riverview and Cheshunt).

When taken cumulatively, Property No. 12 experiences exceedances of the US EPA cumulative PM_{10} criterion of 150 µg/m^3 24 hour over all years. Property No. 9 experiences exceedances in Years 3, and 8 (with Carrington) while Property No. 10 experiences exceedances in Year 8 (with Carrington) only.

The cumulative annual PM_{10} criterion, 30 µg/m^3, is exceeded at Property No. 12 over all years and at Property No. 9 for Years 1, 3, Year 8 (with Carrington) and Year 20. In addition, Property No. 12 experiences exceedances of the EPA criteria for cumulative TSP and cumulative dust deposition criteria over all years. In general, the contribution of HVO north of the Hunter River to these levels is small and the affected properties are currently inside a zone of affectation or subject to a private land holders agreement.

11.9 Greenhouse Issues

Coal mining results in the emission of CO_2 during the combustion of diesel fuel used in diesel powered equipment and in blasting and indirectly in the use of electricity to power mining equipment and operate the CPPs, loading points and conveyors. In addition, methane is released as coal is mined.

To estimate emissions from these sources, the electrical and fuel requirement for existing mining operations have been used to determine the energy required to mine each tonne of coal on the existing mine. These estimates have then been used to estimate CO_2 emission rates for future years.

The starting point for the estimates was data provided by CNA for HVO in 2002. These data showed that HVO used 51,196,989 L of diesel and 132,920,819 kWh of electrical energy to produce 16,974,760 t of ROM coal.

In converting the information to estimates of CO_2-e (CO_2 equivalent) emissions, it has been assumed that each kWh of electrical energy used results in the release of 0.904 kg of CO_2 (Australian Greenhouse Office, 2003) and that each litre of diesel fuel burnt results in the release of 2.7 kg of CO_2. In addition, it has been assumed that each tonne of ROM coal mined results in the release of 2.17 kg of methane and that methane has a greenhouse warming potential of 21. This means that each kilogram of methane, because of its lifetime in the atmosphere and its spectral absorption characteristics, is equivalent to 21 kg of CO_2.

CO_2 emissions from West Pit have been estimated for each year using the above emissions factors for the WPCPP and open cut. The mine will also produce CO_2 when the coal is used by the ultimate customers. This is not included in the above estimates. Over the lifetime of the mine, a total of 235,872,900 t of ROM coal will be mined. This will yield approximately 164,832,407 t of product coal (70 % recovery). On combustion, this will produce approximately 2.65 t of CO_2-e per tonne of coal burnt. That is, the total CO_2-e emission from West Pit over the 21 year life is 436,805,879 t of CO_2 equivalent or 20,800,280 t of CO_2-e per year on average. This can be compared with an average of 590,465 t of CO_2-e emission per year for mining and processing of the coal.

11.10 Mitigation Measures

Mitigation measures to reduce potential impacts from dust are outlined in CNAs EMS Procedure 8.1 (Dust Management CPP) and Procedure 8.2 (Air Quality – Mobile Equipment). The following mitigation measures generally form part of these procedures and are outlined below for the management of dust emissions from the mine. The aim of these measures is to minimise the emission of uncontrolled dust. Dust can be generated from two primary sources, these being wind blown dust from exposed areas and dust generated by mining activities.

Table 11.6 and Table 11.7, list the different sources of wind blown and mining generated dust respectively, and their recommended control procedures.

Monitoring of the operations will be used to demonstrate compliance with consent conditions and real time monitoring will allow the operation to pro-actively manage potential air quality impacts. The monitoring program will include high volume TSP monitors, PM_{10} monitors, dust deposition gauges and real time monitors to measure concentrations at residential receptors.

Table 11.6 Control Measures for Wind Blown Dust

Source	Control Procedures
Areas disturbed by mining	Disturb only the minimum area necessary for mining. Reshape, topsoil and rehabilitate completed overburden emplacement areas as soon as practicable after the completion of overburden tipping.
Coal handling areas	Maintain coal handling areas in a moist condition using water carts to minimise wind blown and traffic generated dust.
Coal product stockpiles	Maintain water sprays on raw and product coal stockpiles and use sprays to reduce the risk of airborne dust.

11.11 Temporary Hunter River Crossing

Earthworks associated with the construction of the temporary Hunter River crossing could generate dust emissions. These works will include the extraction, transport and placement of fill materials.

A water cart will be employed to control moisture content in the fill material, as it is being emplaced and compacted. Not only will this control dust emissions, but will also assist compaction of the material. A water cart will also be used to maintain all haulage routes and working areas in a damp condition, to minimise dust generation.

Air quality monitoring, for both dust deposition and suspended particulates will continue to be maintained via the existing network of deposit gauges and high volume air samplers.

Table 11.7 Control Measures for Mining Generated Dust Sources

Source	Control Procedures
Haul road dust	▪ All roads and trafficked areas will be watered using water carts to minimise the generation of dust. ▪ All haul roads will have edges clearly defined with marker posts or equivalent to control their locations, especially when crossing large overburden emplacement areas. ▪ Obsolete roads will be ripped and re-vegetated.
Minor roads	▪ Development of minor roads will be limited and the locations of these will be clearly defined. ▪ Minor roads used regularly for access will be watered. ▪ Obsolete roads will be, ripped and revegetated.
Topsoil stripping	▪ Access tracks used by topsoil stripping equipment during their loading and unloading cycle will be watered.
Topsoil stockpiling	▪ Long term topsoil stockpiles, not used for over 6 months will be revegetated.
Drilling	▪ Dust aprons will be lowered during drilling. ▪ Drills will be equipped with dust extraction cyclones, or water injection systems. ▪ Water injection or dust suppression sprays will be used when high levels of dust are being generated.
Blasting	▪ Adequate stemming will be used at all times. ▪ Blasting will not be undertaken when weather conditions will result in visible dust affecting private residential property or visibility on surrounding roads.
Raw coal bins	▪ Automatic sprays, or other dust control mechanisms will be used when tipping raw coal that generates excessive dust quantities.
CPPs	▪ All spillage of material will be cleaned up to prevent dust. ▪ Water sprays will be fitted at all transfer points.
Conveyors	▪ Conveyors will be covered on the top and the upwind side wherever possible. All spillages from conveyors will be cleaned up as soon as practicable.

11.12 Conclusion

The Air Quality Study undertaken by HAS examined the expected air quality impacts due to the proposed operations at HVO north of the Hunter River. Potential air quality impacts examined are those due to emissions of various classes of particulate matter (TSP, PM_{10} and deposition of insoluble solids).

The assessment of impacts focused on testing for compliance with annual average concentrations of PM_{10} and TSP and annual average dust (insoluble solids) deposition rates. This assessment has taken all mining operations expected to be active at the selected periods in the development of the mine into account as well as a background for all other sources that cannot be accounted for directly in the model.

It is concluded that all private residences surrounding HVO north of the Hunter River that are not currently inside a zone of affectation or subject to a private land holders agreement will experience dust levels below EPA amenity and health goals for the life of the proposed operations. Four residences that are currently inside a zone of affectation or subject to a private land holders agreement, including Property Nos. 8, 9, 10 and 12 are predicted to experience exceedances of the EPA's assessment criteria due to the proposed operations at HVO north of the Hunter River alone.

CHAPTER 12

noise and vibration

12 Noise and Vibration

12.1 Introduction

A comprehensive Noise and Vibration Study was prepared by ERM and is contained in Part J of Volume 3. The report encompassed all the relevant features of potential noise impact from the proposal including:

- an assessment of the existing noise environment;
- analysis of prevailing meteorological conditions to determine assessable conditions;
- description of applicable noise and vibration criteria;
- measurement of specific mine equipment noise levels;
- noise modelling for all assessable meteorological conditions;
- assessment of potential sleep disturbance impacts;
- cumulative noise effects with other local industry;
- potential for construction, road and rail traffic noise;
- assessment of noise and vibration from blasting; and
- noise management strategy.

This chapter forms a summary of the full noise report, briefly covering the method, results and conclusions of each analysis. A copy of the report is contained in Part J of Volume 3.

Technical terms used in this chapter are defined in the glossary contained in Part E of this EIS.

12.2 Existing Background and Ambient Noise

Unattended and attended monitoring was conducted at five locations chosen as representative of potentially affected private residences. The results of the monitoring are summarised in Table 12.1. Additionally, data from unattended monitoring measured for compliance purposes at four locations by WTS Environmental Laboratories Pty Ltd was re-analysed in accordance with the EPA's Industrial Noise Policy (INP) and is also presented below. The results are listed in Table 12.1.

12.2.1 Prevailing Weather Conditions

A comprehensive set of hourly weather data covering approximately four years, obtained from the weather station at HVO, was analysed. This was done in accordance with the procedures defined in the INP, and as otherwise advised by the EPA.

Temperature Inversions

The frequency of each stability class occurrence was calculated based on the aforementioned hourly data. Combining the atmospheric Stability Class F and G data indicates that occurrence of temperature inversions having potential to enhance noise propagation exceed the EPA's 30 % occurrence threshold for the night during autumn only. Hence a calculation for noise impact under the INP's suggested 3°C/100 m temperature inversion parameter is provided in noise modelling results.

Prevailing Winds

It is demonstrated in the noise study that the assessable gradient winds occur during evening and night time, and that daytime winds are not considered a feature of the area according to the INP.

Table 12.1 Summary of Measured Background Noise Levels

Location		Rating Background Level, dB(A)			Ambient Noise Level, $dB(A)L_{eq}$,period		
No.	**Name**	**Day**	**Evening**	**Night**	**Day**	**Evening**	**Night**
N1	1(1)	33	34	31	53	53	50
N2	7(1)	32	33	33	46	47	42
N3	8(2)	35	33	35	49	43	41
N4	2(1)	31	32	31	49	49	52
N5	10(3)	33	37	35	55	50	46
	9(1 and 4)	31	32	33	50	43	43
	Jerrys Plains Police Station(4)	32	32	32	44	45	46
	11(4)	34	33	33	51	50	47
	12(2 and 4)	39	32	40	49	49	50

Notes: (1) = Wind speed limit for daytime levels at these locations was 6 m/s
(2) = Wind speed limit for daytime levels at these locations was 7 m/s
(3) = Data a combination of ERM and WTS Environmental Laboratories measurements
(4) = Data from WTS Environmental Laboratories
Refer to Figure 24 in Volume 4 for monitoring locations.

Since the evening and night mine operations are the same, and the night time wind data set provides a more statistically valid analysis, the feature winds occurring during the night are used for noise assessment. The analyses also demonstrate that a combined gradient wind and temperature inversion occur significantly less than the EPA's 30 % threshold. Hence, a combined gradient wind and temperature inversion calculation was not produced.

12.3 Noise Criteria

12.3.1 Operational Noise Criteria

Based on the noise monitoring and the EPA's INP, project specific noise criteria were developed for 12 private residences (identified as Property Nos. 1 to 12) considered to be representative of all the most exposed locations around the proposal. The location of Property Nos. 1 to 12 can be seen in Figure 24 in Volume 4. This figure also shows the location of all other properties surrounding the proposal. All properties are private residences, however Property Nos. 7 through 12 are currently inside a zone of affectation or subject to a private land holders agreement.

The project specific noise criteria are shown in Table 12.2. Also shown in Table 12.2 are the potential acquisition limits for each representative location based on an 'existing background + 10 dB' approach that DIPNR have previously applied to similar operations.

12.3.2 Cumulative Noise

The cumulative impact of more than one development can be compared against the EPA's 'amenity' criteria. This is consistent with the INP's holistic approach to industrial noise.

12.3.3 Sleep Disturbance

In this case, the most stringent sleep disturbance criterion can be drawn from the EPA's Environmental Noise Control Manual (ENCM). The criterion uses a 'background + 15 dB' comparison against predicted $L_{1,1minute}$ noise levels. This criterion can be as low as 45 dB(A)L_1 at the quietest locations around HVO north of the Hunter River.

12.3.4 Blasting

The Australian and New Zealand Environment and Conservation Council (ANZECC) recommend the following limitations to minimise annoyance of blasting (these limitations apply where blasting is audible at noise sensitive locations):

- air blast overpressure should not exceed 115 dB(L_{peak}) for more than 5 % of the total number of blasts in a year;
- air blast overpressure should not exceed 120 dB(L_{peak}) at anytime;
- peak particle velocity for ground vibration should not exceed 5 mm/s for more than 5 % of the total number of blasts in a year;
- peak particle velocity for ground vibration should not exceed 10 mm/s at any time;

Table 12.2 Project Specific Noise Limits

Location	$L_{eq,15\ minute}$ Noise Level Criteria, dB(A)			Likely Night Time Mine L_{eq} Noise Acquisition Goal, dB(A)
Property No.	**Day**	**Evening**	**Night**	
1	38	39	36	41
2	36	37	36	41
3	36	37	36	41
4	36	37	36	41
5	36	36	36	41
6	36	36	36	41
7[2]	37	38	37	42
8[2]	40	38	38	43
9[1]	36	37	36	41
10[1]	38	42	38 / (37[3])	43
11[1]	39	38	38	43
12[1]	44	37	37	42

1. These private residences are currently inside a HVO zone of affectation or subject to a private land holders agreement.
2. These private residences are currently inside a zone of affectation or subject to a private land holders agreement with mines other than HVO.
3. This level is an $L_{eq,9hour}$ amenity target.

- no blasting on Sundays or public holidays; and
- blasting should be avoided during temperature inversion conditions.

CNA have consulted with the rural communities surrounding their operations and have found that generally the community support more flexibility in blast times. These communities are more reactive to dust from blasting and would prefer blasting to be undertaken earlier or later in the day where wind conditions are more suitable and less likely to carry dust.

The guidelines recommend that except for minor blasts such as for clearing of crushers and feed chutes, blasting should generally be limited to once per day. Blasting at West Pit will occur more often, as it has previously, with no limiting consequences as it is well removed from private residences. Other mining operations' blast schedules covered within the proposal (eg Carrington) will remain unchanged.

The guidelines recommend that when a temperature inversion is known to exist, blasting should be avoided if practical. These restrictions do not apply where the effects of blasting are not perceived at noise sensitive locations.

Under this proposal blasting operations at HVO will continue to be undertaken between the hours of 7:00 am to 6:00 pm. Monday to Saturday inclusive with no blasting undertaken on Sundays and public holidays. Across the operation several blasts may take place on any one day.

In addition to the above criteria, general best practice procedures can be used to effectively minimise noise impacts.

12.4 Noise Modelling

12.4.1 Calculation Procedures

The Environmental Noise Model (ENM) noise prediction software was used for modelling purposes. ENM takes into account distance, ground effect, atmospheric absorption and topographic detail. ENM is an EPA accepted noise prediction model as it gives consistently reliable predictions of environmental noise.

Initial calculations were performed with no wind or temperature gradients, which are termed still iso-thermal (SI) or calm conditions. Assumed night time air temperature and relative humidity were 10 °C and 80 % respectively. Calculations were then performed under assessable meteorological conditions determined in accordance with the EPA's INP.

The model incorporates three dimensional digitised ground contours for the surrounding land and mine plans. Contours of the mine and overburden emplacement areas for each project stage were superimposed on surrounding base topography.

The noise model calculated L_{eq} noise levels, assuming all plant and equipment operate simultaneously and at full power. In practice, such an operating scenario would be unlikely to occur. The results are therefore considered conservative.

12.4.2 Modelling Scenarios

To enable potential noise impacts to be assessed, the expected life and progression of each mine was examined to produce a timetable that indicated when mines would be operating concurrently or alone. Based on this timetable a total of five mine scenarios were then developed and modelled to cover all of these operations. The first five scenarios cover different years in the life of the proposal and the sixth provides an alternative scenario for Year 8 which includes both Carrington and the Alluvial Lands dumps still in operation. This is a highly unlikely and therefore conservative scenario as CNA anticipate that these activities are likely to cease by this time.

The mine plans in Figures 7 through 11 of Volume 4 present worst-case scenarios for the proposal. This allows a conservative assessment to be made of potential impacts the proposal will have on the area surrounding the mine. The years modelled are Year 1, Year 3, Year 8, Year 14 and Year 20, calculated from an approval date in the first quarter of 2004.

12.4.3 Plant Noise Levels

A comprehensive noise measurement procedure was used to obtain noise emission data for both fixed and mobile equipment specific to the proposal. All or most mobile plant modelled as part of this assessment were measured in operation at HVO north of the Hunter River early in 2003. The results of the measurements were used in the modelling.

12.4.4 Noise Sources

Equipment was placed at various locations and heights, representing realistic operating conditions throughout the life of the mine. These locations were chosen to represent operations for that period and represent typical worst case schedules and activities. A summary of equipment and activities is shown in Table 12.3.

Table 12.3 Noise Sources

Area	Noise Sources
Mine	Drills, rope shovels, front-end loaders, trucks, dozers, graders, dragline, pumps and generators for lighting sets
Overburden and reject emplacements and haul roads	Trucks, dozers, graders and generators for lighting sets
Coal transportation	Trucks and graders on mine haul roads to CPPs and loading points. Conveyors from HVCPP to HVLP, WPCPP to Bayswater Power Station, HVO south of the Hunter River to HVCPP, and HVLP to NLP

12.4.5 Results And Discussion

The results of the modelling for operational noise under SI weather conditions and INP weather conditions are discussed below and summarised in Table 12.4. This table also includes the criteria for intrusiveness and amenity as well as acquisition limits for each property.

Operational Noise – SI Weather Conditions

For private residences not inside a zone of affectation or subject to a private land holders agreement (Property Nos. 1 to 6), the highest modelled noise level corresponds to Year 8 of the proposal. This is where equipment numbers are highest at West Pit and Carrington, with the main contributor being Carrington.

It is clear from Table 12.4 that daytime and night-time mine operations will satisfy EPA noise goals during calm weather conditions at all private residences not inside a zone of affectation or subject to a private land holders agreement. Of the private residences currently inside a zone of affectation or subject to a private land holders agreement, modelled noise levels at Property Nos. 9, 10 and 12 are predicted to exceed EPA goals.

Year 1 operations are similar to current activities. The results demonstrate that only marginal (less than 3 dB) increases are likely for assessed locations and generally these increases are not perceptible (less than 2 dB). This is evident when comparing Year 1 results with those of subsequent years.

The calculations demonstrated that there was no difference in noise between day and night (and evening) operations. This is not unexpected as the equipment fleet is similar in all these operating periods (generally only lighting plant are excluded from daytime operations).

Noise contours demonstrating the worst case SI noise levels over the life of the project are shown in Figure 37 of Volume 4.

Operational Noise – INP Weather Conditions

Intrusiveness Noise

For private residences Table 12.4 indicates that noise levels for INP winds will generally be within or marginally (up to 3 dB) higher than the EPA's intrusiveness goal (which is as low as 36 dB(A) depending on the location's background noise). The exceptions are private residences in the vicinity of Property Nos. 1 and 4 where winds cause enhanced noise for these locations during mining operations early in the mine plan (for Property No. 1) and late (for Property No. 4) in the mine plan.

Contours demonstrating the combined (all years) INP weather affected worst case noise levels over the life of the project for the region are shown in Figure 38 of Volume 4. A comparison between wind affected and the SI model results demonstrate that an increase of up to 23 dB is expected for these properties under weather enhanced conditions. The highest difference between calm and adverse weather is predicted for Jerrys Plains residences during later mine operations. This is attributed to the ridge that exists between the mining areas and these residences. Previous field validation by ERM of the ENM software results, has demonstrated that ENM can over predict noise levels by at least 3 dB under wind enhanced conditions. Where significant topography exists such as the aforementioned ridge, the ENM over-predictions are likely to be more significant than 3 dB. In practice, an increase of 23 dB above calm weather conditions for Jerrys Plains is considered unlikely. Additionally, the modelling assumes simultaneous operation of all equipment, which adds to the modelling conservatism.

The background noise at properties is also expected to rise during such adverse wind conditions due to, for example, vegetation or other industrial activities. These will assist in masking noise from the proposal.

Noise Amenity

Table 12.4 shows that Property Nos. 7 through 12 are predicted to receive noise levels above the project specific amenity target under weather enhanced conditions, however for Property Nos. 7 and 11, the exceedances are marginal and generally not perceptible (that is they are 2 dB or less). Taking into account the expected 3 dB difference between $L_{eq,15\ minute}$ and $L_{eq,night}$ (9 hours) which results from typical equipment downtime for normal staff breaks and maintenance, these predicted noise levels are reduced to within the amenity target for all private residences. Private residences currently inside a zone of affectation or subject to a private land holders agreement are predicted to receive noise levels above the project specific amenity targets.

Table 12.4 Predicted $L_{eq,15\ minute}$ Noise Levels dB(A)

Location	SI Meteorology Da Evening and Night Time						INP Weather Evening and Night						Intrusiveness Criteria, dB(A)		Amenity Criterion (Night)	Potential Acquisition Limit
Year	**1**	**3**	**8(4)**		**14**	**20**	**1**	**3**	**8(4)**		**14**	**20**	**Day**	**Night**		
Property No.			**A**	**B**					**A**	**B**						
1	18	17	19	17	18	18	38	37	38	35	38	41	38	36	40	41
2	21	21	22	18	19	19	38	38	39	34	36	38	36	36	40	41
3	22	22	22	18	19	19	38	38	39	34	36	37	36	36	40	41
4	26	26	27	21	21	21	40	40	41	34	34	35	36	36	40	41
5	19	19	20	19	18	18	29	29	30	28	27	27	36	36	40	41
6	17	17	19	18	16	16	29	29	30	27	26	27	36	36	40	41
7[2]	31	31	31	29	29	29	40	40	40	36	36	37	37	37	38	42
8[2]	36	36	37	34	34	34	**46**	**46**	**46**	42	42	42	40	38	38	43
9[1]	44	44	44	30	37	37	**54**	**54**	**54**	40	42	**46**	36	36	40	41
10[1]	39	39	39	30	36	36	**48**	**48**	**48**	39	40	42	38	38	40	43
11[1]	27	27	27	22	24	24	39	39	39	34	35	35	39	38	37	43
12[1]	42	42	42	40	40	40	**53**	**53**	**53**	**52**	**52**	**52**	44	37	40	42
13[3]	–	–	–	–	–	–	–	–	–	–	–	41	38	36	40	41
14[3]	–	–	–	–	–	–	–	–	–	–	–	41	38	36	40	41

1. These private residences are currently inside a HVO zone of affectation or subject to a private land holders agreement.
2. These private residences are currently inside a zone of affectation or subject to a private land holders agreement with mines other than HVO.
3. Additional Jerrys Plains Assessment locations were added for Year 20 as noise contours extended further west than other years.
4. Scenario 8A includes Carrington Mine and Alluvial Lands while Scenario 8B is the likely scenario for that year.

Bold numbers indicate exceedance of possible acquisition goals

Assessing the weather affected noise predictions shown in Table 12.4 against corresponding night time acquisition shows that all private residences that are not inside a zone of affectation or subject to a private land holders agreement are at or below this level. Of the properties that are currently inside a zone of affectation or subject to a private land holders agreement, Property Nos. 8, 9, 10 and 12 are predicted to exceed likely noise acquisition targets.

It should be noted that Property No. 4 is representative of dwellings situated on localised elevated ground. The noise contours do not reflect the Year 8 tabulated result at this location for this reason.

12.5 Sleep Disturbance

There is a potential for sleep of residents to be disturbed by transient noise such as shovel gates banging, bulldozer track plates, truck engine revving and vehicle reversing alarms.

Maximum noise levels were calculated under INP wind conditions for each location and each operational scenario. Table 12.5 shows calculated maximum noise levels from the highest ranked source for a given residence. This is based on the typical equipment locations used for mining operations and corresponds to the maximum sound power level for the particular item of plant (generally that for a truck or 125 dB(A) L_{max}). Calculations were for a single event, rather than the simultaneous operation of a number of plant items because the values given are instantaneous maxima and such events are not expected simultaneously.

Table 12.5 demonstrates that calculated noise levels under prevailing weather conditions are within the EPA's conservative sleep disturbance criterion at all private residences. Property Nos. 9 and 12 are likely to experience noise levels above the EPA's sleep disturbance goal. For Property No. 9, this is attributed to operations at Carrington, and for Property No. 12, this is associated with truck haulage operations.

12.6 Cumulative Noise Assessment

Adjoining industrial activity also influences the noise climate at residences potentially exposed to the proposal. However, for most residences this is limited as the proposal constitutes the main contributor of industrial noise. Other industrial operations of significance are Riverview and Cheshunt Pits, Wambo, Ravensworth-Narama and Ashton Coal Mine.

Noise from surrounding mines was sourced from the following documents:

- an EIS produced by Resource Strategies Pty Limited in June 2003 for the Wambo Development Project;
- an SEE produced by ERM Australia Pty Limited in November 2001 for a Section 96(2) modification of development consent at HVO;
- an EIS produced by ERM Mitchell McCotter in August 1997 for the extension of mining operations at Ravensworth-Narama; and
- an EIS produced by HLA-Envirosciences Pty Limited in November 2001 for the Ashton Coal Project.

Table 12.5 Sleep Disturbance Impact – INP Wind

Location	External L_{max} Noise Level From On-Site Plant, dB(A)					$L_{1,1minute}$ Criteria, dB(A)
Property No.	Year 1	Year 3	Year 8	Year 14	Year 20	
1	34	35	35	33	39	46
2	36	36	36	33	37	46
3	37	36	36	32	34	46
4	35	35	35	34	34	46
5	28	28	28	28	28	46
6	28	28	28	27	27	46
7[2]	40	40	40	40	40	47
8[2]	46	46	46	46	46	48
9[1]	**51**	**49**	**49**	43	41	46
10[1]	46	47	43	37	37	48
11[1]	39	39	39	34	34	48
12[1]	**60**	**60**	**60**	**60**	**60**	47

1. These private residences are currently inside a HVO zone of affectation or subject to a private land holders agreement.
2. These private residences are currently inside a zone of affectation or subject to a private land holders agreement with mines other than HVO.
Bold numbers indicate exceedance of possible acquisition goals.

The aforementioned documents provide predicted L_{10} or L_{eq} noise levels for calm and adverse weather, however, the weather analysis methods and assessment techniques varied. The total calculated noise level from all industry under weather enhanced conditions is presented along with the percentage contribution from the proposal.

Applying the night time cumulative noise criterion equivalent to the EPA's night time amenity goal of 40 dB(A) $L_{eq,9hour}$, shows that all private residences will be within or marginally (not more than 3 dB) above the EPA's amenity goal. As discussed in the noise study, the predictions above are based on a worst case $L_{eq,15minute}$ noise level from each operation. Adopting a conservative 3 dB correction that is expected between the predicted worst case $L_{eq,15minute}$ and $L_{eq,9hour}$ noise level, implies that noise levels at all private residences are predicted to be below the EPA's amenity goal. This correction is due to the inherent downtime of plant over the 9 hour night-time period as compared with a worst case 15 minute noise emission level. It should be noted that this 3 dB intrusiveness to amenity correction has not been applied to any results.

Private residences predicted to experience cumulative noise above the EPA criterion are Property Nos. 8 to 12. As previously noted, these private residences are currently inside a zone of affectation or subject to a private land holders agreement.

12.7 Other Noise Emissions

12.7.1 Construction Activities

There will be no significant construction activities that are likely to add to received noise levels at private residences.

12.7.2 Road Traffic Noise

The existing staff numbers and shift times are not expected to change significantly as a result of the proposal. The traffic assessment presented in Chapter 15 indicates an increase of between 0.9 % and 11.9 % in daily staff traffic volumes. In noise terms this equates to an increase up to 0.5 dB. Such an increase will not be perceptible in practice. Hence no road traffic noise impact is anticipated.

12.7.3 Rail Traffic Noise

The proposal will not result in any net increase in rail traffic, on the main northern railway line, over and above that which is currently approved. When coal production rates increase at one CPP, it will reduce equally at another. This will essentially result in a balance of coal related rail traffic operations, with no net change anticipated. The increase sought in throughput for the HVCPP will not exceed current loading consent conditions.

Table 12.6 Cumulative Night-time L_{eq} Noise Levels at Properties

Property No.	Proposal Year				
	Year 1	Year 3	Year 8 (4)	Year 14	Year 20
	L_{eq} Cumulative Noise Level (Proposal contribution), dB(A)				
1	39 (79 %)	38 (79 %)	39 (79 %)	39 (79 %)	41 (95 %)
2	40 (63 %)	40 (63 %)	40 (79 %)	39 (50 %)	39 (79 %)
3	40 (63 %)	40 (63 %)	41 (63 %)	39 (50 %)	39 (60 %)
4	42 (63 %)	43 (50 %)	43 (63 %)	39 (32 %)	40 (28 %)
5	40 (8 %)	41 (6 %)	40 (10 %)	38 (8 %)	38 (9 %)
6	40 (8 %)	41 (6 %)	40 (10 %)	37 (8 %)	37 (9 %)
7[2]	43 (50 %)	43 (50 %)	42 (63 %)	37 (79 %)	39 (56 %)
8[2]	**48 (63 %)**	**48 (63 %)**	**48 (63 %)**	43 (79 %)	**46 (43 %)**
9[1]	**54 (100 %)**	**54 (100 %)**	**54 (100 %)**	43 (79 %)	**47 (76 %)**
10[1]	**48 (100 %)**	**48 (100 %)**	**48 (100 %)**	42 (63 %)	44 (62 %)
11[1]	43 (40 %)	**45 (25 %)**	42 (50 %)	40 (32 %)	40 (30 %)
12[1]	**57 (40 %)**	**56 (50 %)**	**54 (79 %)**	**52 (100 %)**	**52 (98 %)**

1. These private residences are currently inside a HVO zone of affectation or subject to a private land holders agreement.
2. These private residences are currently inside a zone of affectation or subject to a private land holders agreement with mines other than HVO.

The Year 8 results assume Carrington and Alluvial Lands are operating.

Numbers in bold indicates levels above EPA night amenity goals (applying an expected minimum 3 dB correction for $L_{eq,15\ minute}$ vs $L_{eq,9\ hour}$ noise levels)

12.8 Blasting Noise and Vibration

The proposal has two mining areas where blasting will occur. These are Carrington and West Pit. The Carrington Mine EIS prepared by ERM Mitchell McCotter Pty Ltd in May 1999 provides a detailed noise and vibration assessment for blasts within Carrington. The assessment concludes that no blast overpressure and vibration exceedances are likely for any residence other than Property No. 9. This was demonstrated using formulae derived from site specific data obtained from various Hunter Valley mines, including a validation of data collected at Carrington. The blast operations within Carrington will not change due to the proposal, and hence the 1999 EIS assessment remains valid.

In respect of the West Pit extension, new blast areas are proposed. A schedule of blast locations for each mining stage was provided to ERM by CNA. The minimum separation distance between such blast locations and assessment locations are summarised in the noise study. The closest and therefore potentially most affected residence to such blast locations is Property No. 9, which is approximately 1.8 km away from potential blasts in the latter most stages of the Proposal (ie, Mitchell Pit blasts in Year 20).

The blast design, and hence corresponding air blast overpressure and ground vibration, is within the control of operators. The site's existing blast management strategy will be used to ensure appropriate charge masses are used for blasting. The relationship between charge masses (or maximum instantaneous charge, MIC) and noise overpressure and ground vibration with distance are demonstrated in Table 6.2 of the noise study. These were derived from 95 % formulae in publications for monitoring data collected at similar mines in the area.

The highest MIC that could be used at West Pit extension is unlikely to exceed approximately 3,000 kg. Given that most residences are more than 3 km from blast locations, blast ground vibration impacts from West Pit extension are unlikely. The exceptions are Property Nos. 9 and 10 where blast activities proposed for the latter stages of mining in the south western most areas of West Pit (formerly Mitchell Pit) may be closer. This is demonstrated in mining footprints for Year 14 and Year 20. In terms of blast overpressure noise, if 3,000 kg MIC is used, the formulae suggest most residences are unlikely to experience impacts. The exceptions again are Properties Nos. 9 and 10, during the latter stages of operations in the Mitchell Pit. For blasts closest to Property Nos. 9 and 10 (for example, blasting in the Mitchell Pit in Year 14 and beyond), a lower MIC should be deployed and monitored at these locations.

Blasting will occur between the hours of 7.00 am to 6.00 pm. This will provide the mine with flexibility to blast during meteorological conditions that will result in the least impact on its neighbours. Typically, the proposal will be conducting blasting operations more than once a day. All blasts will be monitored for overpressure noise and ground vibration at several locations.

12.9 Noise Management

In addition to the mitigation described earlier, a detailed noise management plan (including monitoring program) that exists for HVO north of the Hunter River will be used to reduce impacts further. Features of the noise monitoring plan include the need for attended as well as unattended monitoring in specified locations and operating conditions.

Permanent real time noise monitors are to be established at locations surrounding HVO north of the Hunter River. These monitors will consist of either directional or non-directional real time noise monitors. All stations have frequency filtering capabilities to enable mine related noise to be identified from other background noise sources such as insects.

The establishment of real time noise monitors will provide accurate and reliable noise data to key personnel instantaneously. This will be a proactive management tool that will allow ameliorative measures to be undertaken to prevent the occurrence of potential noise impacts.

12.10 Conclusion

The noise and vibration study considers the potential noise impacts of the proposal, which incorporates all of HVO north of the Hunter River. The acoustic assessment includes modelling of all major mining equipment at representative operational locations.

The noise modelling has shown that under SI or calm weather conditions all private residences not currently within a zone of affectation experience noise levels below the EPA's noise goals. Of the private residences currently inside a zone of affectation or subject to a private land holders agreement, Property Nos. 9, 10 and 12 are predicted to exceed EPA goals.

The model has also shown that under worst case INP derived weather conditions, noise at most properties is below or marginally (less than 3 dB) above EPA noise goals that have been historically applied for calm weather. The exceptions are private residences in the vicinity of Property No. 4 and Jerrys Plains where winds may cause enhanced noise for these locations. However, the proposal's noise impacts at all these locations are predicted to remain similar to existing levels for the life of the proposal.

A comparison against possible acquisition limits imposed on similar mining operations indicates exceedances at four private residences currently inside a zone of affectation or subject to a private land holders agreement. These are Property Nos. 8, 9, 10 and 12. Again, mining noise at these locations is predicted to remain relatively unchanged compared to existing levels.

Blast design will incorporate control on the MIC (maximum instantaneous charge) as described in the noise study to ensure acceptable limits are maintained. This will also be addressed through monitoring.

On going noise monitoring will be used to assess the performance of the mining operations against the predicted noise levels.

CHAPTER 13

aboriginal heritage - archaeology and social values

13 Aboriginal Heritage – Archaeology and Social Values

13.1 Introduction

This chapter provides a summary of an Aboriginal archaeological assessment prepared by AMBS and the Aboriginal social values assessment prepared by AASC. This study is an assessment of the archaeological resources and cultural significance within the West Pit extension area and describes the impact of extending mining into this area. The chapter also provides an overview of other archaeological assessments previously undertaken within existing consent areas for HVO north of the Hunter River (ie. areas with existing development consent). This overview is provided for the purpose of consolidating the existing consents for HVO north of the Hunter River.

The summary of the AMBS report includes background information relevant to the archaeological survey of the West Pit extension area, the survey methodology employed by AMBS, survey results, and management recommendations. The overview of archaeology within existing consent areas for HVO north of the Hunter River includes a review of previous archaeological assessments undertaken in these areas and presentation and analysis of site information maintained in CNA's cultural heritage database.

Together the summary of the AMBS assessment of the West Pit extension area and the overview of the archaeology in the existing consent areas for HVO north of the Hunter River provides details of all known archaeological resources likely to be impacted by mining activities. Impacts essentially relate to the continuation of mining at West Pit and Carrington. Proposed mitigation measures and management strategies for archaeological resources within the area of consolidated consents are outlined.

13.2 West Pit

An archaeological assessment of the West Pit extension area was undertaken by AMBS. This section summarises the AMBS report. A copy of the report is contained in Part L of Volume 3. Note that the area considered in the archaeological assessment was the land within EL 5343 north of Lemington Road and ML 1406 as shown in Figure 25 of Volume 4. The part of the extension area covering portions of ML 1428 and CML 4 was not assessed as it is within existing consent boundaries and had been intensively surveyed and studied in the past (Brayshaw 1989; ERM Mitchell McCotter 1996; AMBS 2000, 2001; details provided in Section 13.3 and 13.4).

13.2.1 Aboriginal Consultation

The Aboriginal community were consulted initially during the archaeological assessment and subsequently through a social values assessment study undertaken by AASC. A copy of this report is contained in Part K of Volume 3.

The following Aboriginal community groups were consulted during the archaeological assessment:

- Wonnarua Nation Aboriginal Corporation (WNAC);
- Upper Hunter Wonnarua Council (UHWC);
- Lower Wonnarua Tribal Council – consulted before the name change (LWTC);
- Wanaruah Local Aboriginal Land Council (WLALC); and
- Ungooroo Aboriginal Corporation (UAC).

An archaeological planning session (or workshop) was organised by CNA prior to the archaeological survey to which all of the above groups were invited to send a representative. The workshop provided the opportunity for CNA to present details of the proposed development, and for community groups to give feedback on the proposed archaeological survey strategy. Representatives from each group, with the exception of LWTC, attended the workshop. Representatives from all groups participated in the archaeological survey.

Further consultation with Aboriginal community groups was undertaken by AASC for the purpose of assessing social values of the West Pit extension area to the Aboriginal community. The following groups were consulted as part of the social values assessment:

- WNAC;
- UHWC;
- Lower Wonnarua Tribal Consultancy Pty Limited (formed subsequent to the archaeological survey by some members of the LWTC and headed by Barry Anderson);
- WLALC;
- Combined Council Hunter Valley Aboriginal Corporation (CCHVAC);
- UAC; and
- Lower Hunter Wonnarua Council (LHWC), previously known as the LWTC.

These Aboriginal community groups were consulted for the express purpose of identifying Aboriginal social values (which may also be referred to as Aboriginal cultural values) within the West Pit extension area and to assess whether the proposed development may impact those values. The consultation comprised an extensive series of meetings, site visits and discussions followed by documentation of community views. The format of meetings and reporting followed protocols established between the consultant and the Aboriginal stakeholder groups at the outset of the project. As a result a series of values were defined through documentation of key statements made by representatives from the Aboriginal organisations consulted.

Efforts were made to identify other relevant organisations and Aboriginal persons who should be consulted in regard to the social values assessment. Mrs Margaret Foot was identified as a senior Wonnarua elder to be consulted through this process. Mrs Foot was contacted and participated in the social values study and confirmed an affiliation with the WNAC. Mrs Foot advised that although she was setting up a corporation called the Wonnarua Custodians, it was not registered at the time of the consultations.

13.2.2 Previous Archaeological Assessments

A number of previous archaeological investigations have been undertaken on, or have included parts of, the West Pit extension area. Dyall (1979) recorded three sites along Emu Creek, two of which are probably located on or very near to the extension area (AMG coordinates provided by NPWS are not precise). Dyall collected all surface artefacts at these sites (a total of 189). HLA Envirosciences (1996) conducted a survey at Cumnock No. 1 Colliery, which covered a portion of the extension area. Two sites recorded in the north of the extension area were recorded during this survey: CUM 1, a small artefact scatter, and CUM 3 an isolated artefact. ERM (Webber 1999) conducted an inspection of the extension area in order to identify potential archaeological issues associated with the mine extension. Four previously unrecorded sites were located during this inspection: two isolated artefacts, a small scatter of two artefacts and a 'possible' scarred tree.

In light of these investigations and other previous archaeological assessments in the wider region (some of which are discussed in more detail in Section 13.3) an archaeological model was developed. The model is framed in terms of landscape use and describes a forager settlement pattern where creek valley floors formed the focus of residential base occupation and slopes and ridge lines, and other less amenable areas, the sites of resource gathering or activity locations. The model predicts evidence for long-term domestic activities will occur along creek lines and evidence of short-term activity locations will occur on slopes or along ridgelines.

13.2.3 Archaeological Survey Methodology

Prior to the archaeological survey a geomorphological investigation of the study area was undertaken. This investigation was designed to divide the study area into different landform zones deemed likely to have different archaeological patterns and to identify areas of archaeological potential (including areas which may have stratified deposit or provide information about occupation during the late Pleistocene or early Holocene). Division of the study area into landform zones provided the basis for developing the archaeological survey strategy.

The geomorphological investigation identified four landform zones: main creek valleys, tributary creeks, valley side slopes and ridges. The study area was then further divided into survey areas each corresponding to one of these zones. All survey areas were surveyed on foot (pedestrian survey). Survey areas on valley side slopes were also inspected from slow moving 4WD vehicles (vehicular survey). Survey coverage in areas in main creek valleys, tributary creeks and ridge crests was 100 %. Pedestrian survey coverage on valley side slopes was approximately 50 %. Vehicular survey of the valley side slopes ensured that all areas of exposure (see definition below) were inspected and increased the survey coverage of this landform zone to 100 %.

Effective survey coverage was calculated following the NPWS *Aboriginal Cultural Heritage Standards and Guidelines Kit*. This value provides a measure of the 'detectability' of the potential archaeological material over an area. Definitions used for visibility and exposure are provided below:

- visibility - the proportion of bare ground that might reveal artefacts (ie. ground not obscured by grass cover, leaf litter or other vegetation or sediment) within a surveyed area; and
- exposure - areas in which the topsoil has been eroded or removed to reveal the subsoil or bedrock (an area of exposure may have some intact subsoil within it, however some subsoil or bedrock must be visible).

All areas of exposure were recorded, whether they contained artefacts or not.

The locations of all artefacts, or artefact concentrations, were recorded as Aboriginal object locations. These locations were grouped into sites based on the survey area (and therefore the landform zone) in which they occur. This approach is consistent with the study's aim of investigating variation between assemblages at a large scale, which may correspond to general patterns of landscape use.

13.2.4 Archaeological Survey Results

The geomorphological investigation divided the study area into four landform zones:

- main creek valleys;
- tributary creeks;
- valley side slopes; and
- ridges.

During the survey a further distinction was made between different valley side slopes, including slopes facing major creeks and slopes facing minor tributaries. The investigation also assessed the soil profile across most of the landform zones as relatively shallow. On ridge crests and valley side slopes the thickness of soils which might contain archaeological material is generally less than 50 mm. Along creek lines and tributary creek lines the A unit of duplex soils are commonly between 50 mm and 150 mm. The potential of soils to contain stratified/dateable sites was assessed to be negligible.

The archaeological survey achieved 100 % coverage of the study area with an effective coverage of 1.7 % (Table 13.1).

Table 13.1 Survey Coverage

Landform zone	Area Surveyed (m^2)	Effective Coverage* (m^2)	Proportion of Area Effectively Covered (%)
Main creek valleys	213,260	15,075	7.1
Tributaries	331,720	9,709	2.9
Slopes facing major creeks	450,730	4,577	1.0
Slopes facing minor creeks	1,007,556	6,559	0.7
Ridge crests	363,980	3,109	0.9
TOTAL	**2,367,246**	**39,029**	**1.6**

Source: AMBS (2003)
* calculated in accordance with NPWS guidelines

Thirty six locations of Aboriginal objects were located during the survey and defined within 11 sites. Brief descriptions of each site (taken from the AMBS report) are provided below. Summary details of artefacts are provided in Tables 13.2 and 13.3. Complete site descriptions, including location and details of all artefacts recorded, can be found in the AMBS report, Part L of Volume 3.

WPE 1

This site is an artefact scatter extending along Farrells Creek where this creek passes through the study area. The site area is approximately 9 ha. The site has been disturbed by gully erosion and erosion associated with the creek, by dam construction in the east and west of the site, and by cattle erosion.

A total of 437 artefacts were recorded. Artefacts include flakes, cores, retouched flakes (including backed artefacts and a thumbnail scraper) and an edge ground axe. The predominant raw materials at this site were identified as mudstone (67 %) and silcrete (25 %). A wide variety of less common raw materials was also identified.

Most artefacts are concentrated around the periphery of the western dam and in an area south west of this dam, however artefacts occur in all areas of exposure. A number of knapping floors within the site were identified (defined as concentrations of artefacts derived from the same material/core(s), at least some of which can be refitted/conjoined).

Unit A of duplex soils at the site is relatively shallow, approximately 50 mm to 100 mm in depth. The potential for artefact concentrations to occur within Unit A of these soils is high. Artefact densities are likely to be greatest near the western dam.

WPE 2

This site is an artefact scatter extending along Emu Creek where this creek passes through the study area. The site area is approximately 12 ha. The scatter continues to the west of the study area boundary and presumably east of the Belt Line Road. The site has been disturbed by gully erosion and erosion associated with the creek, by dam construction, and cattle erosion.

Artefacts occur in all exposures along the creek. A dam wall and a mound to the north east of the wall, probably made during dam construction, was recorded as a single large exposure. These features were almost certainly made with the creek line deposit (from the area where the dam is located) therefore artefacts recorded here may have been displaced up to 200 m.

A total of 410 artefacts was recorded. Artefacts include flakes, cores, retouched flakes, and two flaked axes or choppers. The predominant raw materials at this site were identified as mudstone (67 %) and silcrete (22 %). A wide variety of less common raw materials was also identified. Unit A of duplex soils at the site is relatively shallow, approximately 100 mm to 150 mm in depth. The potential for artefact concentrations to occur within Unit A of these soils is high.

WPE 3

This site is a sparse artefact scatter located on tributary of Farrells Creek over an area of approximately 5 ha. Most artefacts recorded (18 of 19) occur in a relatively small area near Emu Creek.

Artefacts include flakes and retouched flakes. A large mudstone core at this site has been ground along one edge. There is some potential for artefacts to occur within the Unit A of duplex soils (which is less than 50 mm in depth at this location), however artefact densities are likely to be low.

WPE 4

Site WPE 4 is a sparse artefact scatter located on a tributary of Emu Creek. The site area is approximately 2 ha. A single silcrete flake was recorded at a small arm of the tributary in the south west part of the site. Webber (1999) recorded a single flake about 400 m further down the tributary at this site.

WPE 5

Site WPE 5 is a sparse artefact scatter located on a tributary of Davis Creek at the extreme northern end of the study area. The site area is approximately 2 ha. Two artefacts, a broken mudstone flake and a large retouched flake, were recorded near the upper reaches of this tributary.

WPE 6

Site WPE 6 is a sparse artefact scatter located on a valley side slope facing Farrells Creek. The site area is approximately 8 ha. A total of 28 artefacts were recorded at this site. Most of these (17) are located within a small exposure in the north east of the site. Other artefacts were more dispersed and were recorded in the west of the site, where the slope faces both Emu Creek and a northern tributary.

WPE 7

Site WPE 7 is a sparse artefact scatter located on a valley side slope facing Emu Creek. The site area is approximately 18 ha. A total of 12 artefacts were recorded at this site.

WPE 8

Site WPE 8 is a sparse artefact scatter located on a valley side slope facing Emu Creek. The site area is approximately 11 ha. A total of 44 artefacts were recorded. Most artefacts occurred on a series of exposures in the south of the site near Emu Creek. Artefacts recorded include two backed artefacts and one large fragment of an edge ground axe.

WPE 9

Site WPE 9 is a sparse artefact scatter located on a valley slope facing a tributary of Emu Creek. The site area is approximately 21 ha. A total of 14 artefacts was recorded. These artefacts occur in the south west of the site either close to the tributary creek or near the ridge crest to the south.

WPE 10

Site WPE 10 is a sparse artefact scatter located on a valley slope facing a minor tributary of Emu Creek. The site area is approximately 11 ha. A total of five artefacts was recorded in two exposures, one in the centre of the site, the other close to the minor tributary.

WPE 11

Site WPE 11 is a sparse artefact scatter on the ridge crest north of Farrells Creek. The site area is approximately 18 ha. A total of seven artefacts was recorded on six areas of exposure.

Table 13.2 Artefact Raw Material

	Major Creeks	Minor Tributaries	Valley Side Slopes	Ridge Crests
Mudstone	67 %	50 %	59 %	71 %
Silcrete	24 %	36 %	25 %	14 %
Quartz	4 %	9 %	7 %	14 %
Other	5 %	5 %	9 %	0 %

Source: AMBS (2003)

Table 13.3 Artefact Types

	Major Creeks	Minor Tributaries	Valley Side Slopes	Ridge Crests
Flake	79 %	68 %	64 %	43 %
Flaked piece	7 %	5 %	14 %	14 %
Core	5 %	5 %	4 %	43 %
Retouched flake	3 %	9 %	5 %	0 %
Ground	0 %	0 %	1 %	0 %
Heat-shatter	6 %	14 %	13 %	0 %

Source: AMBS (2003)

Two scarred trees were located during the survey, one of these is the possible [Aboriginal] scarred tree identified by Webber (1999). Scars on these trees were not considered to be Aboriginal in origin during the AMBS assessment. Another possible Aboriginal scarred tree was located during the Aboriginal cultural heritage assessment undertaken by AASC. The scar on this tree was assessed by ERM archaeologists to be more likely of natural origin.

The survey results clearly indicate that most of the archaeological resources within the extension area occur along creek lines, a pattern typical of archaeology of the wider region. The survey results indicate that 87 % of all artefacts recorded occur along the two major creeks, Farrells Creek and Emu Creek. Most of the remaining 13 % of artefacts occur on the valley side slopes facing these two major creeks.

Analysis of effective coverage and artefact densities (Table 13.4) indicate this pattern reflects the actual distribution of artefacts and is not simply the consequence of greater visibility and exposure associated with erosion along the creek lines. Further analysis of artefact distribution and artefact attributes also indicate that the stone artefact assemblages from the different landform zones have measurable differences and reflect different types of behaviour and occupation on different landscape zones.

Table 13.4 Artefact Densities

Landform Zone	Effective Survey Coverage (ha)	Number of Artefacts	Artefact Density (Artefacts/ha)
Main creek valleys	15,076	701	562
Farrells	7,408	437	590
Emu	7,667	410	535
Tributary creeks	9,709	22	23
Valley side slopes	11,135	103	93
Facing major creeks	4,577	84	183
Facing minor creeks	6,557	19	29
Ridge crests	3,109	7	23

Source: AMBS (2003)

The sites along creek lines are large artefact scatters with some areas of quite high artefact density. Sites on slopes, ridge crests and minor tributaries are generally very sparse scatters across large areas (typically sites of this type have been recorded in other studies as series of isolated finds). This spatial patterning suggests creek lines were the focus of prolonged activity, used as areas for stone tool production and camping, and that other areas were not used intensively, or at least not as a focus for activities that involved stone tool production. The results of the survey, in terms of artefact distribution and density, therefore provide some support for the proposed archaeological model. Other aspects of the assemblages provide limited evidence to test the model.

Differences in the assemblages from different landform zones are difficult to interpret because of the small size of assemblages from tributary creeks, valley side slopes facing minor creeks and ridge crests. There is a high proportion of retouched flakes on tributary creeks and high proportion of cores on ridge crests, but only 22, 19 and seven artefacts respectively were recorded in these landform zones. The composition of assemblages from main creek valleys and valley side slopes, both in terms of artefact types and raw material are very similar. There are some differences between assemblages from subdivisions of valley side slopes. The assemblage from valley side slopes facing major creeks is more diverse, in terms of artefact types and raw material, than the assemblage from valley side slopes facing minor tributaries.

There is some variation in the size of artefacts from different landform zones. Artefacts recorded on ridge crests and along tributaries are larger than artefacts recorded in other landform zones. Artefacts along major creek valleys and slopes are similar in size. This result was unexpected given that the creek lines are thought to be the focus of activity and stone tool production and should therefore contain assemblages with a high proportion of small artefacts. The most likely explanation for this result is that a large proportion of the assemblage from the valley side slopes derive from a number of locations near creek lines. These artefacts may represent tool production and be associated with occupation of the creek line. It is also possible that the small component of assemblages from the main creek valleys was not detected, either because it was obscured by sediment or because it has been washed down stream.

The model predicts that sites away from creek lines will contain a higher proportion of used and retouched artefacts than sites in the main creek valleys. Individuals may have opted to carry a number of stone tools during hunting and gathering forays into the landscape rather than manufacture tools at task locations, therefore a high number of used tools should be recovered from these low density and dispersed assemblages. The survey results do indicate that a higher proportion of artefacts in the minor tributaries is used (9.1 %) than the proportion of artefacts in the main creek valleys (1.4 %), but this is not significant given the small sample size. The proportion of retouched artefacts recorded on slopes and minor tributaries is higher than the proportion recorded on major creeks.

The model also makes a number of predictions about site diversity and the occurrence of particular artefact types that might distinguish residential base camps from other short term activity locations.

Site diversity may indicate the variety of activity types that occurred at a site. It is expected that base camps will be the sites of a wide variety of activities whereas resource gathering activity locations will be sites of only one activity. Diversity of creek line sites therefore will be higher than sites in other landform zones. Counts of raw material types and artefact types in different landform zones (a simple measure of site diversity) do indicate greater diversity at creek line sites, but this could simply be a consequence of relatively small number of artefacts recorded in other landform zones.

Extended occupation may also be indicated by particular artefact types and archaeological features within sites, such as grindstones, mullers, hearths and heat treatment pits. None of these artefacts or features were found along the major creek lines or anywhere else in the study area.

The survey results do not provide any compelling evidence that long term occupation at particular locations occurred within any of the landform zones. Artefact densities and the pattern of artefact distribution do suggest the main creek valleys were more intensively used than other landform zones and may represent short term base camps or camping by small parties. Both Farrells Creek and Emu Creek are ephemeral and it is possible that they were rarely suited to prolonged periods of occupation. Sites along Bayswater Creek (about 3 km east of the study area), and the Hunter River (about 4 km south of the study area) may have been preferred, as they were more likely to provide a reliable water supply and other associated resources.

13.2.5 Aboriginal Social Values Identified

The Aboriginal stakeholder meetings and site inspections identified no new sites of great Aboriginal significance. A possible "Men's Area" was felt to exist by Mrs Barbara Foot at an unspecified location possibly outside or just within the far north western boundaries of the project area. Apart from recommending senior Aboriginal men carry out any heritage works required for that section of the project area, so as to be culturally safe, there are no further management implications for this area and no impediments for future mining here.

Primarily, the social value assessment study identified the social values of archaeological sites and the associated artefacts to the Aboriginal stakeholder groups. In general, the artefact scatter sites and the associated artefacts were identified as culturally significant to all the Aboriginal stakeholder organisations as cultural reminders of their and their ancestors physical and spiritual connection to their traditional land.

Drawing from the expressed values of these sites, Aboriginal stakeholder groups expressed strong interest in further fieldwork on Aboriginal sites which are to be affected by the proposed extension of mining.

Apart from the desire for further work, the primacy of traditional owners' views in the consultation process was evident. Concern was expressed by some Wonnarua Aboriginal people that the views of non-Wonnarua Aboriginal people were being given equal standing. Where organisations were not expressly "traditional owner" organisations, their representatives promoted the fact that their membership included many Wonnarua people. In one instance a case was made, based on a 1917 paper by surveyor/ethnologist R.H. Mathews, that the area was Kamilaroi, and that the Kamilaroi tribe extended into Jerrys Plains. A pertinent comment was made: "Boundary issues need to be addressed still." (AASC 2003:20).

The study reiterated the "contemporary" significance the Aboriginal Stakeholders hold generally towards those sites and places that are evidence of their ancestors' day to day occupation of the Hunter Valley region. These archaeological sites, representing Aboriginal "people activity", are of value or significance to varying degrees to all of the Aboriginal stakeholders consulted for this project. The values the Aboriginal stakeholders hold towards these sites and the associated artefacts and what they represent is heightened in the mining lease areas in particular because the nature of the mining impacts generally means these sites have been and will continue to be destroyed.

13.2.6 Assessment of West Pit Extension Area

AMBS (2003) used criteria detailed in the *Burra Charter* (Australia ICOMOS Burra Charter) in order to assess the archaeological significance of the West Pit extension area. The AMBS assessment is provided here in full.

Archaeological resources within the study area are typical of archaeological resources found in other areas of the Central Lowlands. The pattern of artefact distribution across the landscape, the types of artefacts, and raw materials that occur conform with previous investigations in nearby areas. No rare or unusual archaeological sites or features, such as stratified sites, mounds, art sites, Aboriginal carved trees or grinding grooves, were identified within the study area.

Most sites recorded during the survey, including sites WPE 3, WPE 4, WPE 5, WPE 6 WPE 7, WPE 8, WPE 9, WPE 10 and WPE 11, are very sparse artefact scatters the boundaries which were arbitrarily defined using survey area boundaries. These sites are comprised of low numbers of artefacts. The thin soils on which they occur have very low archaeological potential. These sites have little potential to contribute additional information to current research questions of antiquity and chronological change or landscape use and settlement patterns. These sites are considered to be of low archaeological significance.

Sites WPE 1, along Farrells Creek, and WPE 2, along Emu Creek, are large artefact scatters with high numbers of artefacts. A number of axes were recorded on these sites. Axes are not common artefact types, presumably because many of them have been collected since European settlement. Both sites have intact archaeological deposit with potential to contain many thousands of artefacts. The deposit is unlikely to be stratified and the artefacts within it have little potential to contribute additional information to current research question of antiquity and chronological change. The number of artefacts at these sites is substantial and therefore the sites may have the potential to address research questions related to stone artefact manufacture and taphonomy. They may also have the potential to address future research questions. However, sites similar to WPE 1 and WPE 2 are common and similar information may be obtained from the excavation of many other sites or from assemblages already salvaged from similar sites in the Central Lowlands. These two sites are therefore assessed to be of low to moderate archaeological significance.

The study area overall is considered to be of low to moderate archaeological significance. It has limited potential to contribute additional information to any current research question beyond the detailed recording undertaken during this survey.

Based on this assessment and the assessment of social values, AMBS provided the following recommendations:

- It is recommended that prior to the development of the extension area a cultural salvage be undertaken. A cultural salvage may involve collections in areas deemed appropriate by the Aboriginal community. Sites WPE 1 and WPE 2, which contain large numbers of artefacts, including a variety of stone tool types, are likely target areas.
- Given the number of Aboriginal community groups involved in the management process and the assessment of low to moderate archaeological significance, it may be appropriate for an archaeologist to develop a salvage program in consultation with the community groups. Artefacts collected could then be lodged with the Australian Museum providing equal access to all community groups and the scientific community. Alternatively, in accordance with the recommendations made by some of the Aboriginal community groups, CNA should consider developing a Keeping Place in which the artefacts could be kept.
- All identified Aboriginal sites should be protected (ie. remain fenced) until such time as their salvage takes place. Note that the fencing along the southern boundary of Emu Creek should be extended to the south to encompass the full surface extent of the site.
- The extent and scope of salvage work should be determined in full consultation with the local Aboriginal community.
- In consideration of the social values identified in or near the West Pit extension area, senior Aboriginal men should be involved with any heritage works proposed in the far north western portion of the study area.
- CNA should continue to liase with the Aboriginal Stakeholder Representatives on issues identified through the study, including the possible scarred tree.

In the course of the social values assessment the Aboriginal groups confirmed their desire for a program of works to be developed to recover as much scientific information as possible. This reflected their "social significance values for their heritage in general" (AASC 2003:30). The preferred strategy is for CNA to conduct a series of consultation meetings with each of the groups contacted by AASC to discuss and agree on the scope of any salvage program.

Other than the sites identified during the archaeological survey, a possible scarred tree and the possible nearby presence of a "Mens' Area" identified by Mrs Barbara Foot, no further Aboriginal sites or areas of significance were identified by the Aboriginal Representative organisations.

13.3 Description of Existing Approvals and Their Impacts

Existing consents/approvals for mining activities at HVO north of the Hunter River are summarised in Chapter 3. These consents cover all areas north of the Hunter River except for the West Pit extension area. Applications for existing consents have involved a number of archaeological assessments. These assessments are summarised below. The summaries provide an effective overview of archaeology within the proposed consent area and details of known sites and sites which have been destroyed. Locations of the survey areas for the assessments are indicated in Figure 39 of Volume 4.

13.3.1 Previous Archaeological Investigation in Existing Consent Areas

Brayshaw 1981

Brayshaw (1981) conducted a survey in an area within the northern part of West Pit. Most of this area has been mined out and all the sites recorded have been destroyed.

Brayshaw recorded nine open artefact scatter sites (designated A to I). One site was found on Davis Creek (a tributary of Bayswater Creek) and eight were found along Parnells Creek and its tributaries. Most sites contained around 20 artefacts or less. One site had more than 100 artefacts. Only one formal implement type was found, a geometric microlith'.

The sites recorded during the survey were assessed as typical for this part of the Hunter Valley and salvage collection and excavation were not considered necessary.

Brayshaw 1983

Brayshaw (1983) conducted a survey in an area within West Pit south of the 1981 survey area. Much of this area has since been mined out.

Brayshaw recorded two sites during the survey. One (Site J), now destroyed, was on an eroded western bank of Parnells Creek and comprised five artefacts in an area 50 m by 2 m. All were flakes and flaked pieces of mudstone. One flake had visible retouch/ usewear. The other site (Site K) also contained five artefacts comprising flakes and flaked pieces of indurated mudstone, silcrete and quartz. There were no artefacts at this site with visible retouch or usewear. The site was in a gully junction on a tributary of Farrells Creek. All artefacts appeared to originate from the Unit A soils.

Brayshaw 1985

Brayshaw (1985) conducted a survey in an area within North Pit (formerly Hunter Valley No. 1 Mine). This area is now completely mined out and parts of it have been rehabilitated.

All sites are now destroyed. Ten artefact scatters and one isolated find were recorded during the survey. All artefact scatters consisted of 10 artefacts or less, however artefacts occurred on 'practically every exposure investigated' (Brayshaw 1985:12). Most artefacts were identified as flakes, others as cores modified flakes and flaked pieces. Mudstone was identified as the predominant raw material.

Brayshaw assessed the sites as unsuitable for further investigation, arguing that they were disturbed and were unlikely to have significant sub-surface deposits. A previously recorded site, Site 37-5-63, was thought likely to extend into the study area. Brayshaw recommended that this site be protected or salvage excavation be undertaken.

Brayshaw 1989

Brayshaw (1989) conducted a survey in an area within West Pit, south of the 1983 survey area.

Six sites were recorded (designated Sites L-Q) and additional artefacts were recorded at the previously recorded Site K. All sites were surface scatters of stone artefacts originating from the topsoil unit. Three sites were located on Farrells Creek. One site was on a tributary of Farrells Creek. Two sites were located on a ridge. Another isolated artefact (IF1) was also found during the survey, on a tributary of Farrells Creek.

The majority of sites had less than 20 artefacts. Site K was re-recorded as containing 27 artefacts in two exposures. One site (Site L) was estimated to contain between 100 to 150 artefacts. Raw materials included silcrete, mudstone, quartz and a few pieces of chert. Most artefacts were identified as unmodified flakes and flaked pieces, others were identified as cores and modified artefacts. No backed artefacts or other formal implement types were found.

It was also considered 'unlikely that more detailed investigation of these particular sites would add significantly to the information recorded' (Brayshaw 1989:10). Therefore, it was recommended that consent to destroy should be applied for and issued by the NPWS (without further archaeological investigation).

Haglund and Rich 1992

Haglund and Rich (1992) conducted a survey in an area within the Alluvial Lands (an extension area of the former Hunter Valley No. 1 Mine). This area has since been completely mined out (and parts of it have been rehabilitated) and all sites have been destroyed. During the survey Haglund and Rich recorded four isolated artefacts amongst alluvial gravels (a flake of a dark igneous material, a flake mudstone flake and two mudstone cores) and relocated two sites (37-5-63 and 37-5-126).

It was recommended that surface collections be undertaken and that site 37-5-63 be protected or salvaged.

ERM Mitchell McCotter 1995

Curran (ERM Mitchell McCotter 1995) conducted an archaeological survey in an area within West Pit south of Brayshaw's previous survey areas (Authorisation 72 of the then Howick ML). Parts of this area have since been mined out and a number of the sites recorded have been destroyed.

Twenty-six open artefact scatter sites were recorded, mostly along creek lines (designated HC1-HC26). None of these sites are located in the present study area. It was concluded that there appeared to be a "trend in site occurrence throughout the western end of part A72, particularly along drainage lines" (ERM Mitchell McCotter 1995:13).

Most of the sites recorded during the survey were stone arterfact scatters containing between 10 and 60 stone artefacts. Higher numbers of artefacts were recorded at sites HC15, HC16, HC17, HC18, HC20 and HC21. It was concluded this represented occupation concentrated along three parallel drainage lines from Parnells Creek towards the Hunter River. HC17 was determined to have the highest significance of all sites recorded within the Howick lease. This site was a large, rich concentration of artefacts and contained a series of knapping floors of various raw materials. It was concluded by Curran (ERM Mitchell McCotter 1995:22) that site HC17 'can increase our knowledge of the process of stone tool manufacture in association with other sites in the local area'. Further archaeological investigation of the site was recommended.

Curran also recommended further investigation of the area containing sites HC15, HC16, HC17, HC18, HC20, HC21 and HC23 to determine the significance of 'that part of [authorisation] A72'. In addition, it was recommended that 'further archaeological investigations of part A72 would place the study area into a regional context and improve knowledge of land use and exploitation of the natural resources by the Aboriginal people, particularly in areas adjacent to the Hunter River' (ERM Mitchell McCotter 1995:22).

ERM Mitchell McCotter 1997 and 1999

ERM Mitchell McCotter conducted surveys in an area within Carrington Pit. Much of this area has since been mined out and most of the sites recorded have been destroyed.

A total of 46 archaeological sites were recorded (ERM Mitchell McCotter 1999a). A number of these sites were linked following additional investigations (ERM Mitchell McCotter 1999b). The sites were all open stone artefact scatters, with two described as silcrete source sites (CM2 and CM37) and one a large tool production site (CM39).

Following additional investigation by Hughes and Hiscock (ERM, Hughes and Hiscock 2000) the silcrete source sites were reassessed as unlikely to be primary sources of raw material for the sites recorded across the Carrington landscape and that artefact counts at these sites may have been inflated due to the occurrence of naturally heat fractured stone. The area was also considered to be potentially significant given colluvial deposits downslope of CM2 which may be of Pleistocene age. This latter area has subsequently been test excavated by Hughes and Hiscock (2000).

Sites were found in all landscape units, specified as low ridge, hillslopes, higher flats and lower flats. The low ridge contained the source site CM2 and a spread of artefacts across the unit. Very few sites were found in the hillslopes landscape unit, mostly open artefact scatters and isolated artefacts, however, the unit also contained the other source site (CM37) on a relic Tertiary river terrace. Both the higher flats and the lower flats landscape units contained open artefact scatters and isolated finds. Site frequency and artefact density in sites was low across the entire Carrington area. Artefact density was especially low in the hillslopes landscape unit, estimated to be less than $0.01/m^2$ (excluding the source site). Artefact densities in the other landscape units consisted of $0.01/m^2$ on the lower flats, $0.02/m^2$ on the higher flats and $0.03/m^2$ on the low ridge (excluding the source site).

The Carrington assessment considered the alluvial flats to have no potential for significant archaeological deposits (ERM Mitchell McCotter 1999b: 4.16). The stability of the drainage lines in the alluvial flats area suggests that the artefact concentrations represent activity locations rather than factors of erosional exposure resulting from channel migration. The poorly developed network of shallow ephemeral drainage lines (probably of late Holocene age) may have acted as a 'slight focus of occupation' (ERM, Hughes and Hiscock 2000). The concentrations of artefacts were still very sparse in this area and artefacts were not observed in the channel walls. Therefore, it was concluded that 'it is possible that the flats may contain some subsurface material, however the likelihood of finding such material is extremely low' (ERM Mitchell McCotter 1999b: 4.17).

The majority of sites recorded were believed to be of mid to late Holocene age, with the exception of one location (Site CM-CD1), at the base of the western slope of the low ridge, where test excavation found artefacts likely to be of late Pleistocene or early Holocene age (Hughes and Hiscock 2000). Sites of late Pleistocene and early Holocene age are rare in the Hunter Region.

It was recommended that application for Consent to Destroy be made for sites CM2-18, CM20-31, CM33-49 and CM54. A sample collection of artefacts across each of the landscape units and additional recording at CM2 in relation to the identification of naturally fractured rock were recommended. Sites CM1, CM19 and CM32 were outside the proposed mine plan and therefore not affected by the Carrington proposal. The Carrington mine layout has been modified to exclude the area containing potential Late Pleistocene/early Holocene artefacts.

AMBS 2000

In response to NPWS recommendations, AMBS (2000) were commissioned to reinvestigate those sites previously recorded by Curran (ERM Mitchell McCotter 1995) in the southern part of the current West Pit lease. These sites included HC21, HC23 – HC26 and an additional site HC101. The aims of this study were to record additional site information, particularly in relation to the artefact assemblages; inspect additional areas in the southern part of West Pit for fresh exposures; and compare findings with sites recorded at the adjacent Carrington.

The survey recorded a total of 179 artefacts from seven sites with low to very low surface densities. Artefact analysis recorded general similarities between all recorded sites in terms of raw materials and artefact types. The major difference between assemblages was the recording of several sandstone grindstone fragments from HC21 and HC24 on the lower flats. At the time of the 2000 survey, HC22 could not be relocated.

Salvage excavations and surface artefact collections were subsequently undertaken by AMBS at sites HC21, HC23, HC24 and HC101 (detailed Section 13.4).

13.3.2 Overview of Archaeological Resources Within the Proposed Consent Area

Previous archaeological investigations indicate that archaeological sites (typically scatters of stone artefacts) are ubiquitous throughout the proposed consent area. Most of the area is undulating terrain intersected by small creeks. Once open woodland this terrain has been cleared for grazing and is now predominantly grassland. Sites are likely to occur in this context wherever erosion has removed some of the topsoil. However, sites are much more likely to occur, and artefact densities are more likely to be greater, near the creek lines than on the slopes or ridge crests. This pattern is consistent with other studies throughout the Hunter Valley. The CNA database indicates that 54 % of all known sites within the proposed consent area, for which associated landform was recorded (112 of 139), were recorded as occurring at or along creek lines.

Sites along creek lines also have potential for archaeological deposits as the topsoil in these areas is often quite deep, commonly between 100 mm and 300 mm. Numerous salvage excavations (of sites within the proposed consent area and other sites in the Hunter River region) provide evidence that the manufacture of stone tools occurred at sites near creek lines. Evidence for the production of backed artefacts have been demonstrated at a number sites (eg. Hiscock 1984, Koettig 1990), including sites at West Pit (AMBS 2001). The small numbers of artefacts found on slopes and ridge crests generally do not allow identification of particular activities, but do provide evidence for occupation of these areas and at the very least transient movement over all parts of the landscape.

Archaeological sites are apparently less common in other contexts within the proposed consent area. In areas close to the Hunter River alluvial deposits may have buried sites or periods of flooding may have eroded and displaced archaeological material. Sites on or within colluvial deposits are also rare, however they do occur (eg. CM-CD1) and may represent stratified cultural deposits providing evidence of chronological change.

Archaeological sites other than artefact scatters or isolated artefacts are not common. Quarry sites have been identified where silcrete outcrops, however the vast majority of raw material used in the manufacture of stone artefacts would have derived (been quarried) from the Hunter River. Quarry sites have not been distinguished from artefacts scatters in either CNA's or NPWS' databases. Axe grinding grooves, which generally occur where suitable sandstone is located in association with water or a creek line, have not been recorded. Scarred trees are rare, presumably because most trees that may be old enough to have been scarred by the removal of bark by Aborigines have either been cleared since European settlement or have died naturally. Three Aboriginal scarred trees have been recorded within the proposed consent area, two have been destroyed and one, located within the West Pit extension area was reassessed by AMBS as not being Aboriginal in origin. There is no evidence of art sites, ceremonial sites or Bora grounds within the proposed consent area, however they are known to occur in the wider Hunter Region.

13.3.3 Potential Impacts

Mining operations in HVO north of the Hunter River will essentially impact archaeological resources in two area, West Pit and Carrington. Sites within proposed disturbance areas at these locations will be destroyed. Development consent has been issued for areas encompassing all proposed mining at Carrington and areas at West Pit west of the proposed extension area. A list of all sites requiring Section 90 Consents for the extension of West Pit is provided in Part L of Volume 3 and the impact of mining within the extension area is assessed in Section 13.2.5. Table 13.5 lists all known extant sites within the proposed consent area (including a number of sites that are likely to have been destroyed or have been salvaged under previous consents, and sites that represent duplicate or additional recordings of previously recorded sites.) and Figure 40 of Volume 4 shows the status and location of these sites (but does not include those sites that are likely to have been destroyed or have been salvaged under previous consents, or sites that represent duplicate or additional recordings of previously recorded sites).

Table 13.5 Extant Sites Within the Proposed Consent Area

Site Name	NPWS#	Site Type	AMG Easting	AMG Northing
WPE 1	na	A	na	na
WPE 2	na	A	na	na
WPE 3	na	A	na	na
WPE 4	na	A	na	na
WPE 5	na	A	na	na
WPE 6	na	A	na	na
WPE 7	na	A	na	na
WPE 8	na	A	na	na
WPE 9	na	A	na	na
WPE 10	na	A	na	na
WPE 11	na	A	na	na
Emu Creek	37-2-0038	A	310705	6408711
Lower Emu Creek	37-2-0144	A	311041	6408756
Upper Emu Creek	37-2-0145	A	310155	6408792
Farrells Creek	37-2-0147	A	309440	6406130
Farrells Creek	37-2-0148	A	309880	6406380
Site L	37-2-0523	A	310010	6407390
Site M	37-2-0524	A	309120	6406600
Site N	37-2-0525	A	309200	6406610
Site O	37-2-0526	A	308860	6406620
Site P	37-2-0527	A	308490	6406150
Site Q	37-2-0528	A	307720	6405560
T/L3	37-2-0562	A	304590	6406800
HC1	37-2-0777	A	305710	6406160
HC2	37-2-0778	A	305730	6406050
HC3	37-2-0779	A	305200	6406150
HC4	37-2-0780	A	305200	6405850
HC5	37-2-0781	A	305850	6405850
HC6	37-2-0782	A	305660	6405690
HC7	37-2-0783	A	306000	6405590
HC8	37-2-0784	A	305940	6405230
HC9	37-2-0785	A	305610	6405560
HC10	37-2-0786	A	305750	6405100
HC11	37-2-0787	A	305850	6405020
HC12	37-2-0788	A	306310	6405020
HC13	37-2-0789	A	306010	6405060
HC14	37-2-0790	A	306260	6404960
HC15	37-2-0791	A	306400	6404820
HC16	37-2-0792	A	306760	6405000
HC17	37-2-0793	A	306710	6405160
HC18	37-2-0794	A	307250	6404790
HC19	37-2-0795	A	307210	6405430
HC20	37-2-0796	A	307520	6405090
CUM-1	37-2-0894	A	311100	6409620
CUM-2	37-2-0895	A	310360	6409690
CUM-3	37-2-0896	IF	311140	6409760
CM85 & 4c24*	37-2-1865	A	307800	6405100
CM57 & HC21*	37-2-1866	A	307780	6404800
CM58 & HC24*	37-2-1867	A	307800	6405100
CM59 & HC24*	37-2-1867	A	308700	6405100
CM60 & HC24*	37-2-1868	A	308600	6405900
CM61 & HC24*	37-2-1869	A	308500	6405700
CM62 & HC24*	37-2-1870	IF	308500	6405600
CM63 & HC25*	37-2-1871	A	308400	6405400
HC100 & HC23*	37-2-1872	A	308200	6405400
HEE1	37-2-1964	A	310400	6407000
HEE3	37-2-1966	IF	310517	6408910
HEE4	37-2-1967	IF	310798	6408164
HEE2	37-2-1965	ST	310255	6407600
IF1	not registered	IF	308990	6406800
TD	not registered		310750	6408900
TG	not registered		310350	6407550
CM 1	37-2-1504	A	308853	6403098
CM 19	37-2-1522	IF	308400	6403240
CM 32	37-2-1535	A	307758	6403174
CM54**	37-2-1864	A	309700	6404400
CM49**	37-2-1874	A	309480	6403340
CM55	37-2-1875	A	307300	6403400
CM56	37-2-1876	A	307700	6403500
CM-CD1	37-2-1877	A	308720	6403350
CM 45**	37-2-1962	A	309992	6402708
CM 46**	37-2-1963	A	309660	6402703
The Mitchell Line**	37-5-0061	A	310637	6402582
CM13**	37-2-1861	A	310380	6403910
CM12**	37-2-1862	A	310500	6403800

CM48**	37-2-1873	A	310200	6402690
CM45**	37-2-1860	A	310280	6403800
Jerrys Plains 7;**	37-5-0131		310810	6401330
MD2	37-3-0286	A	312700	6403900
Malabar The Mitchell**	37-5-0061		310450	6402620
Site K	37-1-0399	A	309790	6407570

Notes:* = Sites that represent duplicate or additional recordings of destroyed or salvaged sites (under consent number SZ300)
** = Sites that have likely been destroyed under previous consents
A = Artefact scatter
IF = Isolated artefact
ST = Scarred tree
A/ST= Artefact scatter and scarred tree
Na = refers to WPE sites, details of which have yet to be lodged with NPWS and site areas are defined by large survey areas

13.4 Mitigation

The cumulative destruction of archaeological sites in the Hunter Valley, as a consequence of mining and other development, is a significant issue. It is therefore important that any future loss of the archaeological resources is mitigated by appropriate conservation and salvage strategies. To date mitigation against the impact of mining on CNA's ML areas have involved salvage excavations and collections, designation of conservation areas and the protection of particular archaeological sites. Further mitigation within the proposed consent area north of the Hunter River will be achieved via further investigation in the area south west of West Pit, and the protection of sites not under threat from actual mining, that is, sites located outside disturbance boundaries.

13.4.1 Previous Excavations and Collections

Previous archaeological assessments have led to salvage excavations and collections at a number of locations within the proposed consent area.

Site 37-5-63

Since its original recording by Haglund (1982) Site 37-5-63, has been the focus of numerous archaeological investigations and salvage programs (Brayshaw and Haglund 1983, Haglund 1993, Rich 1993, Paton 1996, Hiscock and Shawcross 2000). The site was estimated to cover at least 24 ha. The principal activity at the site was the reduction of river cobbles to make stone artefacts. However, the presence of retouched artefacts, backed artefacts with usewear, ochre and a resin hafted flaked piece suggested a range of other on-site activities, including the production of organic implements. Several discrete activity areas associated with primary artefact production were identified. These were used for specialised processes such as backed artefact knapping and retouching larger tools. A variety of approaches to backed artefact production was also identified.

CM-CD1

Subsequent to archaeological investigations at Carrington (ERM 1999a & b) it was recommended that a program of excavations be undertaken to test the proposition that stratified late Pleistocene artefact assemblages might be preserved in colluvial deposits immediately downslope of Site CM2. Excavations showed that potentially old (ie. late Pleistocene or early Holocene) colluvial deposits contained artefacts. This new site was designated CM-CD1. A total of 72 artefacts was recovered from the excavations. Most artefacts were identified as flakes made from locally available silcrete and mudstone. A small number of irregularly retouched flakes were also identified.

The excavations at CM-CD1 were undertaken under a Preliminary Research Permit (Section 87 Permit). No further (salvage) work has been undertaken as mine plans have been altered to protect this site.

West Pit

Following the archaeological assessment of Carrington (then Howick) by AMBS (2000) it was recommended that salvage excavations and surface artefact collections be undertaken at sites HC21, HC23, HC24 and HC101. A salvage program was undertaken by AMBS which recovered 644 artefacts from these sites (AMBS 2001). Some analysis of the recovered assemblage was also undertaken. HC21 was interpreted as a residential base camp, where analysis of the flake assemblage determined a range of activities including blade manufacture and the production of geometrics (2001:6). Usewear and residue analysis identified plant, wood and skin working. Sites HC23, HC24 and HC101 contained lower densities of stone artefacts and analysis of stone artefacts from these sites indicated the locations may have been a focus for intermittent short-term use (AMBS 2001:6).

13.4.2 Further Investigation

Following Curran's (ERM Mitchell McCotter 1995) assessment of Authorisation A72 for extension of the Howick Mine (an area that now includes portions of West Pit and Carrington), the following recommendations were provided:

- Site HC17 requires further investigation to assess this site's significance in a regional context; and
- a program investigating the context of sites in the vicinity of HC15, HC16, HC17, HC18, HC20, HC21 and HC23 is required to determine the significance of that part of A72 and to establish its importance on a regional context.

These recommended investigations have not yet been undertaken.

13.4.3 CNA's Cultural Heritage Management Procedures

The impact of mining operations on archaeological resources at all CNA sites are minimised via CNA's cultural heritage management procedures. These procedures have been developed to ensure all known sites are protected from any activities on mine lease areas. They also provide guidelines in the event of discovering previously unrecorded sites.

There are two key elements to CNA's cultural heritage management procedures: the maintenance of a cultural heritage database (database of archaeological sites) and the ground disturbance permit.

CNA's cultural heritage database holds information about all archaeological sites on HVO mine lease areas including the location and status of each site. This information is used to ensure all relevant mine personnel and contractors have up to date location information on all sites. In addition to this information, sites in mine project areas that are to be conserved are fenced and signposted. The conservation sites adjacent to mining areas are inspected annually by environmental services to ensure that areas are intact and sites have not been disturbed.

The ground disturbance permit ensures that sites, for which no Section 90 Consents have been issued, are not disturbed or destroyed. Accessing any areas not previously disturbed requires a ground disturbance permit. Permits are issued by the Site Environmental Coordinator.

13.4.4 Protection of Sites

The Carrington mine layout has been modified to exclude CM-CD1. This site has been assessed as highly significant because of its potential to contain late Pleistocene or early Holocene artefacts (see Section 13.4.1). Under the existing approvals a Cultural Heritage Indigenous Management Agreement has been developed particularly in relation to the management of site CM-CD1. Other sites not yet issued with Section 90 Consent will be managed following CNA's cultural heritage management procedures (Section 13.4.4).

13.5 Conclusion

Mining operations at HVO north of the Hunter River will impact archaeological resources. The impact of extending West Pit into the West Pit extension area has been assessed by AMBS. Archaeology in this area was assessed as being of low to moderate significance. AMBS recommended that further archaeological investigation would not be required for the application of Section 90 Consents for sites in this area. Subsequent to the archaeological survey and consultation undertaken as part of that survey, Aboriginal stakeholder groups reiterated the social value of archaeological sites as evidence of their ancestors' activities. Based on this social value the Aboriginal groups expressed strong interest in further salvage fieldwork and wish to come to an agreement with CNA regarding the scope of this fieldwork.

All other known archaeological resources outside the West Pit extension area are within existing development consent areas. These resources comprise artefact scatters and isolated artefacts typical of this region of the Hunter Valley. Two areas have been assessed as being of high archaeological significance: the area at West Pit around HC17 (including sites HC15, HC16, HC18, HC20, HC21 and HC23) and the site area of CM-CD1 at Carrington. These areas and sites will be managed according to existing consent conditions. All archaeological sites within the area, which do not have current Section 90 Consents, will be managed according to CNA's cultural heritage management procedures.

CHAPTER 14

visual

14 Visual

14.1 Introduction

This chapter describes the visual impact assessment of the proposed West Pit extension at HVO north of the Hunter River. The aim of the assessment was to determine visual impacts in both the local and regional setting and was based on an analysis of the following factors:

- visual absorption capacity – a factor of site visibility and the degree of contrast between the proposal and the local and regional visual landscape;
- visual sensitivity – a measure of the level of concern attached by a user group to a change in the landscape character. Visual sensitivity is based on the number of people affected, land use and distance of the viewer from the proposal; and
- the nature and extent of rehabilitation and landscape mitigation measures.

To address issues associated with the consolidation of consents within HVO north of the Hunter River, the visual impact assessments conducted for previous approvals are also described and mitigation measures are presented.

14.2 Methodology

The tasks involved in undertaking the assessment are summarised below:

- a review of the regional and local landscape settings;
- identification and description of significant viewer locations that represent the range of possible significant views of the proposal;
- an assessment of the visibility of the proposal from each viewer location. Visual simulations were used to assist in determining the visibility of the mine over the 21 year mine plan;
- determination of the absorption capacity of the proposal, based on visibility from each viewer location in the context of the local and regional setting;
- assessment of the visual sensitivity from each viewer location;
- determination of the likely visual impacts of the proposal, based upon an analysis of the visual absorption capacity and visual sensitivity of each viewer location; and
- a review of the timing of the proposal including proposed rehabilitation activities and feasible mitigative measures to minimise potential visual impacts.

14.3 Existing Visual Environment

14.3.1 Regional Context

West Pit is located in the Upper Hunter Valley, a region characterised by a range of landscapes from steep sloping peaks along the escarpment boundary, to slightly undulating hills and the river flats on the floodplain.

The Upper Hunter was traditionally dominated by a mixed grazing and cropping landscape, with dairy farms clustered along the Hunter River floodplain. Wollemi National Park and Barrington Tops National Park form significant mountain backdrops to the south west and north east of the site, helping to create a relaxed rural landscape character in the semi enclosed valley.

The visual environment of the Upper Hunter has been significantly altered over the last 50 years following the commencement of coal mining. The region now has the highest proportion of coal mining in NSW, 90 % of which is open cut. The visual environment is dominated by a combination of mining and supporting industrial infrastructure, together with the traditional agricultural enterprises spread throughout the region.

14.3.2 Local Setting

The locality immediately surrounding West Pit is dominated by coal mines and associated industry as shown in Figure 2 in Volume 4. Riverview, Cheshunt, Wambo and Warkworth Mines are located to the south, Ravensworth-Narama Mine is located to the east and Cumnock No. 1 Colliery to the north east. The mines and their associated infrastructure are a locally dominant feature in the landscape and are visible from a range of viewer locations including roads, residential and rural properties, and nearby industrial areas.

The Bayswater and Liddell Power Stations are located north of West Pit and the village of Jerrys Plains is located to the west. A ridgeline to the south west of West Pit separates the mining area from the village of Jerrys Plains.

The proposed extension area is mostly cleared land with some scattered trees. Mining will proceed through areas of regrowth woodland in the south east corner of the existing lease area toward Lemington Road. The extension area and existing lease area are mainly characterised by gently undulating hills leading into a ridge at the south east edge of the lease area.

14.4 Site Visibility

14.4.1 Overview

The visibility of West Pit is dependent upon the surrounding topography and the elevation of the viewer location. Two viewer categories were selected to provide a representation of potential views from within the visual catchment. The viewer categories include:

- southern viewer locations; and
- road users.

These categories were selected as residents in the vicinity of West Pit are generally located to the south in Jerrys Plains or south east in Maison Dieu. The residents of Jerrys Plains are screened from views of mining by an intervening ridgeline and residents of Maison Dieu are located east of existing mining operations at HVO south of the Hunter River. In addition to these towns, there are scattered residences to the south of West Pit which make up the southern view locations.

Representative viewer locations from within each category were selected to determine the range and extent of visibility of both the existing operations and the proposed extension area. The viewer locations were selected through the analysis of topographic data and verified by field inspections. From simulations of the viewshed a selection of locations were developed using a 3D digital terrain computer model and mine plans. The model simulates the extent of the viewshed from any given point on the landscape, based on a viewer height of 1.5 m (or average eye level) and the surrounding topography.

14.4.2 Southern Viewer Locations

Jerrys Plains

Southern viewer locations include the area around Jerrys Plains and along the Golden Highway. Jerrys Plains is generally located at an elevation of approximately 80 m and is screened from mining activity by a ridgeline to the north east which has an average elevation of 200 m. This ridgeline will continue to screen Jerrys Plains from mining activities in the proposed extension area.

Property No. 11

Four residences are located on Property No. 11 located off the Golden Highway. These residences are located at an elevation of 85 m and currently have an uninterrupted view between two ridgelines toward mining at Carrington and parts of Cheshunt, Figure 41 of Volume 4.

The proposed extension of West Pit will not be visible from this location. However, part of the existing approval area at West Pit will become visible as mining progresses. While mining at West Pit will become increasing visible from this location, it will be at a significant distance from the viewer and will be visually consistent with mining activities at Carrington and Cheshunt.

Like Property No. 11, residences at Property Nos. 9, 10 and 12 are unlikely to have views of West Pit due to the ridgeline in the south east corner of the proposed extension area and the screening vegetation along the southern side of Lemington Road.

14.4.3 Road Users

Road users are expected to make up the majority of viewers of the proposed extension which will be visible from Lemington Road, the New England Highway and the Golden Highway. Descriptions of the viewsheds from each of these roads is provided in the sections below.

The Golden Highway

Two viewer locations on the Golden Highway were assessed. Viewer location 1 is directly south of West Pit at a distance of approximately 7 km and Location 2 is approximately 18 km south west of West Pit. Views of mining from Location 1 are screened along the Golden Highway by ridges and vegetation with the exception of one section, which has glimpsed views of mining at Carrington. Location 2, Figure 42 of Volume 4, has views across a number of mining operations including West Pit. Users of the Golden Highway along this section of road would have glimpsed distant views toward West Pit which would be in context with other mining operations visible in the foreground.

The proposed West Pit extension will not be visible from the Golden Highway at either of the two locations as the elevation of the road is sufficient for existing ridgelines and vegetation to screen views of mining in the extension area.

New England Highway

The New England Highway is located approximately 2 km north of West Pit and travels in a south east to north west direction. The northern overburden dumps are currently visible as glimpses to road users of the New England Highway, Figure 42 of Volume 4.

A small part of the northern section of the West Pit extension will be visible from the New England Highway. Views of the extension area will be in the form of glimpses for road users.

Lemington Road

Lemington Road currently travels south through regenerated woodland and grasslands from the New England Highway along the western edge of Ravensworth-Narama Mine which is located to the east of the proposed West Pit extension. It then curves west to travel around HVO before proceeding south west along the disturbance boundary of West Pit and then past Carrington before crossing the Hunter River to intersect the Golden Highway, Figure 43 Volume 4. As part of the Ravensworth West approval for the Ravenworth-Narama Mine, Lemington Road is proposed to be relocated to travel west across the top of the Ravensworth-Narama ML and then south along the lease boundary. This boundary follows the Belt Line Road to meet up with the existing Lemington Road alignment adjacent to the HVCPP.

Four viewer locations were assessed along the existing alignment of Lemington Road:

- Location 3 – 3.5 km south of the New England Highway, approximately 2.5 km east of the eastern boundary of the proposed extension area;
- Location 4 – south eastern section of the West Pit disturbance area approximately 100 m west of Belt Line Road overpass;
- Location 5 – 1 km south west of the Western Haul Road overpass; and
- Location 7 – 2 km south of the West Pit disturbance area.

A fifth viewer location, Location 6, at a point along the northern section of the proposed realignment of Lemington Road, was also assessed. This point was approximately 400 m from the eastern boundary of the proposed extension area.

Location 3 was representative of views along the northern section of Lemington Road. Views along this section toward existing operations at West Pit were typically screened by regenerated woodland. This woodland will also screen mining at West Pit in the proposed extension area provided the proposed re-alignment of Lemington Road does not occur. Should this realignment occur, views into a small part of the proposed extension area and the mine as a whole will be available from Location 6.

Location 4 was located immediately west of the Belt Line Road overpass. The view along this section of the road is north toward the extension area and is comprised of hills with scattered trees. This area forms the southern section of the proposed extension and forms part of the disturbance area of the extension. Overburden dumps will be clearly visible as mining approaches to within 400 m of the road.

Location 5 was located about 1 km to the south west of the Western Haul Road adjacent to the ridgeline in the south west of the existing lease area. This area is covered with regenerated woodland which dominate views on both sides of the road. Views toward Carrington in the south are screened by this dense vegetation. Views from this point toward the proposed mining area immediately behind the ridgeline will be blocked; however, overburden dumps approximately 1.5 km to the north west of the viewer location will be visible. Views of the extension area to the north will be blocked by a ridge line to the north which will not be mined.

Location 7 is located about 2 km to the south of West Pit. Existing views from this location are characterised by mining at Carrington, North Pit and Cheshunt to the east, as well as agricultural activities such as grazing and dairy farming. Wooded ridgelines are visible to the north. The proposed extension to West Pit will not be visible from this location. However, glimpses of the final landform within the existing West Pit approval area will be visible from this point.

14.4.4 Site Lighting

The 24 hour operation of the mine involves the installation of flood lighting in the extension area for operational and safety requirements. The West Pit extension will be visible at night and form an extension to the existing bank of lights from the adjoining mines.

The types of lighting to be used include on-board machinery lights and lighting plants. On board machinery lights will be attached to equipment such as draglines, excavators, shovels, drills and haul trucks. Lighting plants will be used in active mining and emplacement areas.

Active mining areas are shielded from the view of most receivers and lighting structures will not be directly visible. Lighting of emplacement operations will be directed away from incoming views and generally be seen as a low distant glow. All lighting above natural topographic screens will be directed downwards and light shields will be used where required to further limit the effect of lighting. Additional site lighting is not expected to add significantly to the effects of illumination on surrounding areas.

14.5 Visual Absorption Capacity

14.5.1 Overview

The visual absorption capacity of the development can be expressed as the level of visual contrast (ie form, shape, pattern, line, texture and colour) of the proposed development to the visual setting within which it is placed.

A high absorption capacity will occur if there is minimal contrast and a high level of integration between the proposal and the existing landscape setting. Conversely, a low visual absorption capacity will occur when the proposal has a high visual contrast to the surrounding landscape and there is little or no visual screening, resulting in a more extensive visual impact.

Open cut mining is a visually intrusive process and results in a high degree of visual contrast with the surrounding landscape. However, the proposal involves the extension of a brown field site, meaning that it is an extension to existing operations at West Pit.

The locality surrounding West Pit is dominated by coal mines and associated industry. An assessment of the absorption capacity of the development must therefore be undertaken with consideration to the local landscape context, incorporating both coal mines and the surrounding agricultural and rural setting.

14.5.2 Southern Viewer Locations

The West Pit extension will not be visible from the southern viewer locations. Part of the existing approval area at West Pit will become visible as mining progresses. However, West Pit is approximately 7 km to the north of the viewer locations and will be visually consistent with mining activities at Carrington and Cheshunt which make up most of the existing views.

14.5.3 Road Users

Parts of West Pit are currently visible as glimpses to road users from the surrounding road network including the New England Highway and the Golden Highway. On these roads, the proposed extension will be visually consistent with the existing operations at West Pit and the surrounding mines.

The proposed extension will also be visible as glimpses from Lemington Road, with the exception of the section of road between the Belt Line Road overpass and the Western Haul Road overpass. At this point, mining will approach the road and will be clearly visible and in some instances, dominate the view of road users. Vegetation screening in this area is proposed to reduce the visual impact of the proposed extension in this area. The vegetation screening will also form part of the overall rehabilitation plan for West Pit.

Planting of vegetation screens adjacent to Lemington Road will be undertaken at the beginning of the proposed operations, so that trees are mature when the pit extends to the road in later years. As mining gets close to the road, bunding will be provided behind the vegetation buffer if required.

14.6 Visual Sensitivity

Visual sensitivity is a measure of the level of concern attached by surrounding land users to a change in the existing landscape. It is based largely upon visibility and distance from critical viewing areas, but is also influenced by land use, the current degree of exposure to the style of development proposed and the length of viewing time.

Generally the sensitivity of a user group will increase the closer they are to the critical change in landscape character. Similarly the greater the viewing time or period of exposure, the more critical the user group will be to the change. The existing land use is also critical in determining the visual sensitivity of each key viewer location. Residential or recreational land uses generally have a higher sensitivity to a change in landscape character than for example an industrial land use, as they place a greater emphasis on scenic qualities and visual amenity.

14.6.1 Southern Viewer Locations

The southern viewer location at Property No. 11 is located approximately 7 km from the proposed extension area. Existing views from this location include mining at Carrington. The proposed extension at West Pit will not be visible from this location and the view of mining operations at West Pit, which will become visible as mining progresses will form part of the existing mining vistas. This location and other residences in the vicinity of the mine are not considered to be visually sensitive to mining in the extension area at West Pit.

14.6.2 Road Users

With the exception of parts of Lemington Road, West Pit is visible as glimpses only from the surrounding road network. Visual sensitivity of motorists in the vicinity of the mine will be largely determined by the land uses serviced by the road network.

Lemington Road forms one of the access routes to the mining industry around West Pit from Jerrys Plains, Cessnock, Singleton and Muswellbrook. It also services rural and residential areas between West Pit and Jerrys Plains. This road affords views of existing mining areas at Ravensworth-Narama along its northern section and Carrington, North Pit, Riverview and Cheshunt along the southern section. Views of rural areas are also available along the southern section of this road. The main users of this road are expected to be associated with the operation of mines. In general, the visual sensitivity of the West Pit extension along Lemington Road is expected to be low with the exception of the area between the Belt Line Road overpass and the Western Haul Road overpass in which mining will be highly visible.

The length of viewing time also has a major influence on visual sensitivity. The local road network generally operates with speed limits of 100 km/hr, limiting the viewer time of road users. However, the extent of mining and visual prominence of mining operations along Lemington Road between the Belt Line Road and Western Haul Road overpasses will result in considerable views. Motorists on more distant roads such as the New England Highway and the Golden Highway are not expected to be sensitive to the development due to the distance from the mine site and the limited viewer time.

14.7 Existing Approvals

14.7.1 West Pit

The existing visibility of West Pit has been described above. This section describes the visual impact assessment for parts of West Pit which do not form part of the proposed mine plan for the West Pit extension, but have been approved, and have not yet been developed. This area is described as the Mitchell Pit extension and was assessed by Novacoal and approved in 1996.

Whilst mining in this area will be visible to the public from sections of Lemington Road, this mining is proposed to commence at the point furthest from the road. The first activity to become visible is likely to be the development of the overburden emplacement.

As the mine develops, the mining equipment will be intermittently visible on the surface as a new strip and highwall is made. Due to the number of seams and operating benches, it was projected that the mine would approach to within 1 km of the road in Year 15 of the development. In the current proposal, however, mining in the Mitchell Pit is expected to commence in Year 14, that is, 2018. Mining is therefore unlikely to approach Lemington Road to the same extent in the life of this consent as that assessed in 1996.

In addition to users of Lemington Road, the overburden emplacement will be visible from across the Hunter River flats but distance will make this view less dominant. The ridgeline between West Pit and Jerrys Plains is of sufficient height and length to ensure that overburden emplacements in this area are not visible from the village.

Mitigation measures proposed included the introduction of a vegetative barrier along the road to inhibit future views. Given the delay in commencing operations in the Mitchell Pit, the intervening period of time will allow trees to attain sufficient height and density to provide effective screening.

14.7.2 Carrington

Mining at Carrington commenced in 2000. After two years of mining, operations are well established across two thirds of the Carrington disturbance boundary. These operations are visible from Lemington Road, the Muswellbrook-Jerrys Plains Scenic Landscape and surrounding residences. The visual impacts as assessed in the Carrington EIS (ERM, 1999) are described below.

Muswellbrook-Jerrys Plains Scenic Landscape

The visual impact of Carrington was assessed for Muswellbrook – Jerrys Plains Scenic Landscape, local residences and road users. The Muswellbrook-Jerrys Plains Scenic Landscape is west of Carrington and generally follows the Hunter River between Muswellbrook and Jerrys Plains. The ridgeline to the west of Carrington forms the eastern boundary of this scenic landscape which excludes the mine site.

The visual impact of Carrington on this scenic landscape is minimal due to the focus of the landscape on the river flats along the Hunter River and the limited exposure of the mine to the landscape.

Residences

Views of Carrington from nearby residences were also assessed. There are significant visual impacts to Property No. 9 due to the proximity of the mine (500 m). Visual impacts will be reduced throughout the life of the mine through progressive rehabilitation.

Residences located on Property No. 10 were also assessed as having views of Carrington. The principle residence has some views toward Carrington which are screened by a row of trees. Progressive rehabilitation of the mine will reduce visual impacts throughout the life of the mine. Two other residences also have views toward Carrington which are partially screened by trees along Lemington Road and a shed in front of the second residence. The last residence is located south along the ridge at a lower elevation. Views to Carrington from this location are reduced by distance and orientation.

Residents along the Golden Highway have views toward Carrington which are reduced by the distance to the site, orientation of the residences and tree screening. These residences are located 4.3 to 4.8 km south-west of the mine and their views are limited to the lower elevated Hunter River floodplain between two ridges. Residences at Property No. 11 are on a lower elevation and only view higher emplacements in the distance. Other residences along the Golden Highway will not see Carrington due to their elevation; however the mine will be visible from land behind these residences which have a higher elevation.

Road Users

Views of Carrington will be afforded from Lemington Road which was relocated as part of the Carrington proposal. This road also passes other mines including North Pit, Ravensworth-Narama and Ravensworth West. The visual assessment for road users stated that travellers along this road will have clear views of overburden emplacements and rehabilitation operations in the first 18 months of operation. After this time the visual impact will diminish as rehabilitation pasture and trees establish. The medium term impact was expected to be minor with the emplacements expected to block most views into the pit.

The visual impact of the domestic coal surge bin located north-east of the New England Highway is expected to be minimal due to screening and a landscape already altered by mining.

Night Lighting

Night lighting will be visible from CNA owned houses around the mine site, residences located on Property Nos. 9 and 10 and some residences to the west of the Golden Highway. Lighting will generally be seen as a low distant glow from the Golden Highway residences. Directional lighting, shields and existing vegetation screening will prevent light being directed at residences on Property Nos. 9 and 10.

Motorists on the Lemington Road will see fixed lighting in the mine and emplacements as well as headlights on haul trucks and mobile equipment. The separation distance between these activities and the road will prevent motorists being dazzled by mine lights.

Conclusions

The landscape character of the area around Carrington has been modified by mining and Carrington is viewed in this context. Progressive rehabilitation, together with the rehabilitation of existing operations around Carrington will reduce the overall impact of the proposal on the visual environment. In addition, the proposed increase in the rate of mining may also increase the rate of rehabilitation of the mine, thus reducing the length of time over which the visual impacts would occur.

After rehabilitation the site will be viewed as undulating grazing pasture and native vegetation.

14.7.3 North Pit/The Alluvial Lands

Mining at North Pit and the Alluvial Lands will be complete at the end of 2003. These pits have been progressively rehabilitated such that much of North Pit and half of the Alluvial Lands have been rehabilitated. This process will continue until the Alluvial Lands are returned to their pre-mining contours and land use. The progressive rehabilitation of these lands will continue to improve the visual amenity of this area which was assessed as being visible to Property Nos. 8, 10 and 12. North Pit and the Alluvial Lands are no longer visible to users of Lemington Road since its relocation as part of the development of Carrington.

Progressive rehabilitation of North Pit and the Alluvial Lands will reduce existing visual impacts.

14.8 Temporary Hunter River Crossing

The proposed temporary Hunter River crossing will be located within topographic low points in close proximity to mining operations at HVO north of the Hunter River and HVO south of the Hunter River. In addition, the land disturbance will be of short duration and will be rehabilitated within approximately three weeks of commencement. It is expected that there will be no adverse visual impact as a result of the construction and removal of the temporary Hunter River crossing.

14.9 Mitigation Measures

Visual impacts from the West Pit extension are expected to be greatest along Lemington Road adjacent to the Belt Line Road. These potential visual impacts will be mitigated by vegetation screening and bunding if required. The vegetation screening is proposed to form part of the rehabilitation program and would be planted early in the mine plan to provide screening when it is required at this location. A similar vegetative screen was proposed and approved for the development of Mitchell Pit in the southern area of West Pit to screen views of the mine from users of Lemington Road.

Careful mine planning will also be used to minimise the intrusiveness of the development by ensuring the highest potential visual absorption capacity is maintained throughout the mine plan.

The proposed increase in the rate of mining at Carrington may also provide mitigation of visual impacts by potentially reducing the life of Carrington and increasing the rate of rehabilitation. Progressive rehabilitation of North Pit and the Alluvial Lands will also reduce existing visual impacts.

14.10 Conclusions

The visual impact of the proposed West Pit extension and mine plan have been described and assessed. While small sections of West Pit will be visible from a number of surrounding locations throughout the life of the mine, the main impact will occur toward the end of mining when West Pit approaches Lemington Road. Tree screening along Lemington Road early in the mine plan is proposed to mitigate these impacts. Bunding may also be required along this section of Lemington Road when mining approaches the road. Other visual impacts are considered to be minor.

The visual impact assessments produced for the Carrington and North Pit and the Alluvial Lands approvals have also been described in the context of existing mining and rehabilitation levels which are highly advanced in North Pit and the Alluvial Lands. Based on these assessments, Carrington has visual impacts on surrounding residents and users of Lemington Road. However, these impacts may be reduced by the increase in the rate of mining at Carrington which may reduce the life of mining and increase the rate of rehabilitation. This may result in the early rehabilitation of Carrington and reduce the length of time over which visual impacts would be evident.

Mining in the North Pit and the Alluvial Lands will be complete at the end of 2003 and rehabilitation in these areas is in an advanced state. The progressive rehabilitation of these areas will reduce the existing visual impacts associated with these pits.

CHAPTER 15

transport and traffic

15

15 Transport and Traffic

15.1 Introduction

HVO generates traffic from a number of sources which utilise the surrounding road transport network. This chapter provides a description of this road transport network and assesses the likely impacts that the proposal will have on that network.

15.2 Road Transport Network

15.2.1 General

HVO is generally located between the New England Highway to the north and the Golden Highway (or Jerrys Plains Roads) to the south. Both roads form the two main access routes to operations both north and south of the Hunter River.

From these roads, vehicle access to HVO north of the Hunter River can be obtained via Lemington Road and Pikes Gully Road, both of which run through the operations' lease area. Access to HVO south of the Hunter River is obtained directly from the Golden Highway.

The road transport network that surrounds HVO can be seen in Figure 43 in Volume 4.

15.2.2 New England Highway

The New England Highway is a national highway (National Highway 15) that starts at Hexham, approximately 15 km from Newcastle and finishes at Ipswitch in Queensland. From Hexham, the highway generally runs in a north west direction to Muswellbrook before heading in a north direction to the New England district and Queensland.

Between Singleton and Muswellbrook, the New England Highway is generally a single carriageway, high standard rural highway with frequent overtaking lanes. With the exception of a 90 km/hr section in the vicinity of the village of Ravensworth, this section of the highway operates at 100 km/hr.

The New England Highway carries a large mix of traffic, from small commuter vehicles to semi-trailers and B-double trucks.

15.2.3 Golden Highway (or Jerrys Plains Road)

The Golden Highway is a state highway (State Highway 27). From its intersection with the New England Highway south of Singleton, the Golden Highway runs west through Denman towards Dubbo. In the vicinity of the village of Jerrys Plains, the Golden Highway shares its name with Jerrys Plains Road.

The Golden Highway is a two lane, low standard rural highway with soft shoulders generally constructed to a maximum 100 km/hr standard. In the vicinity of HVO, the Golden Highway carries a significant amount of mine related traffic, including coal mine employees and contractors and coal trucks transporting product coal from mines within the local area to the Mount Thorley Coal Loader.

15.2.4 Lemington Road

Lemington Road connects the New England Highway and the Golden Highway approximately midway between Singleton and Muswellbrook. Due to mining, several sections of the road have been relocated during the past 25 years, so much of the road has been constructed to a two lane rural highway standard of a maximum of 100 km/hr.

Lemington Road is heavily utilised by the mining industry. It runs through a number of ML areas, including HVO north of the Hunter River and provides vehicle access to:

- North Pit and Alluvial Lands;
- Carrington; and
- HVCPP.

Lemington Road also provides vehicle access to Ravensworth-Narama and Nardell (although the main access to Nardell is from the New England Highway). As part of a recent consent for an extension to Ravensworth West (now Ravensworth-Narama), it is proposed to relocate the northern part of Lemington Road, adjacent to the Belt Line Road.

Lemington Road is a local road that is owned and maintained by SSC.

15.2.5 Pikes Gully Road

Pikes Gully Road runs between West Pit at HVO and the Old New England Highway. It passes under the New England Highway approximately 500 m west of Lemington Road and can be accessed from the highway via a short link road informally known as the West Pit Access Road.

Pikes Gully Road is a two lane sealed local road, generally with a soft shoulder and no markings. The road is predominantly used for mining activities as it provides access to a number of mines and associated facilities, including:

- West Pit and WPCPP;
- offices housing CNA's Technical Services division;
- Cumnock No. 1 Colliery and associated facilities;
- RCT (via Liddell Station Road);
- NLP;
- HVLP; and
- Liddell mine and Liddell CPP.

The western and eastern ends of Pikes Gully Road are subject to an 80 km/hr speed limit. The middle section, between the New England Highway and the access road to the HVLP is restricted to 60 km/hr.

The majority of Pikes Gully Road is publicly owned by both SSC and MSC, however, there are sections which are privately owned, including sections at West Pit and near NLP which are owned by CNA. Ownership of Pikes Gully Road can be seen in Figure 43 in Volume 4.

Although some of Pikes Gully Road is publicly owned, it is fully maintained by CNA and Xstrata. The maintenance is managed by CNA (as owners and operators of HVO) and partly funded by Xstrata (as owners and operators of Cumnock No. 1 Colliery and Liddell).

15.2.6 Liddell Station Road

Liddell Station Road runs between Pikes Gully Road and the Old New England Highway. It is a two lane sealed local road, generally with a soft shoulder and no markings. The road is predominantly used for mining activities as it provides access to Cumnock No. 1 Colliery and the RCT.

The northern boundary of Liddell Station Road forms the boundary between SSC and MSC. The road is publicly owned.

15.3 Existing Transport Conditions

15.3.1 Road Traffic Flows

General

A review of road traffic flow data on roads described above has been undertaken. This data is described below and summarised in Table 15.1. The locations of the traffic counts can be seen in Figure 43 in Volume 4.

New England Highway

RTA traffic data for the New England Highway, south of Lemington Road, for 2001 indicates an annual average daily traffic (AADT) volume of 11,611 vehicles. This is a minor increase from AADT volumes in 1998 of 11,468 vehicles, but a decrease from AADT volumes in 1995 of 12,643 vehicles.

In the vicinity of HVO north of the Hunter River, observations indicate that the New England Highway operates at good level of service with stable traffic flow conditions.

Golden Highway

Project specific traffic counts were undertaken in two locations on the Golden Highway between 28 April and 9 May 2003. The first location was west of Lemington Road and the second location was west of the Putty Road.

The counts west of Lemington Road indicate an average daily traffic (ADT) volume of 2,107 vehicles, which includes 1,060 vehicles westbound and 1,047 vehicles eastbound. The counts west of the Putty Road indicate an ADT volume of 3,824 vehicles, which includes 1,920 vehicles westbound and 1,904 vehicles eastbound. The additional vehicles recorded west of the Putty Road highlight the impact that the local mining industry has on traffic volumes on the Golden Highway.

Observations indicate that in the vicinity of HVO north of the Hunter River, the Golden Highway operates at a high level of service with free flow traffic conditions.

Lemington Road

Project specific traffic counts were undertaken in two locations on Lemington Road between 28 April and 9 May 2003. The first location was near Lemington Road's intersection with the New England Highway and the second location was near its intersection with the Golden Highway.

Table 15.1 Traffic Volumes

Road	Traffic Count Location	Daily Traffic Volume
New England Highway	South of Lemington Road	11,611[(1)]
Golden Highway	West of Lemington Road West of the Putty Road	2,107[(2)] 3,824[(2)]
Lemington Road	Near intersection with New England Highway Near intersection with Golden Highway	1,134[(2)] 395[(2)]
Pikes Gully Road	West of New England Highway	934[(2)]
West Pit Access Road	–	829[(2)]

Notes: (1) = Counts undertaken in 2001 from RTA Count Site 05037
(2) = Project specific counts undertaken in 2003

The counts near Lemington Road's intersection with the New England Highway indicate an ADT volume of 1,134 vehicles, which includes 565 vehicles northbound and 569 vehicles southbound. The counts near Lemington Road's intersection with the Golden Highway indicate an ADT volume of 395 vehicles, which includes 198 vehicles northbound and 197 vehicles southbound.

Observations indicate Lemington Road operates at a high level of service with free flow traffic conditions.

Pikes Gully Road (Including West Pit Access Road)

Project specific traffic counts were undertaken on both Pikes Gully Road and the West Pit Access Road between 28 April and 14 May 2003. The counts on Pikes Gully Road were undertaken on the western side of the New England Highway.

The counts on Pikes Gully Road indicate an ADT volume of 934 vehicles, which includes 468 vehicles eastbound and 466 vehicles westbound. The counts on the West Pit Access Road indicate an ADT volume of 829 vehicles, which includes 553 vehicles northbound and 276 vehicles southbound.

Site surveys indicate that existing daily traffic flows on Pikes Gully Road between the HVLP and NLP are relatively low with less than 20 vehicle movements per hour. Flows between the NLP and the New England Highway average approximately 40 vehicle movements per hour.

Pikes Gully Road both east and west of the New England Highway operates at a high level of service with free flow traffic conditions.

Liddell Station Road

Site surveys indicate that existing daily traffic flows on Liddell Station Road are relatively low with approximately 30 vehicle movements per hour.

15.3.2 Coal Haulage Traffic Flows

Pikes Gully Road is currently used by CNA for the haulage of product coal between WPCPP and NLP where it is then loaded onto trains for transfer to the Port of Newcastle. Coal is also hauled by CNA between the HVLP and NLP on a privately owned section of Pikes Gully Road. A fleet of highway rated single trailer trucks and B-double trucks are used to haul the coal.

Between 28 April and 14 May 2003, the same period that the traffic counts on Pikes Gully Road were undertaken, there were a total of 4,904 two way truck movements between WPCPP and NLP. Table 15.2 provides details on the number of truck movements between WPCPP and NLP compared to the total number of traffic movements on Pikes Gully Road between 28 April and 14 May 2003.

Table 15.2 shows that during weekdays and weekends, truck movements between WPCPP and NLP account for an average of 27 % and 69 %, respectively, of all traffic movements on the western side of Pikes Gully Road (western side of the New England Highway). The remainder of traffic relates to truck movements generated by Cumnock No. 1 Colliery and employee and contractor vehicles associated with operations at HVO north of the Hunter River, Cumnock No. 1 Colliery and Liddell Mine and CPP.

15.3.3 HVO Employee Traffic

Existing operations at HVO and surrounding mines significantly contribute to local traffic conditions with mine employee traffic providing one of the greatest contributions to local traffic volumes.

HVO currently has nearly 600 employees, with additional contractor resources equal to around 400 people. Given that HVO north and south of the Hunter River operates as an integrated operation (subject to current approvals), which includes the sharing of resources, such as people, it is difficult to differentiate between the number of people that work north or south of the Hunter River. However, figures provided by CNA suggest that:

- approximately 494 people principally work at HVO north of the Hunter River, including people that work within the pits, CPPs and loading points;
- approximately 186 people principally work at HVO south of the Hunter River, including people that work within the pits; and
- approximately 350 people work across both north and south of the Hunter River, including management, office staff and maintenance staff. Of these, 225 people work at HVO north of the Hunter River.

Therefore approximately 719 people work principally or partly at HVO north of the Hunter River.

The proportion of the overall workforce accessing the site on a daily basis is integral in calculating the effect of employee traffic movements on the local road network. Most of the workforce operates on a roster system, with staff spilt between two daily shifts. In addition, there are a number of staff rostered off on any one day. Currently, out of a total workforce of 719 people that work principally or partly at HVO north of the Hunter River, approximately 239 people are rostered off on any one day. As such, on any one day there are approximately 480 full-time employees working principally or partly at HVO north of the Hunter River.

Table 15.2 Number of Truck Movements Between WPCPP and NLP and Traffic Movements on Pikes Gully Road (28 April to 14 May 2003)

Date	Two Way Truck Movements Between WPCPP and NLP	Two Way Traffic Movements on Pikes Gully Road	Ratio of Truck Movements Between WPCPP and NLP to Traffic Movements on Pikes Gully Road (%)
28 April 2003	260	–(1)	–
29 April 2003	294	1,358	22
30 April 2003	288	–(1)	–
1 May 2003	118	–(1)	–
2 May 2003	294	1,140	26
3 May 2003(2)	**298**	**482**	**62**
4 May 2003(2)	**292**	**396**	**74**
5 May 2003	236	1,042	23
6 May 2003	208	734	28
7 May 2003	320	1,134	28
8 May 2003	150	–(1)	–
9 May 2003	326	–(1)	–
10 May 2003(2)	**316**	**485**	**65**
11 May 2003(2)	**350**	**472**	**74**
12 May 2003	328	1,073	31
13 May 2003	328	1,172	28
14 May 2003	498	–(1)	–
TOTAL	**4904**	**–(1)**	**–**
Weekday Average	**281**	**1,093**	**27**
Weekend Average	**314**	**459**	**69**

Notes: (1) = Total counts for day unavailable due to failure of automatic count
(2) = Bolded dates and figures relate to weekends

Figures provided by CNA indicate that 35.3 % of the current workforce at HVO live within the Singleton LGA, with the remaining 64.7 % living in surrounding LGAs (see Table 15.3)

Based on Table 15.3, the majority of staff are expected to access HVO north of the Hunter River from the east (78.7 %), mainly from the major urban centres including Singleton, Cessnock, Maitland and Newcastle. A small proportion of staff will access the mine from the west of the site (21.3 %), from other centres such as Muswellbrook and Scone.

With a large proportion of workers residing in different LGAs, there is expected to be some degree of car sharing particularly by shift workers. There have been a number of recent studies undertaken for coal mines in the Hunter Valley to determine the estimated level of car sharing and overall car usage rates for mine employees. One study of employees at HVO in 1998 indicated that 66 % of employees used their own car to travel to work while the

Table 15.3 Residential Location of the HVO Workforce

LGA	Proportion of Workforce (%)	Direction Accessing Site
Singleton	35.3	East
Cessnock	28.5	East
Muswellbrook	18.5	West
Maitland	10.7	East
Scone	2.2	West
Newcastle	1.7	East
Lake Macquarie	1.4	East
Port Stephens	0.7	East
Dungog	0.4	East
Merriwa	0.2	West
Murrurundi	0.2	West
Tamworth	0.2	West

Source: CNA 2002

remainder (34 %) were passengers who travelled to work with a colleague. This figure is likely to be representative of employees' car usage today.

As such, the existing workforce who work principally or partly at HVO north of the Hunter River, is expected to generate approximately 317 employee vehicles to and from the work place each day, equivalent to 634 vehicle movements.

Based on the above:

- approximately 60 % of employee vehicles (or 380 vehicles) currently travel to and from HVO north of the Hunter River from the east using the New England Highway. As most mining staff start from HVO's main offices, only approximately one quarter of the vehicles (or 95 vehicles) will then access HVO north of the Hunter River from Pikes Gully Road while the other three quarters will access HVO north of the Hunter River from Lemington Road (285 vehicles);
- approximately 20 % of employee vehicles (or 127 vehicles) currently travel to and from HVO north of the Hunter River from the east using the Golden Highway. All of these vehicles are likely to access HVO north of the Hunter River from Lemington Road;
- approximately 10 % of employee vehicles (or 63 vehicles) currently travel to and from HVO north of the Hunter River from the west using the New England Highway. Approximately one quarter of the vehicles (or 16 vehicles) will then access HVO north of the Hunter River from Pikes Gully Road three quarters of vehicles (or 47 vehicles) will access HVO north of the Hunter River from Lemington Road; and
- approximately 10 % of employee vehicles (or 63 vehicles) currently travel to and from HVO from the west using the Golden Highway. All of these vehicles are likely to access HVO north of the Hunter River from Lemington Road.

15.4 Internal Haul Roads

There are a series of internal haul roads which currently operate within HVO, the majority of which are used for the haulage of overburden and coal.

There are three bridges at HVO north of the Hunter River spanning public roads. These include:

- a bridge over Lemington Road which links West Pit and the WPCPP with Carrington, North Pit/Alluvial Lands and the HVCPP;
- a bridge over Lemington Road for the Belt Line Road; and
- a bridge over the New England Highway on the Belt Line Road which links the HVCPP with the HVLP.

In addition, there is a bridge spanning the Hunter River which links HVO north and south of the Hunter River.

15.5 Future Road Changes

The RTA, SSC and MSC have indicated that there are no planned road changes that will significantly affect the road network in the locality of HVO north of the Hunter River.

Notwithstanding this, as part of the 1997 EIS for the extension of Ravensworth West (now Ravensworth-Narama), the relocation of a 4.5 km section of Lemington Road was approved. The proposed alignment moved the existing alignment further to the west adjacent the Belt Line Road (as shown on Figure 43 in Volume 4). This relocation was initially proposed to occur during Year 4 of the operations, or in 2002, however, the relocation has not yet occurred.

With the exception of delays during construction, the proposed relocation of part of Lemington Road is unlikely to have any affect on the operation of the surrounding road network.

15.6 Other Mining Developments

15.6.1 General

A review of recent approvals or current applications for extensions to other mining operations in the local area suggests that there is unlikely to be any significant increase in traffic movements on roads surrounding HVO as a result of these developments. Any additional traffic generated will generally be confined to the construction phases only, with decreases in traffic generally expected during the operational phases.

15.6.2 Warkworth

The Minister for Infrastructure and Planning recently granted development consent for an extension of Warkworth Mine. The EIS which accompanied the DA to the Minister states that after a small increase in traffic movements associated with construction activities, the number of traffic movements generated by the proposal is expected to decline over time.

15.6.3 Wambo

A DA is currently before the Minister for proposed extensions to Wambo Mine. The EIS which accompanies the DA predicts similar results to Warkworth. It indicates that while there will be an increase in traffic on the local road network during the construction phase, traffic generation during the operational phase is expected to generally decline.

15.6.4 United Colliery

The Minister for Infrastructure and Planning recently granted development consent for the extension of operations at United Colliery. The EIS which accompanied the DA indicated that the proposed extension will lead to an increase in traffic flows on the Golden Highway as a result of increased truck movements of product coal between the mine and the Mount Thorley Coal Loader.

15.7 Baseline Traffic Volumes

Estimated baseline traffic volumes are provided in Table 15.4. These volumes include existing recorded AADT or ADT volumes and estimates of traffic that will be generated by other mining developments at Warkworth and Wambo Mines.

15.8 Road Transport Generation as a Result of the Proposal

15.8.1 General

The proposal will generate a small amount of additional traffic on the public road network as a result of:

- an increase in employees over the life of the mine;
- the intermittent haulage of product coal between HVLP, NLP and RCT; and
- construction traffic associated with construction activities.

It should be noted that no additional haulage of product coal is proposed between the WPCPP and NLP. In fact, due to the proposed increased throughput at HVCPP (and the potential decreased throughput at WPCPP), it is likely that there will be a reduction in the number of truck movements between the WPCPP and NLP along Pikes Gully Road.

15.8.2 Increase in Employees

As stated in Section 15.3.3, HVO currently employs a total of approximately 1,030 people, including employees and contractor equivalents. Employment predictions provided by CNA indicate that over the next 21 years, employment levels at HVO will increase. The figures indicate that a potential peak of 1,246 people will be employed at HVO in 2020 (Year 17), including employees and contractor equivalents, an increase of 216 people over current employment levels if market conditions are favourable. Of these 216 potential additional employees, approximately 177 are expected to work principally or partly at HVO north of the Hunter River.

Based on the 66 % car usage rate for employees at HVO, potentially 177 additional employees are likely to generate an additional 234 daily vehicle trips. This number doesn't account for rostered time off and is therefore a conservative estimate.

15.8.3 Construction Traffic

Construction Activities

The proposal is for the continuation of operations at HVO north of the Hunter River. As such, the proposal has minimal infrastructure requirements and associated construction activities. Construction activities will be confined to:

- the upgrade of sections of the haul route between the HVLP, NLP and RCT;
- works associated with the intermittent transfer of heavy equipment across the Hunter River;
- upgrading of the Belt Line Conveyor;
- upgrading of the HVCPP to increase its washing capacity to 20 Mtpa;
- construction of a conveyor between HVO south of the Hunter River and the HVCPP if it is economically feasible; and
- construction of a conveyor linking the HVLP and NLP if it is economically feasible.

Table 15.4 Baseline Traffic Volumes

Road	Traffic Count Location	Daily Traffic Volume	Traffic From Other Mining Proposals	Baseline Traffic Volumes
New England Highway	South of Lemington Road	11,611	–	11,611
Golden Highway	West of Lemington Road	2,107	100(1)	2,207
	West of the Putty Road	3,824	560(2)	4,384
Lemington Road	Near intersection with New England Highway	1,134	100(1)	1,234
	Near intersection with Golden Highway	395	50(1)	445
Pikes Gully Road	West of New England Highway	934	–	934
West Pit Access Road	–	829	–	829

Notes: (1) = General assumption on additional traffic generated during construction phases of Warkworth and Wambo
(2) = Based on estimates from EISs for Warkworth, Wambo and United Colliery

Some additional traffic movements will be generated as a result of construction vehicles, delivery of equipment and materials and transportation movements due to the services required to support the construction activities.

With the exception of the works required for the intermittent transfer of heavy equipment across the Hunter River and the possible construction of a conveyors linking the HVLP and NLP, and HVO south of the Hunter River and the HVCPP, all of the above construction activities are anticipated to be constructed within Year 1.

Construction Workforce

A small construction workforce will be required during the project. The anticipated construction workforce requirements and timing of construction activities is detailed in Table 15.5.

Table 15.5 indicates that the construction workforce is anticipated to peak at approximately 55 during Year 1. This figure assumes that all proposed construction activities in Year 1 will be undertaken concurrently, including the construction of a temporary crossing over the Hunter River. In reality, this is unlikely as construction activities will be undertaken at different times throughout the year.

Light Construction Vehicle Movements

A degree of car sharing is expected from construction contractors. A car usage rate of 85 % has been conservatively used to assess construction traffic generation. The peak construction workforce is therefore estimated to create an additional 43 vehicles travelling to and from the site each day, representing an additional 86 daily vehicle movements.

Heavy Construction Vehicle Movements

The number of heavy construction vehicle movements generated by the proposed construction activities are shown in Table 15.6.

Based on the data in Table 15.6, a maximum of 44 daily heavy vehicle movements will be generated by the proposal at any one time. Once again, this is conservative, as construction activities are unlikely to be undertaken at the same time.

15.8.4 Intermittent Haulage of Product Coal

General

To improve the efficiency of the operations and maximise the use of loading facilities at HVLP and NLP, it is proposed to increase the haulage of product coal between the HVLP and NLP and also haul between the HVLP, NLP and RCT. The haulage will enable HVO to optimise its management of stockpile capacity and improve its performance in respect of production capability, quality and train loading. A conveyor between the HVLP and NLP will replace haulage if its construction is economically feasible.

Intermittent haulage of product coal is also proposed along the privately owned Belt Line Road between the HVCPP and HVLP to provide back up should the conveyor break-down or require routine maintenance.

Proposed Route

The proposed intermittent haulage route of product coal is shown on Figure 13 in Volume 4.

For the haulage between the HVLP, NLP and RCT, trucks will transfer coal via Pikes Gully Road, Liddell Station Road and private haul roads. Trucks will proceed from the HVLP to either NLP or RCT depending

Table 15.5 Anticipated Construction Workforce

Construction Activity(1)	Estimated Timing	Estimated Duration	Estimated Workforce
Upgrade of sections of haul route between HVLP, NLP and RCT	*Year 1*	*1 month*	*10*
Intermittent transfer of heavy equipment across Hunter River	*Occasional*	*1 month*	*15*
Upgrade of Belt Line Conveyor	*Year 1*	*1 month*	*5*
Upgrade of HVCPP	*Year 1*	*2 months*	*25*
TOTAL			***55***
Conveyor between HVO south of the Hunter River and HVCPP(2)	Year 2	2 months	20
Conveyor between HVLP and NLP(2)	Year 5	2 months	20

Notes: (1) = Italicised activities are those activities that will be undertaken during Year 1
(2) = Construction of the conveyors in Years 2 and 5 will only be undertaken if economically feasible

Table 15.6 Anticipated Number of Heavy Vehicle Movements

Construction Activity[1]	Estimated Timing	Estimated Duration	Estimated Number of Heavy Vehicle Movements Per Day
Upgrade of sections of haul route between HVLP, NLP and RCT	*Year 1*	*1 month*	*10*
Intermittent transfer of heavy equipment across Hunter River	*Occasional*	*1 month*	*20*
Upgrade of Belt Line Conveyor	*Year 1*	*1 month*	*4*
Upgrade of HVCPP	*Year 1*	*2 months*	*10*
TOTAL			***44***
Conveyor between HVO south of the Hunter River and HVCPP[2]	Year 2	2 months	10
Conveyor linking HVLP and NLP[2]	Year 5	2 months	10

Notes: (1) = Italicised activities are those activities that will be undertaken during Year 1
(2) = Construction of the conveyors in Years 2 and 5 will only be undertaken if economically feasible

upon the receival capacity of these loading points. For haulage between the HVCPP and HVLP, trucks will use the privately owned Belt Line Road.

Trucks hauling between the HVLP and NLP will follow the following route, which is located fully on privately owned roads:

- trucks will collect coal from the eastern end of the coal pads at the HVLP and then proceed around the pads in a one-way direction to the HVLP's combined ingress/egress access road;
- from the HVLP's access road, trucks turn left onto Pikes Gully Road, travel a distance of approximately 350 m and then turn right into a one-way ingress road into NLP;
- trucks will then proceed to and dump coal into hoppers or stockpiles at NLP;
- trucks leaving NLP will then use a one-way egress road for their return trip to HVLP; and
- from HVLP's access road, trucks will proceed in a one-way direction around coal pads back to the loading point.

Trucks hauling between the HVLP and RCT will follow the following route on both public and private roads:

- trucks will collect coal from the eastern end of the coal pads at the HVLP and then proceed around the pads in a one-way direction to the HVLP's combined ingress/egress access road;
- from the HVLP's access road, trucks will turn left onto Pikes Gully Road, proceed to the West Pit Access Road where they will turn left;
- immediately after turning onto the West Pit Access Road, trucks will turn left onto a privately owned sealed road that runs parallel to the New England Highway;
- from the sealed road, trucks will turn left onto an internal haul road and travel to Liddell Station Road where they will turn right; and
- from Liddell Station Road, trucks will turn right into a combined ingress/egress road and then proceed to dump coal into hoppers at the RCT before returning to the HVLP.

Coal may also be loaded at the NLP for transportation to the HVLP or the RCT.

Haulage from the HVCPP to HVLP will principally be undertaken on the privately owned Belt Line Road. North of the New England Highway, the haulage will be undertaken on private haul roads through to the HVLP. Part of this route includes a bridge which passes over Liddell Station Road.

The majority of the proposed haulage will be undertaken on privately owned roads, including the northern section of Pikes Gully Road and the Belt Line Road. The publicly owned roads include Liddell Station Road and the southern portion of Pikes Gully Road.

Loading and Unloading

For the intermittent haulage between the HVLP, NLP and RCT, the loading of trucks will be via a front-end loader, which will collect coal from a specific stockpile created at the HVLP. Only coal from the dedicated stockpile will be loaded. Unloading at the NLP and RCT will be undertaken at existing hoppers currently used for the receipt of coal from trucks.

For the intermittent haulage between the HVCPP and HVLP, trucks will be loaded via a front-end loader from stockpiles at the HVCPP. Trucks will unload adjacent to existing stockpiles at the HVLP.

Truck Movements and Tonnages

Haulage between the HVLP, NLP and RCT will only be undertaken when the need for the transfer of coal arises. This will vary but may be undertaken over a period of five days at least once a month. Between the HVLP and NLP, approval is being sought for the haulage of a maximum of 25,000 t per day. Between the HVLP and RCT, approval is being sought for the haulage of a maximum of 15,000 t per day.

It is expected that haulage will only be undertaken between two loading points at one time. That is, no haulage will be undertaken between the HVLP and RCT when haulage is being undertaken between the HVLP and NLP, and vice versa.

Haulage between the HVCPP and HVLP will only be undertaken when the Belt Line Conveyor breaks down or is undergoing routine maintenance. This is likely to be undertaken at an average rate of once per month. Haulage will also be undertaken during the upgrade of the conveyor during Year 1. Approval is being sought for the haulage of approximately 25,000 t per day during these times.

It is proposed to utilise a fleet of highway rated B-double trucks on a rotational basis for the proposed haulage. The number of truck movements required will depend upon the amount of coal to be transferred, however based on a limit of 15,000 t per day between the HVLP and RCT, truck movements will not exceed 319 one-way movements or 638 two-way movements. Based on a limit of 25,000 t per day between the HVLP and NLP, and the HVCPP and HVLP, truck movements will not exceed 532 one-way movements or 1,064 two-way movements.

All trucks will be covered during the transfer of coal, which will prevent spillage on roadways. In addition, CNA will also regularly sweep and maintain publicly accessible roads along the route such as Pikes Gully Road, the West Pit Access Road and Liddell Station Road.

Road and Intersection Improvements

To facilitate the safe haulage of coal between the loading points, the following road and intersection improvements are currently being undertaken:

- the intersection of the HVLP's access road and Pikes Gully Road will be improved by:
  - removing or relocating the existing gates away from Pikes Gully Road (further into the property);
  - resealing of cracked edges to the HVLP's access road;
  - provision of a wider sealed splay for vehicles turning left from the HVLP's access road onto Pikes Gully Road; and
  - line marking of Pikes Gully Road intersection to facilitate trucks turning right from Pikes Gully Road into the HVLP's access road.
- line marking of Pikes Gully Road at its intersection with the access road into the NLP to facilitate trucks turning right from Pikes Gully Road; and
- With the exception of the access road, a speed limit of 20 km/hr will be imposed on trucks travelling within the HVLP. A speed limit of 40 km/hr will imposed on trucks travelling on the HVLP access road.

The above improvements are currently being undertaken as part of the recent approval for the intermittent haulage of coal between the HVLP and NLP.

15.9 Impacts on the Road Transport Network

15.9.1 General

This section addresses the potential impacts that the proposal is likely to have on the surrounding road transport network, including potential impacts associated with:

- additional employees;
- construction traffic; and
- intermittent haulage.

Traffic associated with additional employees and construction activities will be distributed throughout the surrounding road network while traffic associated with the intermittent haulage will be confined to roads around the rail loading points. As such, the discussion on the employee and construction related traffic addresses potential impacts on the general road network while the discussion on the intermittent haulage focuses on local roads around the loading points.

Consideration has also been given to the proposal's implications on existing coal haulage along Pikes Gully Road between the WPCPP and NLP.

15.9.2 Employee Traffic

Distribution and Number of Additional Vehicle Movements

As previously stated, employee numbers at HVO are predicted to peak in 2020 or Year 17 at 1,246 people, an increase of 216 people over current employment levels if market conditions are favourable. Of these 216 potential additional employees, approximately 177 are expected to work principally or partly at HVO north of the Hunter River.

Based on the 66 % car usage rate for employees at HVO, 177 additional employees are likely to generate an additional 234 daily vehicle trips. Most of the traffic generated by the additional employees, will be generated from the east from Singleton, Cessnock, Maitland and Newcastle etc. A small proportion will be generated from the west from Muswellbrook and Scone etc.

The distribution of traffic generated by the additional employees is expected to be the same as the current distribution as described in Section 15.3.3. Based on this distribution and the expected traffic movements described in Sections 15.8.2, the following employee traffic movements are expected:

- approximately 60 % of the additional employee vehicles (or 106 vehicles) are expected to travel to and from HVO north of the Hunter River from the east using the New England Highway. Approximately a quarter of these vehicles (or 27 vehicles) will then access HVO north of the Hunter River from Pikes Gully Road while three quarters (or 79 vehicles) will access HVO north of the Hunter River from Lemington Road;
- approximately 20 % of the additional employee vehicles (or 35 vehicles) are expected to travel to and from HVO north of the Hunter River from the east using the Golden Highway. All of these vehicles are likely to access HVO north of the Hunter River from Lemington Road;
- approximately 10 % of the additional employee vehicles (or 18 vehicles) are expected to travel to and from HVO north of the Hunter River from the west using the New England Highway. Approximately one quarter of the vehicles (or 5 vehicles) will then access HVO north of the Hunter River from Pikes Gully Road three quarters (or 13 vehicles) will access HVO north of the Hunter River from Lemington Road; and
- approximately 10 % of the additional employee vehicles (or 18 vehicles) are expected to travel to and from HVO from the west using the Golden Highway. All of these vehicles are likely to access HVO north of the Hunter River from Lemington Road.

Predicted Traffic Volumes

Table 15.7 describes the projected traffic flows at relevant traffic count locations as a result of the increase in employees that will work principally or partly at HVO north of the Hunter River and compares these flows against baseline data.

As Table 15.7 demonstrates, additional traffic daily flows generated by additional employees at the peak of the operations will be relatively small, ranging between 18 two way movements (9 vehicle trips to and from the site) on the Golden Highway west of Lemington Road and 106 two way movements (53 vehicle trips to and from the site) on the New England Highway.

On the New England Highway and Golden Highways, the additional traffic represents less than 1 % of existing flows. While additional flows on Lemington Road, Pikes Gully Road and the West Pit Access Road represent between 3.4 and 11.9 % of existing flows, the existing level of service on these roads will be maintained. These roads currently carry only a small volume of traffic and have the capacity to cater for much larger volumes of traffic.

15.9.3 Construction Traffic

Distribution and Number of Additional Vehicle Movements

Construction traffic will largely be limited to the first year of the proposed operations. After this, the only construction envisaged as part of the proposal is the occasional construction of the temporary crossing over the Hunter River and the construction of the conveyors between HVO south of the Hunter River and the HVCPP, and the HVLP and NLP when it is economically feasible.

In Year 1, construction traffic will peak at 130 two way traffic movements (86 two way light vehicle movements and 44 two way heavy vehicle movements).

Table 15.7 Predicted Employee Traffic Volumes

Road	Traffic Count Location	Baseline Traffic Volumes	Predicted Traffic Volumes	Change	Change %
New England Highway	South of Lemington Road	11,611	11,717	106	0.9
Golden Highway	West of Lemington Road	2,207	2,225	18	0.8
	West of the Putty Road	4,384	4,419	35	0.8
Lemington Road	Near intersection with New England Highway	1,234	1,326	92	7.5
	Near intersection with Golden Highway	445	498	53	11.9
Pikes Gully Road	West of New England Highway	934	966	32	3.4
West Pit Access Road	–	829	861	32	3.9

The likely distribution of construction traffic is likely to be similar to the distribution of employee vehicles, with the majority of traffic being generated from the east. However, instead of one quarter of the traffic accessing HVO north of the Hunter River from Pikes Gully Road via the West Pit Access Road and the other three quarters accessing the site from Lemington Road (as is the case for employees), the split for construction traffic is likely to be 50/50. That is, half of the construction vehicles are expected to access HVO north of the Hunter River from Pikes Gully Road while the other half will access the site from Lemington Road.

Based on peak construction traffic movements and the distribution of traffic described above, the following construction traffic movements are expected in Year 1:

- approximately 60 % of the construction vehicles (or 78 vehicles) are expected to travel to and from HVO north of the Hunter River from the east using the New England Highway. Approximately half of these vehicles (or 39 vehicles) will then access HVO north of the Hunter River from Pikes Gully Road while the other half will access HVO north of the Hunter River from Lemington Road;
- approximately 20 % of the construction vehicles (or 26 vehicles) are expected to travel to and from HVO north of the Hunter River from the east using the Golden Highway. All of these vehicles are likely to access HVO north of the Hunter River from Lemington Road;
- approximately 10 % of the construction employee vehicles (or 14 vehicles) are expected to travel to and from HVO north of the Hunter River from the west using the New England Highway. Approximately half of the vehicles (or 7 vehicles) will then access HVO north of the Hunter River from Pikes Gully Road while the other half will access HVO north of the Hunter River from Lemington Road; and
- approximately 10 % of the additional employee vehicles (or 14 vehicles) are expected to travel to and from HVO from the west using the Golden Highway. All of these vehicles are likely to access HVO north of the Hunter River from Lemington Road.

Predicted Traffic Volumes

Table 15.8 describes the projected traffic flows at relevant traffic count locations as a result of construction traffic generated in Year 1 and compares these flows against baseline data.

Again, as Table 15.8 demonstrates, additional traffic daily flows generated by construction activities during Year 1 will be relatively small, ranging between 14 two way movements (7 vehicle trips to and from the site) on the Golden Highway west of Lemington Road and 78 two way movements (39 vehicle trips to and from the site) on the New England Highway. These additional flows represent less than 1 % of existing flows.

While additional flows on Lemington Road, Pikes Gully Road and the West Pit Access Road represent between 3.7 and 9 % of existing flows, the existing level of service on these roads will be maintained. As previously mentioned, these roads currently only carry a small volume of traffic and have the capacity to cater for much larger volumes of traffic.

15.9.4 Intermittent Haulage of Product Coal

Distribution and Number of Additional Vehicle Movements

When required, trucks will be used to haul product coal between the WPCPP, NLP and RCT. These trucks will use Pikes Gully Road to access the HVLP for intermittent haulage between the HVLP, NLP and RCT and internal haul roads to access the HVCPP for intermittent haulage between the HVCPP and HVLP.

Haulage between the HVLP, NLP and RCT will only be undertaken when the need for the transfer of coal arises. This will vary but may be undertaken over a period of 5 days at least once a month. Between the HVLP and NLP, approval is being sought for the

Table 15.8 Predicted Construction Traffic Volumes

Road	Traffic Count Location	Baseline Traffic Volumes	Predicted Traffic Volumes	Change	Change %
New England Highway	South of Lemington Road	11,611	11,689	78	0.7
Golden Highway	West of Lemington Road	2,207	2,221	14	0.6
	West of the Putty Road	4,384	4,410	26	0.6
Lemington Road	Near intersection with New England Highway	1,234	1,280	46	3.7
	Near intersection with Golden Highway	445	485	40	9.0
Pikes Gully Road	West of New England Highway	934	980	46	4.9
West Pit Access Road	–	829	875	46	5.5

haulage of a maximum of 25,000 t per day. Between the HVLP and RCT, approval is being sought for the haulage of a maximum of 15,000 t per day.

Haulage between the HVCPP and HVLP, haulage will be undertaken at a maximum rate of 25,000 t per day at least once per month. It is proposed to utilise a fleet of highway rated B-double trucks on a rotational basis for the proposed haulage. The number of truck movements required will depend upon the amount of coal to be transferred, however based on a limit of 15,000 t per day between the HVLP and RCT, truck movements will not exceed 319 one-way movements or 638 two-way movements. Based on a limit of 25,000 t per day between the HVLP and NLP, and the HVCPP and HVLP, truck movements will not exceed 532 one-way movements or 1,064 two-way movements.

Furthermore, intermittent haulage between the HVLP and NLP will cease if the conveyor between the HVLP and NLP is economically feasible to construct.

Predicted Traffic Volumes

Intermittent haulage between the HVCPP and HVLP will be undertaken on private haul roads (mostly along Belt Line Road). No haulage along this route will be undertaken on public roads.

Intermittent haulage between the HVLP, NLP and RCT will be undertaken on Pikes Gully Road, internal haul roads and Liddell Station Road. While the northern section of the route along Pikes Gully Road is privately owned, haulage on the southern section of Pikes Gully Road and Liddell Station Road will be undertaken on public roads. As described in Section 15.2, these roads are predominantly used by mining activities, principally for the haulage of coal.

Based on site surveys undertaken on Pikes Gully Road east of the New England Highway and Liddell Station Road, daily traffic flows of approximately 960 and 720 vehicles are experienced respectively. The proposal will increase these flows to 2,024 vehicle movements on Pikes Gully Road and 1,358 vehicle movements on Liddell Station Road. While these movements will increase traffic flows on these roads by 111 % and 89 %, it is unlikely that they will have little effect on the operation and level of service of these roads. The roads currently carry small amounts of traffic and have the capacity to cater for significantly greater amounts of traffic.

Furthermore, it is noted that the majority of the additional flows (111 % increase over existing flows) on Pikes Gully Road will be on the privately owned section between the HVLP and NLP, where consent is sought for haulage of 25,000 t per day. On the publicly owned section, where consent is sought for the haulage of 15,000 t per day, additional flows represent an increase of 67 % on the days that haulage is undertaken.

15.9.5 Coal Haulage

As previously stated, Pikes Gully Road is currently used for the haulage of product coal between the WPCPP and NLP. Figures provided by CNA for the period 28 April to 14 May 2003 indicate that there was a total of 4,904 two way truck movements, at an average of 288.5 two way truck movements per day.

No additional haulage of product coal is proposed between the WPCPP and NLP. In fact, due to the proposed increased throughput at HVCPP (and the potential decreased throughput at WPCPP), it is likely that there will be a reduction in the number of truck movements between the WPCPP and NLP along Pikes Gully Road at some stage in the future. This will reduce the impact that haulage between the HVLP, NLP and RCT will have on this road.

15.9.6 Blasting

Mines are generally required to close any public roads when blasting approaches within 500 m of any public road surrounding the mine. As West Pit extends within 500 m of Lemington Road towards the end of the mine plan, it is expected that the road will have to be temporarily closed when blasting is undertaken. Road closures will generally be less than 15 minutes per blast.

15.10 Road Maintenance

As previously stated, although some of Pikes Gully Road is publicly owned, the road is fully maintained by CNA and Xstrata. The maintenance is managed by CNA (as owners and operators of HVO) and partly funded by Xstrata (as owners and operators of Cumnock No. 1 Colliery and Liddell).

Maintenance that is undertaken includes:

- weekly inspections to ascertain work requirements;
- regular road sweeping;
- repair of potholes and damage;
- maintenance of guide posts;
- maintenance of verges and shoulder (including grass slashing in some areas); and
- line marking.

As part of the proposal, the existing road maintenance measures for Pikes Gully Road will be maintained by CNA.

15.11 Conclusion

The proposal will not have an adverse impact upon the surrounding road network.

Additional traffic movements generated by additional employees on the New England and Golden Highways, represents less than 1 % of existing flows. While additional flows on Lemington Road, Pikes Gully Road and the West Pit Access Road represent between 3.4 and 11.9 % of existing flows, the existing level of service on these roads will be maintained.

Vehicle movements associated with construction activities are not expected to have a noticeable impact on the surrounding road network. While additional flows on Lemington Road, Pikes Gully Road and the West Pit Access Road represent between 3.7 and 9 % of existing flows, the existing level of service on these roads will be maintained. These roads currently carry only a small volume of traffic and have the capacity to cater for much larger volumes of traffic.

Additional traffic flows as a result of intermittent haulage will increase flows to approximately 2,024 vehicle movements on Pikes Gully Road and approximately 1,358 vehicle movements on Liddell Station Road. While these movements will increase traffic flows on these roads by 111 % and 89 % on the days the haulage is undertaken, it is unlikely that they will have little effect on the operation and level of service of these roads. The roads currently carry small amounts of traffic and have the capacity to cater for significantly greater amounts of traffic. Further, the majority of the increase in flows on Pikes Gully Road as a result of the will be on privately owned sections of the road between the HVLP and NLP. On the publicly owned sections of the road, there will be an increase in traffic flows of 67 % on the days that haulage is undertaken.

CHAPTER 16

waste

16 Waste

16.1 Introduction

A number of wastes are produced as part of the mining process and as a result of the supporting activities at HVO north of the Hunter River. These wastes include:

- overburden and interburden;
- coarse and fine reject from the CPPs;
- water and waste water;
- general waste including domestic wastes;
- recyclable waste;
- regulated waste; and
- other hazardous waste.

Each of these wastes is discussed in detail in the following sections. CNA have developed procedures for handling these wastes in accordance with the principles of waste management which are:

- reducing wastes at the source;
- reusing materials where possible;
- recycling wastes where practicable; and
- disposing of wastes appropriately and responsibly.

Waste reduction forms part of the planning process and is considered in the redesign of equipment and development of new or alternative processes. In addition, purchasing guidelines have been developed to encourage the selection of recyclable or reusable products where practical. This includes consideration of the nature and amount of packaging so that products which have a minimum of packaging or recyclable or reusable packaging are selected.

The procedures for handling the wastes described above are provided in the following sections.

16.2 Overburden

Overburden is produced as part of the mining process. It is disposed of within mined out sections of the mine to rebuild the surface to produce a final landform developed as part of the mine plan.

Assessments of the pH of soils at depth in both Carrington and West Pit suggest that overburden will be generally high in pH, typically between pH 8.5 and 9.0. Acid generation in these soils is therefore unlikely. Should acidic overburden be identified it will be disposed of at depth to minimise potential impacts to groundwater quality.

The placement of overburden is undertaken in accordance with the mine plans for each mining operation within HVO north of the Hunter River.

16.3 Reject

Reject material is produced as a by-product of the coal washing process. ROM coal often contains part of the rock strata above and below the coal seam. This rock is removed from the product coal through a process of washing. As a result, two types of reject are formed, coarse and fine reject.

Coarse reject is made up of larger rock and is disposed of into voids left by mining in much the same way as overburden.

Fine reject has a high water content and is pumped into tailings dams for settling and dewatering. Water from the tailings dams is reused in the water management system. When these dams reach capacity, they are allowed to dry out, capped with overburden and the land rehabilitated to an appropriate land capability in accordance with the mine plan.

16.3.1 Tailings Dams Within HVO North of the Hunter River

Tailings dams are currently located at West Pit and North Pit. Two tailings dams are located in West Pit, namely Bob's Dump and Dam 6. Bob's Dump is currently at a height of RL 167. Approval has already been obtained to increase the height of this dam to RL 175 which will increase the life of this dam by three to four years depending on ROM coal production rates. Should additional storage be required, Dam 6 has a storage volume of 2 Mm^3. Bob's Dump is scheduled to be decommissioned at the end of 2006, with reshaping and rehabilitation planned for 2011. Selection of sites for additional tailings dams will be undertaken in consultation with the DMR.

Two tailings dams are currently located within the North Pit, namely the Central Storage and the South East Storage. These storages are expected to be filled by the end of 2003. Following this, it is proposed to use the North Pit void located to the north of the boundary of the Alluvial Lands and to the west of the mine access road as a tailings dam. Approval for the North Pit Tailings Storage Facility has already been obtained and construction has commenced. The tailings storage facility is an in pit storage and will have a capacity of around 20 Mm^3 of storage. The storage facility will be confined by mine spoil on three sides (north, east and south) and the mine highwall forms the western boundary. The southern boundary is adjacent to the Alluvial Lands and will be separated from the Alluvial Lands by a 50 m buffer zone.

A groundwater monitoring program has been developed to enable the monitoring of the water levels and quality in the area surrounding the tailings facility. Three piezometers will be installed in the Alluvial Lands down gradient of the storage facility. These will be used to monitor the water level, pH and salinity levels on a monthly basis. In addition the locations will be used to check for speciation, initially on a quarterly basis and eventually to an annual basis as trends occur. Flow meters on bores will monitor water outflow from the Alluvial Lands area and the decant area.

All tailings dams and storage facilities will be rehabilitated in compliance with MOP requirements.

16.3.2 Reuse Option for Fine Reject

Fine rejects have a high coal content. A proposal has been put forward that would use the fine reject from the HVCPP as a fuel in Bayswater and Liddell Power Stations. This project would involve construction of a flotation plant adjacent to the HVCPP to concentrate the coal fraction within the fine reject and a pipeline to pump the concentrate to the power stations for use as a fuel. Water extracted from the fine reject would be returned to CNA's water management system for reuse. The construction of such a facility adjacent to the HVCPP does not form part of the current proposal. If the reuse project proceeds, it is envisaged that a separate approval would be pursued. However, approval is sought to send tailings to and from such a facility.

16.4 Water and Waste Water

The management, use and reuse of water and waste water within HVO north of the Hunter River is discussed in detail in Chapter 2 and Chapter 10. The integration of the water management system across HVO north of the Hunter River will improve the efficiency of water re-use thus reducing the volume of water discharged to the Hunter River.

16.5 General Waste

General waste includes non recyclable and non reusable wastes. These wastes are collected in specific bins and disposed of by a licenced contractor in accordance with CNA's waste management procedures. General wastes include:

- food scraps (putrescible waste);
- food wrappers;
- non-recyclable plastics (packaging);
- rope;
- rubber (hydraulic) hoses – oil to be drained;
- polystyrene cups;
- damaged pallets or wooden products;
- rubber bands, metal clip binders, pens;
- damaged air filters; and
- light hydrocarbon contaminated rags.

The proposal does not require a significant increase in the number of staff or equipment used across HVO north of the Hunter River. The volume of general waste produced by the proposal is therefore not expected to increase. In addition, CNA's waste management procedures will result in a reduction in the volume of general waste disposed of into landfill through careful selection of goods with less packaging and the appropriate reuse and recycling of wastes which may otherwise have been classed as general waste.

16.6 Recyclable Waste

Recycling bins have been provided on site to receive the following waste:

- paper – copy paper, newspaper, hand towels, phone books, envelopes;
- magazines;
- aluminium cans;
- glass bottles;
- cardboard; and
- plastics which show the recyclable logo 1, 2 or 5.

These recyclable wastes are co-mingled and collected on a regular basis by a licensed contractor.

Other recyclable materials collected on site include:

- wooden pallets
- toner cartridges;
- conveyor belting;
- light vehicle and heavy earthmoving tyres; and
- scrap metal.

Each type of waste is stored at the waste management facility on site until it is collected for recycling by the nominated waste contractor.

Light vehicle tyres are removed from site for repair, reprocessing or disposal by the nominated contractor. Heavy earthmoving tyres are typically re-used on site as road markers or for other delineating purposes. At the end of their life they are disposed of within the pit and their location and depth recorded.

Scrap metal is collected in specific bins on site and include heavy metal scrap, light gauge scrap, aluminium, brass, lead copper, and 205 L and 20 L drums (drained of oil residues). These metals are collected for recycling by a licenced contractor.

CNA's procedures for recycling waste products will reduce the volume of waste, which would otherwise be directed to landfill. In addition, CNA's policy to select goods which have less packaging will also reduce the volume of waste produced by the proposal.

16.7 Regulated Waste

Regulated wastes include oils, grease, lubricants, oily rags, contaminated soils, oily contaminated absorbents and oil filters. Each type of waste is collected in a specific bin. Waste oil and oily water are stored in bulk waste oil storage tanks in bunded areas and the oil is collected and treated by an EPA approved waste oil merchant. Waste coolant is collected, stored and treated in the same way as waste oil. The disposal of these wastes is regulated by a tracking and recording system in accordance with regulatory and CNA requirements.

As the proposal does not significantly increase the equipment requirements of HVO north of the Hunter River, the volume of regulated wastes produced across the site is not expected to increase significantly. The procedures described above, will ensure that any regulated wastes produced by the proposal are disposed of appropriately.

16.8 Hazardous Waste

Other hazardous wastes produced on site include lead acid batteries, non-hydrocarbon based solvents and sharps and other medical wastes. These wastes are subject to regulated tracking and recording systems and are disposed of by a licenced contractor.

As the proposal will not result in a significant increase in the number of staff or equipment, the volume of hazardous waste produced by the site is unlikely to increase. The procedures for the proper disposal of these wastes will also ensure that there are no adverse impacts from the generation of these wastes.

16.9 Waste Tracking System

CNA have developed a waste tracking and recording system to ensure that all waste is managed in accordance with regulatory and CNA requirements. Waste tracking is provided by the nominated contractor who supply the site supply department with waste transport certificates. These certificates detail the waste producer, type of the waste, physical nature of the waste (liquid, solid), collection time and date, transporter details, proposed destination for the waste and evidence that the waste was received at the disposal or recycling facility.

16.10 Conclusion

CNA have developed a detailed waste management procedure to handle wastes in accordance with the principles of waste management. As the proposal does not significantly require an increase in staff or equipment, the volume of wastes produced across HVO north of the Hunter River is unlikely to increase. In addition, the waste management procedure and policy will result in a decrease in the volume of waste disposed of to landfill by encouraging reuse and recycling where possible and appropriate disposal strategies where necessary.

CHAPTER 17

risk

17 Risk Assessment

17.1 Introduction

This risk screening study has been undertaken to determine if the proposal is potentially hazardous and therefore subject to *SEPP 33*. The objectives of the risk screening study are as follows:

- identify the class, location, and quantity of the hazardous materials present at and in the vicinity of the proposed extension;
- determine if the proposed extension should be considered potentially hazardous according to the guidelines provided in *Applying SEPP 33*; and
- conclude if a Preliminary Hazard Analysis (PHA) and/or a route evaluation study should be submitted as part of the EIS.

17.2 Methodology

The methodology for the risk screening study comprises the following:

- data collection and review;
- hazardous materials identification;
- quantity and distance screening; and
- transportation screening.

The assessment covered the dangerous goods (DG) depots present at and in proximity to HVO north of the Hunter River. The study provides an assessment of all existing depots at the following premises:

- West Pit;
- North Pit; and
- NLP.

The depots within HVO south of the Hunter River were excluded from the study as they are located a reasonable distance from operations north of the Hunter River. In addition, the Orica explosives site at Cheshunt has been excluded as it is not in the scope of the EIS.

17.3 Hazardous Materials Identification

Based on the DG licences for HVO, the site plan, and a DG licence audit report prepared by Workplace Safety & Training Services for CNA in 2003, the class, location and quantity of the hazardous materials present at and in proximity to the proposal were identified. This information is summarised in Table 17.1.

Transportation information for the materials held on site for which screening is applicable is summarised in Table 17.2.

17.4 Quantity and Distance Screening

The proposal may be potentially hazardous if the hazardous materials present exceed the screening threshold provided in *Applying SEPP 33*. If the proposal is found to be potentially hazardous, a PHA should be completed in accordance with the PHA guidelines prepared by DIPNR.

For the purpose of risk screening, the DG stores were grouped into 11 general areas. The hazardous materials present in each of these areas were then grouped and summed according to their classes. The guidelines provided in *Applying SEPP 33* were adopted during grouping and the following should be noted:

- LPG, though classified as a flammable gas (Class 2.1), is treated separately for screening purposes. Hence, the LPG stored in Depot 7 in North Pit was screened separately; and
- C1 materials (diesel) stored in the depots have been excluded since they are stored in a separate bund or not stored in proximity to any other flammable materials.

After grouping and summation, the quantity and/or distance to the nearest site boundary of each group of hazardous material was compared with the threshold values provided in the guidelines in *Applying SEPP 33*. The results of the screening exercise are provided in Table 17.3 and are summarised below:

- Depot 4 in West Pit - the minimum distance of the depot from the site boundary is greater than the threshold distance applicable to petrol (Class 3PGII). Thus, this depot is not considered potentially hazardous.
- Depot 6 in North Pit - the quantity of turpentine substitute stored is less than the minimum screening quantity. Thus, this depot is not considered potentially hazardous.
- Depot 7 in North Pit – the minimum distance of the depot from the site boundary is greater than the threshold distance applicable to dissolved acetylene (Class 2.1). In addition, the stored LPG quantity is less than the threshold quantity. Thus, this depot is not considered potentially hazardous.
- Depot MG1 in North Pit - the minimum distance of the depot from the site boundary is greater than the threshold distance applicable to explosive material (Class 1.1). Thus, this depot is not considered potentially hazardous. Depots MG2A and MG2B in North Pit - the stored explosive material quantity is less than the minimum screening quantity. Thus, these depots are not potentially hazardous.

Table 17.1 Hazardous Materials in Proximity to the Proposed Extension

Area	Depot	Mode of Storage	Material	Class & Packaging Group	Stored Quantity	Unit
W1	4	U/G Tank	UN 1203 Petrol	3PGII	27	m^3
W2	5	A/G Tank	UN 00C1 Diesel	C1	110,000	l
W2	6	A/G Tank	UN 00C1 Diesel	C1	110,000	l
W2	7	A/G Tank	UN 00C1 Diesel	C1	110,000	l
W2	8	A/G Tank	UN 00C1 Diesel	C1	110,000	l
W2	9	A/G Tank	UN 00C1 Diesel	C1	110,000	l
W2	10	A/G Tank	UN 00C1 Diesel	C1	110,000	l
N1	6	Flammable Liquids Cabinet	UN 1300 Turpentine substitute	3PGIII	0.2	m^3
N2	7	Cylinder Store	UN 1001 Acetylene, dissolved	2.1 - liquefied	42	m^3
N2	7	Cylinder Store	UN 1075 Petroleum gases, liquefied	2.1 - liquefied	0.18	m^3
N3	8	A/G Tank	UN 00C1 Diesel	C1	106,000	l
N3	9	A/G Tank	UN 00C1 Diesel	C1	106,000	l
N3	10	A/G Tank	UN 00C1 Diesel	C1	106,000	l
N3	11	A/G Tank	UN 00C1 Diesel	C1	106,000	l
N3	12	A/G Tank	UN 00C1 Diesel	C1	106,000	l
N3	13	A/G Tank	UN 00C1 Diesel	C1	106,000	l
N4	14	A/G Tank	UN 00C1 Diesel	C1	650,000	l
N5	15	A/G Tank	UN 00C1 Diesel	C1	1,200,000	l
N6	MG1	Magazine	UN 0042 Boosters	1.1D	10	tonnes
N6	MG1	Magazine	UN 0065 Cord, detonating	1.1D	5	tonnes
N7	TBA(1)	Cylinder Store – Acetylene manifold storage cage	UN 1001 Acetylene, dissolved	2.1 - liquefied	140	m^3
N8	MG2A	Magazine	UN 0029 Detonators, non-electric	1.1B	1,000	No.
N8	MG2A	Magazine	UN 0030 Detonators, electric	1.1B	250	No.
N8	MG2A	Magazine	UN 0360 Detonators assemblies, non-electric	1.1B	10,000	No.
N8	MG2A	Magazine	UN 0360 Detonators assemblies, non-electric	1.1B	10,000	No.
N8	MG2A	Magazine	UN 0360 Detonators assemblies, non-electric	1.1B	500	No.
N8	MG2A	Magazine	UN 0360 Detonators assemblies, non-electric	1.1B	2,500	No.
N8	MG2B	Magazine	UN 0029 Detonators, non-electric	1.1B	1,000	No.
N8	MG2B	Magazine	UN 0030 Detonators, electric	1.1B	250	No.
N8	MG2B	Magazine	UN 0360 Detonators assemblies, non-electric	1.1B	2,500	No.
N8	MG2B	Magazine	UN 0360 Detonators assemblies, non-electric	1.1B	500	No.
N8	MG2B	Magazine	UN 0360 Detonators assemblies, non-electric	1.1B	10,000	No.
N8	MG2B	Magazine	UN 0360 Detonators assemblies, non-electric	1.1B	10,000	No.
P1	1a	A/G Tank	UN 00C1 Diesel	C1	40,000	l
P1	1b	Exempt - A/G Tank	UN 00C1 Diesel	C1	20,000	l

Notes: (1) = TBA refers to depot to be added to current DG licence
A/G = Above ground
U/G = Underground
Prefix W indicates that the area is in West Pit
Prefix N indicates that the area is in North Pit
Prefix P indicates that the area is in the NLP

Table 17.2 Hazardous Material Transportation Information

Class and Packaging Group	Material	Estimated No. of Loads Per Week	Load Size[1]
1.1D	UN 0042 Boosters	1	3840 no.
1.1D	UN 0065 Cord, detonating	1	11.7
1.1B	UN 0029 Detonators, non-electric, UN 0030 Detonators, electric and UN 0360 Detonators assemblies, non-electric	1	1
2.1 - liquefied	UN 1075 Petroleum gases, liquefied	1	0.17
2.1 - liquefied	UN 1001 Acetylene, dissolved	1	0.02
3PGII	UN 1203 Petrol	0.0128[2]	2.93
3PGIII	UN 1300 Turpentine substitute	Not available	0.17

Notes: (1) = Load size is in t unless specified (2) Delivery once every 18 months

- Existing depot to be added in to the DG licence for North Pit - the minimum distance of the depot from the site boundary is greater than the threshold distance applicable to acetylene (Class 2.1). Thus, this depot is not considered potentially hazardous.

It can be seen that the proposed extension is not considered to be potentially hazardous and a PHA is therefore not required.

17.5 Transportation Screening

The proposed extension may be potentially hazardous if the number of generated traffic movements, for significant quantities of hazardous materials entering or leaving the site, are above the annual or weekly cumulative vehicle movements stated in *Applying SEPP 33*. If the proposal is found to be potentially hazardous with respect to transportation, a route evaluation study should be completed in accordance with the route selection guidelines prepared by DIPNR.

In accordance with *Applying SEPP 33*, transportation issues were considered for the following hazardous materials:

- explosive material;
- LPG;
- dissolved acetylene;
- petrol; and
- turpentine substitute.

A comparison of the traffic movements of hazardous materials in the proposed extension and the threshold values provided in the guidelines in *Applying SEPP 33* is shown in Table 17.4. It can be seen that the proposed extension is not considered to be potentially hazardous with respect to transportation of hazardous materials and thus does not require a route evaluation study.

17.6 Conclusions

A risk screening study was undertaken for the proposal, based on the guidelines provided in *Applying SEPP 33*. The results of the study indicate that the proposal is not considered potentially hazardous and a PHA is therefore not required to be prepared. In addition, it was found that the proposal is not considered to be potentially hazardous with respect to transportation and no route evaluation study is required.

Table 17.3 Quantity and Distance Screening Results

Area[#]	Depot No.	Depot Type	Material	Screening Class[*]	Quantity	Method Used[+]	Threshold Quantity / Distance[x]	Closest Distance to Site Boundary (m)	Potentially Hazardous?	Remarks
W1	4	U/G Tank	UN 1203 Petrol	3PGII	27 m^3	figure 9	11 m	862	No[b]	
N1	6	Flammable Liquids Cabinet	UN 1300 Turpentine substitute	3PGIII	0.2 m^3	N/A	N/A	N/A	No	The quantity is less than the minimum screening quantity (2 m^3) listed in Applying SEPP table 1, thus the depot is not potentially hazardous.
N2	7	Cylinder Store	UN 1001 Acetylene, dissolved	2.1 - liquefied	42 m^3	figure 7	23 m	241	No[b]	
N2	7	Cylinder Store	UN 1075 Petroleum gases, liquefied	LPG (A/G)	0.18 m^3	table 3	16 m^3	N/A	No[a]	The density of LPG is estimated to be 510 kg/m^3. (Ref: MSDS for LPG from Elgas Ltd. NSW Australia)
N6	MG1	Magazine	UN 0042 Boosters UN 0065 Cord, detonating	1.1	15 tonnes	figure 5	340 m	655	No[b]	
N7	To be added to licence	Cylinder Store - Acetylene manifold storage cage	UN 1001 Acetylene, dissolved	2.1 - liquefied	140 m^3	figure 7	33 m	103	No[b]	
N8	MG2A and MG2B	Magazine	UN 0029 Detonators, non-electric UN 0030 Detonators, electric UN 0360 Detonators assemblies, non-electric	1.1	48.5 kg	N/A	N/A	N/A	No	The explosive content in a detonator assemblies, non-electric is estimated to be 1 g. (Ref: Norabel Ignition Systems - ST Detonator (7.8 m) technical data). The explosive content in a detonator, non-electric or a detonator, electric is of similar value according to a review of the initiating system product catalogue from African Explosives Limited. The quantity is less than the minimum screening quantity (100 kg) listed in Applying SEPP table 1, thus the depot is not potentially hazardous.

Notes: A/G = Above-ground, U/G = Underground

(#) Prefix W indicates that the area is in the West Pit; Prefix N indicates that the area is in the North Pit.

(*) The screening class refers to the 'class' column in table 1 of Applying SEPP 33.

(+) This column refers to the 'Method to use / Minimum Quantity' column in table 1 of Applying SEPP 33.

(x) This column refers to the 'Screening threshold quantity' column in table 3 of Applying SEPP 33 or the threshold distance for the stored quantity, as given in the relevant figures of Applying SEPP 33.

(a) If the stored quantity is less than the threshold quantity, the storage is not considered to be potentially hazardous.

(b) The minimum distance from the site boundary is greater than the threshold distance. Thus, the area is not considered to be potentially hazardous.

Table 17.4 Transportation Screening Results

Class	Material	Estimated Max. Number of Loads Per Week	Load Size (in tonnes unless specified)	Peak Weekly Vehicle Movements Thresholds	Thresholds (Min. quantity per load (tonnes)	Trigger a route evaluation study?	Remarks
1.1D	UN 0042 Boosters	1	3,840 no.	N/A	N/A	No(#)	Each load contains 1.5 pallets (1 pallet = 2,560 individual boosters). Up to 1 tonne of boosters in each delivery.
1.1D	UN 0065 Cord, detonating	1	11.7	N/A	N/A	No(#)	30 boxes/week (approx. 390 kg (2 rolls @ 500 m) in each box).
1.1B	UN 0029 Detonators, non-electric, UN 0030 Detonators, electric, UN 0360 Detonators assemblies, non-electric	1	1	N/A	N/A	No(#)	Up to 1 tonne of detonators in each delivery.
2.1	LPG	1	0.17	30	5(+)	No	Deliver once (3 "S" size cylinders) per week; S Size = 108 l (Ref: BOC Gas Hotline). The density of LPG is estimated to be 510 kg/m^3. (Ref: MSDS for LPG from Elgas Ltd. NSW Australia).
2.1	Acetylene (Dissolved)	1	0.02	30	5(+)	No	Deliver once (3 "G" size cylinders) per week max. to HVO main warehouse. Each "G" size cylinder contains 7 m^3 of acetylene at ambient conditions with a specific volume of 0.90 m^3/kg at 21°C (Ref: Information of Dissolved Acetylene Instrument Merchant from BOC website).
3PGII	UN 1203 Petrol	1.28E-02	2.93	45	3(x)	No	Deliver once every 18 months. 4,000 l in each delivery. Specific gravity = 0.73 at 20°C.
3PGIII	UN 1300 Turpentine substitute	Not available	0.17	60	10(x)	No	Since there is no delivery data available, it was assumed that the delivery quantity is equal to the current storage capacity which is 200 l. Specific gravity = 0.86 at 15°C. (Ref: US Coast Guard CHRIS Hazardous Chemical Data)

Note:

(#) - Transportation screening of Class 1 materials are not based on the estimated maximum number of loads per week, but whether the transportation of the dangerous goods in this class creates a risk in terms of transportation practices. As part of the proposed extension, it is not envisaged that the quantity or the method of transportation of Class 1 materials will change over existing practices which operate in accordance with relevant codes of practice and approval from the Department of Mineral Resources. Therefore, it is considered that a route evaluation study is not required.

(+) - Minimum quantity applicable for packages.

(x) - Minimum quantity applicable for bulk delivery.

CHAPTER 18

cumulative impacts

18 Cumulative Impacts

18.1 Cumulative Impact Setting

In 1997, the Department of Urban Affairs and Planning (DUAP) published a study which investigated the cumulative impacts of mining and other activities in the Upper Hunter Valley. The study recognised that all individual disturbances to the environment caused by natural and human activities have the potential to act in unison to create cumulative impacts. The issues identified in the study have been considered in the preparation of this EIS.

In order to fully determine the impacts associated with the proposal, it is necessary to assess the proposal in the context of the cumulative effect of the proposal together with all of the existing or proposed mines in the area. This is particularly important for issues associated with public amenity, including noise and air quality, where the cumulative effect is often greater than the sum of the individual components.

The cumulative impact assessments have included potential impacts associated with surrounding mines and industrial areas. The surrounding mines included for assessment were Ravensworth-Narama (including the Ravensworth West Extension), HVO south of the Hunter River (Riverview and Cheshunt Pits), United Colliery, Ashton and Wambo.

Cumulative impact assessments are generally complex and rely on detailed information on other companies' existing and proposed operations. This information is not always available or in consistent formats that are capable of being used for the assessment. The cumulative assessment therefore requires assumptions to be made regarding the timing of developments, changes in which can significantly affect the assessment of cumulative impacts. Where information has not been available, assumptions have been made. Furthermore, so as not to underpredict potential cumulative impacts, conservative assumptions have been made.

The following sections provide a summary of the cumulative assessments undertaken throughout the EIS. More detailed information on the cumulative impacts is presented in the relevant chapters of the EIS.

18.2 Noise

The cumulative noise assessment assessed the influences from surrounding industrial activity on residences potentially impacted by the proposal. The significant noise sources in the vicinity of HVO north of the Hunter River include Ravenworth-Narama, HVO south of the Hunter River (Riverview and Cheshunt Pits) and Wambo.

Noise from surrounding mines was sourced from the following documents:

- an EIS produced by Resource Strategies Pty Limited in June 2003 for the Wambo Development Project;
- an SEE produced by ERM Australia Pty Limited in November 2001 for a Section 96(2) modification of development consent at HVO;
- an EIS produced by ERM Mitchell McCotter in August 1997 for the extension of mining operations at Ravensworth-Narama; and
- an EIS produced by HLA-Envirosciences Pty Limited in November 2001 for the Ashton Coal Project.

These documents provide predicted L_{10} or L_{eq} noise levels for calm and adverse weather. For the purposes of this cumulative assessment, the following was adopted:

- for the Wambo project, the L_{eq} predicted noise levels enhanced under south easterly winds were used as those present the worst case impact on the private residences being addressed;
- for HVO south of the Hunter River, the predicted noise levels were presented as L_{10}'s, and additionally weather effects were predicted through statistically determining the frequency of occurrence of particular noise levels. These levels presented in the SEE are the 90th percentile point in that occurrence frequency set. These have been used as L_{eq} weather enhanced results in this assessment;
- for Ravensworth-Narama, the predictions under a 3 °C/100 m temperature inversion were adopted. This is considered more appropriate than say winds in a given direction, given the relative locations of residences potentially affected by the proposal and Ravensworth-Narama. That is, winds that enhance noise from one mine will not enhance noise from the other at the same residential location; and
- For the Ashton Coal Project, the predicted results for temperature inversions were used. These range from 31 dB(A) to 35 dB(A) L_{eq} for potentially the most exposed Maison Dieu residence for various operating scenarios. However, a timeline breakdown is not provided hence the upper level of the range was adopted for the cumulative assessment.

The cumulative noise from these operations was added to the results for worst case INP weather from the proposal. This is a conservative approach as, for example, a south easterly wind that may enhance noise from Wambo will not equally enhance noise from the proposal. Nonetheless, this approach does provide a crude method of assessing cumulative noise during prevailing weather.

Table 18.1 summarises the cumulative noise effects of surrounding mines and related infrastructure. The percentage values in the parenthesis indicate the proposal's contribution (in noise terms) at that residence. The results are for prevailing weather conditions as described earlier and are therefore conservative. It should be noted that based on the information provided in corresponding EIS's, both Wambo and Ravensworth-Narama mines will cease operations in 2016 (year 14) and 2007 (year 4) respectively. However, the Ravensworth-Narama mine was presumed to operate until 2012 (year 8) for assessment purposes. The predicted noise from these operations were therefore cumulative assessed accordingly. From beyond year 14, noise is attributed to the proposal, Ashton and HVO south of the Hunter River.

Applying a night time cumulative noise criterion equivalent to the EPA's night time amenity goal of 40 dB(A) $L_{eq,9hour}$, applicable for a rural residence according to the INP, shows that all private residences not currently within a zone of affectation will be within or marginally (not more than 3 dB) above the EPA's amenity goal. As discussed earlier, the predictions above are based on a worst case $L_{eq,15minute}$ noise level from each operation. Adopting a conservative 3 dB correction that is expected between the predicted worst case $L_{eq,15minute}$ and $L_{eq,9hour}$ noise level, implies that noise levels at these private residences are predicted to be below the EPA's amenity goal. This correction is due to the inherent downtime of plant over the 9 hour night-time period as compared with a worst case 15-minute noise emission level. It should be noted that this 3 dB intrusiveness to amenity correction has not been applied to any results.

Private residences predicted to experience cumulative noise above the EPA criterion are Property Nos. 8 to 12. These properties are currently inside a zone of affectation or subject to a private land holders agreement. HVO North of the Hunter River's contribution to these exceedances is displayed in percentage terms in Table 18.1.

18.3 Air Quality

Cumulative air quality impacts have been determined by assessing the planned ROM coal production and dust emission rates for each neighbouring mine operating in the area for Years 1, 3, 8, 14 and 20.

The neighbouring mines included Ravensworth-Narama, United Colliery, Wambo and HVO south of the River (Riverview and Cheshunt Pits). In addition to these mines, it is acknowledged that other mines and other sources will contribute to $PM_{2.5}$, PM_{10}, TSP concentrations and to dust deposition. In the past, annual average concentrations of particulate matter contributed by these more distant sources have been set at 5 μg/m^3 for PM_{10}, 10 μg/m^3 for TSP and 0.5 g/m^2/month for deposited dust.

In the cumulative modelling work each neighbouring mine has been treated as three volume sources. These sources have been located at the apparent

Table 18.1 Cumulative Night-time L_{eq} Noise Levels at Properties

Property No.	Proposal Year				
	Year 1	Year 3	Year 8[(4)]	Year 14	Year 20
	Cumulative Noise Level (Proposal contribution), dB(A)				
1	39 (79 %)	38 (79 %)	39 (79 %)	39 (79 %)	41 (95 %)
2	40 (63 %)	40 (63 %)	40 (79 %)	39 (50 %)	39 (79 %)
3	40 (63 %)	40 (63 %)	41 (63 %)	39 (50 %)	39 (60 %)
4	42 (63 %)	43 (50 %)	43 (63 %)	39 (32 %)	40 (28 %)
5	40 (8 %)	41 (6 %)	40 (10 %)	38 (8 %)	38 (9 %)
6	40 (8 %)	41 (6 %)	40 (10 %)	37 (8 %)	37 (9 %)
7[2]	43 (50 %)	43 (50 %)	42 (63 %)	37 (79 %)	39 (56 %)
8[2]	**48 (63 %)**	**48 (63 %)**	**48 (63 %)**	43 (79 %)	**46 (43 %)**
9[1]	**54 (100 %)**	**54 (100 %)**	**54 (100 %)**	43 (79 %)	**47 (76 %)**
10[1]	**48 (100 %)**	**48 (100 %)**	**48 (100 %)**	42 (63 %)	44 (62 %)
11[1]	43 (40 %)	**45 (25 %)**	42 (50 %)	40 (32 %)	40 (30 %)
12[1]	**57 (40 %)**	**56 (50 %)**	**54 (79 %)**	**52 (100 %)**	**52 (98 %)**

1. These private residences are currently inside a HVO zone of affectation or subject to a private land holders agreement.
2. These private residences are currently inside a zone of affectation or subject to a private land holders agreement with mines other than HVO.
3. The Year 8 results assume Carrington and the Alluvial Lands are operating.

Numbers in bold indicates levels above EPA night amenity goals (applying an expected minimum 3 dB correction for $L_{eq,15\ minute}$ vs $L_{eq,9\ hour}$ noise levels) points of major emission as estimated from the known locations of the pits and or major dust sources on the mine or facility.

Dust concentrations and deposition levels were predicted throughout the mine plan, considering the impact of the proposal in isolation and cumulatively. For each of the five years, isopleth diagrams have been produced showing the following:

- the predicted annual average PM_{10} concentration;
- the predicted annual average TSP concentration; and
- the predicted annual average dust deposition.

Most mines in the Hunter Valley will be operating reactive control strategies to manage air quality in the short term. The effect of these strategies can not be included in the cumulative modelling. If these strategies work, then the mines should not be significant contributors to non-compliance with the short term standards or goals.

The results of the cumulative air quality assessment are presented as a series of isopleths in the Air Quality Study contained in Part I of Volume 2 as well as Figures 34 to 36 of Volume 4. Comparison of the isopleths with the relevant criteria for cumulative air quality impacts revealed that Property No. 12 experiences exceedances of the US EPA cumulative PM_{10} criterion of 150 μg/m^3 24 hour over all years. Property No. 9 experiences exceedances in Years 3 and 8 (with Carrington) while Property No. 10 experiences exceedances in Year 8 (with Carrington) only.

The cumulative annual PM_{10} criterion, 30 μg/m^3, is exceeded at Property No. 12 over all years and at Property No. 9 for Years 1, 3, Year 8 (with Carrington) and Year 20. In addition, Property No. 12 experiences exceedances of the EPA criteria for cumulative TSP and cumulative dust deposition criteria over all years. In general, the contribution of HVO north of the Hunter River to these levels is small and the affected properties are currently inside a zone of affectation or subject to a private land holders agreement.

18.4 Socioeconomic

The cumulative socioeconomic impacts for the proposal relate principally to the extension of West Pit, which extends the life of HVO north of the Hunter River by eight years. As the employees utilised by West Pit in the planned extension of the mine will mainly consist of the current workforce, it is not expected that the extension of the mine will place pressure on the social infrastructure in the area, such as community services, housing and other social services.

The extension of the mine will maintain the supply of thermal coal, which has been identified by the State Government as a key export earner. This will have flow on effects to other key industries and local contractors.

18.5 Visual Environment

An assessment of the visual impacts associated with the proposed extension of West Pit was undertaken in the context of both the regional and local setting.

Open cut mining is a visually intrusive process and results in a high degree of visual contrast with the surrounding landscape. However, the West Pit extension involves the extension of a brown field site, meaning that it is an extension to an existing operation.

The locality surrounding HVO north of the Hunter River is dominated by coal mines and associated industry. The visual assessment was therefore undertaken with consideration to the local landscape context which incorporates both coal mines and the surrounding rural and forested setting.

The visual impact of HVO north of the Hunter River will decrease over the life of the mine as mining operations cease in both the Alluvial Lands and Carrington. Visual impacts to users of Lemington Road will increase in the short term due to the West Pit extension. Lemington Road links the New England Highway with the Golden Highway and forms the main access route to a number of mines. Views of mines and mining operations are common along this road and the West Pit extension will be visually consistent with these existing activities. The visual impacts of the West Pit extension will be mitigated along Lemington Road by the use of vegetation screening early in the mine plan.

Users of the New England Highway and the Golden Highway are not expected to be visually impacted by the proposal due to the distance of the proposal from these roads and the length of viewing time.

Some elevated viewer locations to the south of HVO north of the Hunter River near the Golden Highway already have views toward Carrington. These viewer locations are not expected to have views toward mining at West Pit due to shielding by ridgeline in the south east corner of the West Pit mining area.

Careful mine planning will ensure the intrusiveness of the development is minimised and the proposal is sympathetic to significant viewer locations especially along Lemington Road. Mitigation measures will include tree planting and bunding as required and the design of the rehabilitation schedule to ensure the maximum possible disturbed area is rehabilitated at any one time.

18.6 Traffic and Transport

The potential cumulative impacts associated with the proposal were assessed taking into account the future contribution to traffic from the Wambo, United and Warkworth mine developments. Assessments of these developments suggested that while traffic would increase in the construction phase, overall traffic volumes would decrease in the operational phase. Estimates of the traffic generated by these developments were used to develop baseline traffic numbers, which were in turn used to assess traffic impacts from the proposal. The cumulative impact assessment covered:

- employee traffic;
- construction traffic;
- intermittent haulage of product coal; and
- haulage of product coal.

Additional traffic daily flows generated by additional employees at the peak of the operations will be relatively small, ranging between 18 two way movements (9 vehicle trips to and from the site) on the Golden Highway west of Lemington Road and 106 two way movements (53 vehicle trips to and from the site) on the New England Highway.

On the New England and Golden Highways, the additional traffic represents less than 1 % of existing flows. While additional flows on Lemington Road, Pikes Gully Road and the West Pit Access Road represent between 5 and 11.9 % of existing flows, the existing level of service on these roads will be maintained. These roads currently carry only a small volume of traffic and have the capacity to cater for much larger volumes of traffic.

Additional traffic daily flows generated by construction activities were also assessed. During Year 1 flows will be relatively small, ranging between 14 two way movements (7 vehicle trips to and from the site) on the Golden Highway west of Lemington Road and 78 two way movements (39 vehicle trips to and from the site) on the New England Highway.

While additional flows on Lemington Road, Pikes Gully Road and the West Pit Access Road represent between 3.7 % and 9 % of existing flows, the existing level of service on these roads will be maintained. As previously mentioned, these roads currently only carry a small volume of traffic and have the capacity to cater for much larger volumes of traffic.

Intermittent haulage between the HVCPP and HVLP will be undertaken on private haul roads (mostly along Belt Line Road). No haulage along this route will be undertaken on public roads.

Intermittent haulage between the HVLP, NLP and RCT will be undertaken on Pikes Gully Road, internal haul roads and Liddell Station Road. While the northern section of the route along Pikes Gully Road is privately owned, haulage on the southern section of Pikes Gully Road and Liddell Station Road will be undertaken on public roads. As described in Chapter 15, these roads are predominantly used by mining activities, principally for the haulage of coal.

Based on site surveys undertaken on Pikes Gully Road east of the New England Highway and Liddell Station Road, daily traffic flows of approximately 960 and 720 vehicles are experienced respectively. The proposal will increase these flows to 2,024 vehicle movements on Pikes Gully Road and 1,358 vehicle movements on Liddell Station Road. While these movements will increase traffic flows on these roads by 111 % and 89 %, it is likely that they will have little effect on the operation and level of service of these roads. The roads currently carry small amounts of traffic and have the capacity to cater for significantly greater amounts of traffic.

Furthermore, it is noted that the majority of the additional flows (111 % increase over existing flows) on Pikes Gully Road will be on the privately owned section between the HVLP and NLP, where consent is sought for haulage of 25,000 t per day. On the publicly owned section, where consent is sought for the haulage of 15,000 t per day, additional flows represent an increase of 67 % on the days that haulage is undertaken.

Product coal is hauled between WPCPP and NLP along Pikes Gully Road. No additional haulage of product coal is proposed between the WPCPP and NLP. In fact, due to the proposed increased throughput at HVCPP (and the potential decreased throughput at WPCPP), it is likely that there will be a reduction in the number of truck movements between the WPCPP and NLP along Pikes Gully Road at some stage in the future.

18.7 Water Resources

Potential cumulative impacts on surface water and groundwater as a result of the proposal were assessed in Chapter 10 and in the Surface and Groundwater Management Study in Part H of Volume 2.

The major cumulative effect predicted is related to the cumulative depressurisation of coal seam aquifers in the locality. Coal measures pressures will never recover to pre mining levels, as the region now retains different hydraulic properties, with spoil permeability being two to three orders of magnitude higher than undisturbed coal measures. The net effect of the changed properties will be a relatively flat water table over the mined areas at a maximum elevation of about 50 m AHD.

Cumulative depressurisation impacts as a result of the West Pit extension and Carrington are predicted to extend to a distance of about 3.5 km. Loss of aquifer pressures is not predicted to impact Hunter River alluvium nor any existing water supply bores or wells since all bores and wells are located within shallow alluvium.

There will be a loss of 1,486 ha of catchment as a result of mining at West Pit. Catchments which will be consumed include parts of Emu Creek and Farrells Creek. However, 2,835 ha will be reinstated through progressive rehabilitation which will result in a net increase in catchment runoff at the completion of mining at West Pit.

Altered drainage patterns associated with the proposed West Pit extension and mining within HVO north of the Hunter River are not expected to significantly alter the cumulative effect on hydrology caused by the impact of mining operations in the Upper Hunter. The potential to accelerate rehabilitation at Carrington as a result of the proposed increase in mining rate will increase catchment runoff and create flow patterns with a greater similarity to the pre-mining landscape.

Runoff water quality in rehabilitated areas across HVO north of the Hunter River is likely to exhibit a reduced salt load compared to other drainage lines unaffected by mining. This is mostly attributed to the removal of regional aquifer pressures with the coal seams that would otherwise contribute saline seepage to the drainages. All areas planned to be returned to the natural catchment will need to be carefully monitored at the sedimentation dam exit points during early years of rehabilitation to ensure water qualities (suspended and dissolved constituents) are acceptable.

18.8 Ecology

Strategic environmental assessment, which incorporates cumulative impact assessment, is seen as one of the key institutional tools for achieving ecologically sustainable development (Commonwealth of Australia 1994). Cumulative impact assessment is required because significant impacts could result from several smaller actions that, by themselves, might not have significant impacts, but when added to impacts from other actions undertaken in the past, present, and those that could be reasonably undertaken in the foreseeable future, may have significant impacts.

Within the region, when one remnant patch is lost a local population or vegetation community may still survive because it can use resources that are present in, or persist in, adjacent patches. However, the loss of many patches of habitat in a region over time may be large enough to cause the local extinction of species, populations or communities. The subject site and study area have been cleared and disturbed at various times in the past and consist of native pasture, scattered trees, regrowth woodland and cleared areas that provide habitats for a variety of flora and fauna, including threatened species. Therefore, while the proposal will involve clearance of a relatively small area of vegetation of relatively low significance, it will still add to the cumulative impact within the region.

At the regional level a high proportion of the original vegetation of the Hunter Valley has been cleared in the past and so an important consideration of this proposal is how to minimise cumulative impacts for vegetation and habitat loss. The management of cumulative impacts from this proposal includes assessing the potential impacts of the proposal in this EIS and minimising environmental impacts by regeneration and rehabilitation.

The following strategies have been proposed to manage cumulative impacts:

- implementation of a coordinated rehabilitation plan for the HVO north of the Hunter River, which will involve enhanced environmental impact minimisation strategies. This coordinated approach includes regeneration and rehabilitation for biodiversity over the HVO and will assist in minimising the cumulative impacts of past mines within the HVO as well as the current proposal;
- regeneration of woodland areas in Site 2 for up to 15 years, which will increase the area of native vegetation for that time. This will provide additional woodland habitat that will help maintain the patch of vegetation in the study area that links with other remnants (such as the woodland on Ravensworth-Narama and Cumnock No. 1 Colliery), and helps to maintain a more uniform cover of vegetation throughout the Hunter Valley floor; and
- rehabilitation of 30 % of the West Pit mined area to restore the landscape to a state that provides habitat for populations of threatened species that are currently known on the subject site. In addition, rehabilitation on Carrington Mine will now include woodland for biodiversity. The areas proposed for rehabilitation and regeneration within HVO are planned to connect with adjacent patches of vegetation and regional corridors and will be consistent with the *Synoptic Plan: Integrated Landscapes for Coal Mine Rehabilitation in the Hunter Valley of New South Wales* (NSW Department of Mineral Resources 1999).

These measures therefore aim to minimise the cumulative impact of the clearance of vegetation and habitat within HVO and the Hunter Valley by regenerating representative communities and habitats of local, state and regional conservation significance in the study area as well as maintaining and enhancing local and regional corridor connectivity.

18.9 Archaeology

Archaeological sites are an irreplaceable aspect of the cultural landscape and, as a source of information for addressing archaeological research questions, they represent a non-renewable resource. The cumulative impact on Indigenous archaeology is therefore a significant issue and is considered in archaeological assessments (Chapter 13). This section provides a brief discussion of the cumulative impacts on Indigenous archaeology at both the local and regional levels in the Hunter Valley.

Archaeology in the Hunter Valley has been impacted during a long history of European land use, predominantly by land clearing and pastoral activities, but more recently by large scale coal mining operations. The impact of mining is particularly significant because it completely destroys sites and the cultural landscape in which they are situated. The impact of other developments, including past land clearing and pastoral use, may be quite minimal and relate to disturbance of sites rather than destruction.

The cumulative destruction of archaeological sites in the local area as a consequence of mining, particularly within the proposed consent area and areas immediately south of the Hunter River, effects both the social (Aboriginal cultural) and archaeological value of the region. In the surrounding area archaeological sites have been destroyed by mining at Ravensworth-Narama, Cheshunt and Riverview Pits (HVO south of the Hunter River) and Wambo. The destruction of sites by mining activities is however limited to discreet mine pit areas. Areas adjacent to these may be very similar and are likely to contain similar archaeology. Cumulative destruction of sites may therefore have a limited impact on archaeological value of the region as representative samples of different types of terrain or landforms are extant and may be used to address regional research questions (which arguably constitute the only current substantive research questions, or category of research, in the Hunter Valley).

It is more difficult to assess the impact of the cumulative destruction of sites on the Aboriginal cultural value of the region. Aboriginal groups generally provide a blanket assessment of sites or places as 'significant' (ie. they regard all Aboriginal sites and objects as equally significant) therefore they may consider the cumulative destruction of sites to correspond directly with the cumulative destruction of cultural value. Aboriginal cultural value may also be strongly associated with the landscape in which sites are situated (ie. the cultural landscape). In this respect destruction of the landscape may impact on the cultural value of adjacent areas, and there may be a cumulative effect of other measurable impacts. For example, the impact on the visual environment may also impact on the cultural landscape.

PART D

project justification

D

CHAPTER 19

environmental management and monitoring

19 Environmental Management and Monitoring

19.1 Environmental Management System

CNA have developed an Environmental Management System (EMS) that conforms with ISO14001. The EMS covers CNAs corporate and four mine sites, including HVO, Bengalla, Mount Thorley Operations and Warkworth. It is designed so that CNA can:

- efficiently manage its environmental issues;
- ensure compliance with regulatory requirements;
- continually improve its environmental performance; and
- satisfy the expectations of stakeholders and the local community.

The EMS uses environmental policy to feed into planning which in turn feeds into implementation and operation, then measurement and evaluation and finally review and improvement. These then feed back into the environmental policy and each relates back to the ISO 14001 standard. A description of the EMS is provided below.

19.1.1 Policy

CNA's health, safety and environmental (HS&E) policy forms part of the EMS. It has been endorsed by the CNA Board and signed by the Managing Director. Copies of the HS&E policy are located at strategic positions throughout each mine site and at corporate offices. Copies of the policy are included in public documents such as the Annual Environmental Management Report and the CNA Social and Environmental Report, and is included in major tender documents as necessary.

The HS&E policy states that CNA:

> *"… are committed to supplying coal-based energy to global markets in an efficient, safe and environmentally responsible manner. To this end we will:*
>
> - *Conduct our business in a way that maintains a safe and healthy workplace for our employees, contractors, visitors and surrounding community;*
> - *Use all our resources efficiently;*
> - *Protect the environment during all stages of mining;*
> - *Develop sustainable solutions that contribute to meeting the world's energy needs; and*
> - *Provide resources to manage our health, safety and environmental performance."*

The HS&E policy is reviewed for its continuing appropriateness and applicability during the annual management review of the EMS.

19.1.2 Standards

Standards are prescriptive statements of what must be undertaken on site to maintain compliance and to achieve the defined outcomes of the EMS. Once the standards are fully integrated on site, the site performance against each standard will be measured by auditing. Changes to standards can be approved only by the Operations Committee. There are 15 standards within the EMS.

19.1.3 Procedures

There are two types of procedures within the EMS:

- system procedures which describe the maintenance of the EMS; and
- operating procedures which are established, documented and maintained for all activities that have the potential to impact on the environment.

Procedures are common across all sites with appendices to describe site-specific details. Procedures provide details of operation and maintenance of facilities, equipment and machinery to achieve the requirements of the standards. Contractors and suppliers of goods and services are required to adhere to relevant environmental procedures. Table 19.1 provides a list of the procedures which form part of the EMS.

19.1.4 Accountabilities

Employees at all levels are accountable, within the scope of their responsibilities, for environmental performance in accordance with the EMS. Specific responsibilities are described in environmental procedures and job descriptions for managers and personnel with key environmental responsibilities. Contractors have defined environmental responsibilities equivalent to those for mine personnel.

Contractors undertaking work on site that could result in environmental impacts must conform to a similar standard of environmental management as specified in the CNA EMS. This involves a combination of environmental criteria in contract specifications, the preparation and adherence to an Environmental Control Plan or Environmental Management Plan for large contracts, and environmental induction/training as for mine personnel.

19.1.5 Approvals and Licences

Directly applicable legal and other requirements are considered when setting environmental objectives and targets.

Table 19.1 EMS Procedures

Standard	Procedures
1. EMS	1.1 Aspects and Impacts 1.2 Objectives and Targets 1.3 Risk Assessment 1.4 Environmental Audits, Inspections and Non-conformance Management (includes EPA, DMR and DIPNR snap audits) 1.5 Environmental Legislative Compliance 1.6 Environmental Training 1.7 Environmental Reporting 1.8 Incident Reporting 1.9 Communications (includes community and complaints management) 1.10 Monitoring and Measurement 1.11 Annual Management Review of the EMS 1.12 Document Control
2. Environmental, Social and Cultural Impact Management	2.1 Cultural Heritage Management (includes European and Aboriginal heritage)
3. Property Transaction	3.1 Property Transaction Guidelines (Rio Tinto)
4. Closure Planning	4.1 Closure Planning Guidelines
5. Rehabilitation	5.1 Rehabilitation
6. Waste Management	6.1 Waste Management (includes hazardous and Group A waste) 6.2 Coarse rejects and tailings disposal
7. Water Management	7.1 Water Management 7.2 Water Discharge
8. Air Quality Management	8.1 Dust Management CPP 8.2 Air Quality – Mobile Equipment 8.3 Air Quality – Spontaneous Combustion
9. Noise and Vibration Control	9.1 Noise 9.2 Blasting (includes air quality and vibration)
10. Land Management	10.1 Visual Management (including infrastructure design and lighting management) 10.2 Flora and Fauna
11. Greenhouse Minimisation	11.1 Greenhouse Minimisation
12. Acid Mine Drainage	12.1 Acid Mine Drainage Prevention and Control
13. Site Contamination Prevention and Control	13.1 Site Contamination Prevention and Control (note: Safety System handles chemicals)

An independent regulatory compliance audit is undertaken annually to ensure compliance with conditions of approvals. Compliance against relevant environmental acts and regulations is assessed progressively as part of the internal environmental audits and as part of the independent regulatory compliance audit as described in Section 19.1.9.

19.1.6 Environmental Aspects and Impacts

The systematic identification of all activities related to the mine that can cause pollution and the risk ranking of the impacts associated with these activities represented the starting point for the development of the EMS.

Significant aspects are those aspects that have been assessed to have a high environmental risk. Aspects identified with a high environmental risk require a higher level of management and the increased use of resources. This involves one or more of the following:

- on-going environmental monitoring;
- regular auditing and/or inspection;
- the existence of environmental procedures;
- inclusion in environmental management programs; and
- training.

These significant aspects are reviewed annually at the annual management review of the EMS.

19.1.7 Objectives and Targets

The purpose of establishing and maintaining environmental objectives and targets is to ensure continual improvement in environmental performance. Objectives can be considered as long term goals for improvement while targets are specific and measurable where practicable, and have a set time for their achievement. Progressive performance against targets is communicated as part of the

Environmental Services Manager's monthly environmental report to each site.

CNA's objectives and targets are consistent with the HS&E Policy. They incorporate legal requirements, the management of significant environmental impacts, the views of the community, the mine's technological options and its operational and business requirements. For a number of the targets there is variation among the mines. Objectives and targets are reviewed and modified as part of the Annual Management Review (AMR) of the EMS.

19.1.8 Environmental Management Programs

Environmental Management Programs (EMPs) document the practical means to achieve the mine's environmental objectives and targets by the accomplishment of identified environmental improvements. The programs are updated annually at the AMR, prior to budget planning.

19.1.9 Environmental Audits

CNA undertakes or is subject to a variety of environmental audits including:

- regular internal environmental audits which are undertaken 4 – 6 times per year;
- periodic external certification audits of the EMS to verify that it complies with ISO14001 - these are normally at annual intervals;
- a combined annual compliance audit against approval conditions and a Rio Tinto audit;
- DIPNR audits at three to five yearly intervals, undertaken at the same time as the compliance audit; and
- other audits by statutory authorities (DMR and DIPNR annual audit of rehabilitation, announced or unannounced audits by the EPA and DIPNR).

19.1.10 Corrective Action Register

Non-conformances from internal environmental audits, compliance audits, periodical audits of the EMS against ISO14001, departmental inspections, observations and other sources are placed on the Corrective Action Register (CAR). The CAR is managed on a database and details what corrective or preventive action is required, the environmental risk, responsibility for action, target date for completion and closing comments.

CAR items are managed by each department and can be sorted into overdue, current and completed. Progress against completion of CAR items is monitored through internal environmental audits.

19.1.11 Management Reviews

The EMS is reviewed annually at each site by the Management Team to determine its continuing suitability, adequacy and effectiveness. It includes an assessment of the appropriateness of the environmental policy, risk assessments, objectives and targets, audit results, responsibilities and resources. Following the site reviews, a summary of outcomes is presented to the Operations Committee, for sign-off by the Managing Director.

19.1.12 Environmental News and Reports

CNA is actively involved in communicating its environmental management initiatives to its staff, contractors, regulatory authorities, visitors and external interest groups.

External communications include:

- Community Consultative Committees;
- newsletters;
- annual Social and Environment Report;
- Annual Environmental Management Report;
- complaints management and environmental contact line;
- visits to neighbours by mine personnel;
- open days;
- project planning process / EIS meetings;
- CNA internet site;
- inspections by statutory authorities; and
- school links program.

Internal communications on environmental matters are undertaken through communication sessions, toolbox talks, notice boards, intranet and e-mail.

19.1.13 Training Resources

All mine personnel receive training in environmental awareness and the EMS as part of their induction and thereafter as refresher courses to provide updated information on changes to legislation and environmental management controls.

Specific training based upon environmental issues and summarising the relevant content of procedures is provided on a regular basis, in toolbox talk format. Each department is responsible for maintaining their training records.

Contractors are required to ensure that their workforce have been trained and meet the requirements of the EMS. This includes induction and toolbox talks. Permanent contractors must be included in the relevant mine's toolbox talks.

19.2 Summary of Mitigation Measures

19.2.1 General

The impacts identified as resulting from the proposal will be managed through the use of the procedures outlined in Table 19.1 which form CNA's EMS. The following sections provide a summary of the objectives for key environmental aspects associated with the proposal together with the appropriate procedure and specific mitigation measures to achieve these objectives.

19.2.2 Socio-economic

Objective

To protect and maintain the existing socioeconomic fabric of the local and regional communities.

Mitigation

In order to minimise the social impacts of the proposal effectively, good communication between CNA and the local community will be maintained through existing management strategies outlined in EMS Procedure 1.9 – Communications. These strategies include:

- a pro-active community information program. The Community Consultative Committee for HVO will continue to meet with members of SSC, MSC, DPNIR, DMR and the EPA to discuss the progress of mines within HVO and compliance with conditions of development consent; and
- a 24 hour contact line will continue to operate, allowing the community to contact CNA staff, should they have an issue with the operation of the mine. The complaints process ensures that complaints are recorded and monitored, effectively handled, and reviewed on a regular basis.

In addition, CNA will continue to contribute to the local community through sponsorship of local community programs and visits to the mine.

19.2.3 Land Management

Objective

To maximise the efficient, productive and sustainable landuse practices on non-mining land.

Mitigation

EMS Procedure 10.2 - Flora and Fauna documents management procedures for the following land management control programs which will continue to be undertaken:

- ongoing weed management and control within the proposal area is continued to be carried out to the satisfaction of the RLPB. Control methods include spraying, wick weeding, cultivation and grazing. Weed management is undertaken on a regular basis;
- a feral animal control program will include ongoing baiting to control the numbers of rabbits, hares, foxes, wild dogs and feral cats. Special myxomatosis will be released on site in conjunction with the RLPB for rabbit control;
- a number of management procedures are used to minimise the potential for bushfire hazard including:
  - maintenance of grazing practices, to reduce fuel loads and maintain low grass levels in areas of high bushfire potential;
  - provision of an adequate level of fire breaks and access trails throughout the ML;
  - regular maintenance and grading of access trails; and
  - provision of sufficient on-site fire fighting equipment.

19.2.4 Rehabilitation and Regeneration

Objective

To ensure rehabilitation and revegetation is self sustaining and follows the principles of sustainable development.

Mitigation

Mitigation measures are designed to minimise the direct and indirect impact of the gradual clearance of native vegetation within West Pit and Carrington over the life of these mines. EMS Procedure 5.1 – Rehabilitation documents the procedure for rehabilitation. This procedure is used for rehabilitation works within HVO north of the Hunter River. However, in addition to these procedures it is proposed to establish 30 % of the rehabilitated area of the extension with local native tree and shrub species to increase biodiversity values. These areas will link up with other rehabilitation measures being undertaken within HVO north of the Hunter River to enhance the local connectivity in the final landform by linking habitat along a south west to north east corridor. Rehabilitation will be undertaken in consultation with the DMR and will be promoted for bio-diversity conservation by:

- using native endemic seeds (to match those already found on the subject site) where possible, for seeding and replanting programs;
- rehabilitate groundcover, understorey and canopy species by seeding and planting (planting understorey and tree species would be undertaken where grass competition restricts the use of direct seeding);
- planting a variety of species as opposed to a monoculture, especially species that flower at different times of the year or that provide foraging resources for affected species;

- creating a diversity of landforms and habitats such as woodland, regrowth and open forest on ridgetops and lower slopes;
- placement of habitat features such as logs, rocks and dams; and
- linkage of areas rehabilitated with trees within adjacent remnant vegetation to promote regional corridors.

19.2.5 Flora and Fauna

Objective

To reduce impacts to native flora and fauna within the West Pit extension area and HVO north of the Hunter River.

Mitigation

EMS Procedures 5.1 - Rehabilitation and 10.2 Flora and Fauna provide mitigation measures to address impacts to flora and fauna. Specific mitigation measures for the West Pit extension which will be included in the EMS are designed to minimise the direct impact of the gradual clearance of native vegetation within the extension area and indirect impacts on the area within West Pit over 30 years. They include:

- vegetation and habitat clearance protocols;
- progressive rehabilitation; and
- regeneration.

These mitigation measures will compliment the proposed integration of rehabilitation, regeneration and best practice environmental controls and management for HVO north of the Hunter River.

Rehabilitation plans will be developed as part of the MOPs and will incorporate considerations such as conservation objectives, community expectations, pre-mining land use, final land use, drainage, stability, soils, erosion control and visual compatibility. Rehabilitation plans will also follow the principles and strategies outlined in the *Synoptic Plan: Integrated Landscapes for Coal Mine Rehabilitation in the Hunter Valley of New South Wales* (NSW Department of Mineral Resources 1999) and will be undertaken in consultation with the DMR.

The integration of rehabilitation and regeneration measures over HVO north of the Hunter River will have a greater beneficial effect in the long term for flora and fauna on West Pit and in HVO north of the Hunter River, compared to rehabilitation undertaken separately for each mine within HVO north of the Hunter River. Beneficial effects in the long term include an increase in areas of naturally regenerated woodland which will enhance biodiversity habitat and an increase in connectivity across a landscape that is currently highly fragmented.

19.2.6 Water Resources

Objective

To minimise potential off-site environmental impacts and to maximise the use of mine water on-site.

Mitigation

The EMS for HVO contains procedures for water management (Procedure 7.1) and water discharge (Procedure 7.2). In addition to these two procedures, a water management system for all of HVO north of the Hunter River has been developed by MER (2003). This water management system is described in Chapter 4 and in the Surface and Groundwater Management Study in Part H of Volume 2. This water management system maximises the use of water within HVO by connecting the separate operations. A schematic of the water management system is shown in Figures 14 and 15 of Volume 4. The water management system demonstrates the efficient use of water within HVO north of the Hunter River to reduce water discharges and the need to obtain water from the Hunter River.

19.2.7 Air Quality

Objective

To minimise the generation of airborne dust and air emissions from the site to ensure compliance with the relevant performance indicators and regulatory requirements and to minimise unduly effects on the local amenity.

Mitigation Measures

CNA have developed three EMS procedures to manage impacts to air quality. These procedures include Procedure 8.1 – Dust Management CPP, Procedure 8.2 – Air Quality – Mobile Equipment and Procedure 8.3 – Air Quality – Spontaneous Combustion.

Procedure 8.1 provides management measures for handling dust generated at CPPs within HVO north of the Hunter River. These measures include, but are not limited to:

- automatic sprays, or other dust control mechanisms will be used when tipping raw coal that generates excessive dust quantities at the raw coal bins;
- all spillage of material at the CPP will be cleaned up to prevent dust; and
- water sprays are/will be fitted at all transfer points within the CPP.

Procedure 8.2 provides management measures for mitigating dust generated from mobile equipment such as haul trucks. The following management measures to control dust emissions from the mine are included in the procedure:

- disturbance of the minimum area necessary for mining. Reshape, topsoil and rehabilitate completed overburden emplacement areas as soon as practicable after the completion of overburden tipping;
- maintain coal handling areas in a moist condition using water carts to minimise wind blown and traffic generated dust;
- maintain water sprays on product coal stockpiles and use sprays to reduce the risk of airborne dust;
- all roads and trafficked areas will be watered using water carts to minimise the generation of dust;
- all haul roads will have edges clearly defined with marker posts or equivalent to control their locations, especially when crossing large overburden emplacement areas;
- obsolete roads will be ripped and re-vegetated;
- development of minor roads will be limited and the locations of these will be clearly defined;
- minor roads used regularly for access etc will be watered;
- access tracks used by topsoil stripping equipment during their loading and unloading cycle will be watered;
- long term topsoil stockpiles, not used for over 6 months will be re-vegetated;
- dust aprons will be lowered during drilling;
- drills will be equipped with dust extraction cyclones, or water injection systems;
- water injection or dust suppression sprays will be used when high levels of dust are being generated from drilling activities;
- adequate stemming will be used during all blasting operations; and
- mining activities will be adjusted if wind conditions causes visible dust on Lemington Road or on sensitive locations.

It is envisaged that the monitoring program necessary to verify environmental performance will incorporate the following:

- one meteorological station at the HVO;
- six high volume TSP monitors around HVO;
- one PM_{10} monitor in the vicinity of Lemington Road;
- four real time dust monitors will be installed to measure PM_{10} concentrations to the west, south west, east and south east of the mine. Any high levels of dust will trigger appropriate alarms allowing the mine to modify activities;
- dust deposition gauges at representative locations around HVO; and
- real time monitoring of wind speed and direction will assist in best management practices.

Monitoring of operations will be used to demonstrate compliance with consent conditions. Where non-conformances are detected, additional safeguards will be investigated to satisfy CNA's statutory obligations.

19.2.8 Noise

Objectives

To manage noise emissions throughout the operation of the mine, to ensure compliance with the relevant performance indicators and regulatory requirements and to ensure that noise emissions do not unduly affect the amenity of nearby residences.

Mitigation Measures

CNA have developed EMS Procedure 9.1 – Noise, which includes measures to mitigate noise produced as part of normal mining operations.

This procedure features a noise monitoring program which includes the following items:

- the need for attended as well as unattended monitoring is specified for given locations and operating conditions. To ensure that suitable data is captured, the types of monitoring equipment for each location are specified. Weather impacts on monitoring are also addressed;
- a qualitative guide for data collection is provided;
- the number of monitoring stations and their locations is nominated;
- monitoring duration and frequency for each site is specified, depending on the progress of mining operations;
- the monitoring includes sampling such as statistical parameters L_1, L_{10} and L_{90} as well as descriptors such as L_{eq} and L_{max} noise levels; and
- two real time noise monitors will be installed to measure noise levels to the south east and south west of HVO north of the Hunter River. Any high levels will trigger appropriate alarms allowing the mine to moderate its activities.

Monitoring of operations will be used to demonstrate compliance with consent conditions. Where non-conformances are detected, additional safeguards will be investigated to satisfy CNA's statutory obligations.

19.2.9 Vibration

Objective

To minimise the effect of blasting on the surrounding community, and to ensure that the blasting activities comply with regulatory and safety requirements.

Mitigation Measures

EMS Procedure 9.2 – Blasting provides management measures to reduce the impact of vibrations caused by blasting activities. It incorporates the following limitations recommended by ANZECC to minimise annoyance from blasting (they apply where blasting is audible at noise sensitive locations):

- air blast overpressure should not exceed 115 dB(L_{inPeak}) for more than 5 % of the total number of blasts in a year;
- air blast overpressure should not exceed 120 dB(L_{inPeak}) at anytime;
- peak particle velocity for ground vibration should not exceed 5 mm/s for more than 5 % of the total number of blasts in a year;
- peak particle velocity for ground vibration should not exceed 10 mm/s at any time;
- no blasting on Sundays or public holidays; and
- blasting should be avoided during temperature inversion conditions.

Blasting will occur between the hours of 7.00 am to 6.00 pm. This will provide the mine with flexibility to blast during meteorological conditions that will result in the least impact on its neighbours. Typically, HVO will be conducting blasting operations more than once per day.

19.2.10 Aboriginal Heritage

Objective

To ensure that all sites of Aboriginal heritage are identified on the site prior to construction activities and that appropriate measures are implemented for their conservation.

Mitigation Measures

CNA have developed EMS Procedure 2.1 – Cultural Heritage Management which includes management measures for both European and Aboriginal Heritage. This procedure has been developed to ensure all known sites are protected from any activities on mine lease areas. They also provide guidelines in the event of discovering previously unrecorded sites.

There are two key elements to CNA's cultural heritage management procedures: the maintenance of a cultural heritage database (database of archaeological sites) and the ground disturbance permit.

CNA's cultural heritage database holds information about all archaeological sites on HVO mine lease areas including the location and status of each site. This information is used to ensure all relevant mine personnel and contractors have up to date location information on all sites. In addition to this information, sites in mine project areas that are to be conserved are fenced and signposted. The conservation sites adjacent to mining areas are inspected annually by environmental services to ensure that areas are intact and sites have not been disturbed.

The ground disturbance permit ensures that sites, for which no Section 90 Consents have been issued, are not disturbed or destroyed. Accessing any areas not previously disturbed requires a ground disturbance permit. Permits are issued by the Site Environmental Coordinator.

In addition to the procedure described above and on the basis of the archaeological survey of the proposed extension area, the following recommendations will be adhered to for the West Pit extension:

- that prior to the development of the extension area a cultural salvage be undertaken. A cultural salvage may involve collections in areas deemed appropriate by the Aboriginal community. Sites WPE 1 and WPE 2, which contain large numbers of artefacts, including a variety of stone tool types, are likely target areas; and
- given the number of Aboriginal community groups involved in the management process and the assessment of low to moderate archaeological significance, it may be appropriate for an archaeologist to develop a salvage program in consultation with the community groups. Artefacts collected could then be lodged with the Australian Museum providing equal access to all community groups and the scientific community.

In addition to the archaeological survey, a cultural heritage report was also conducted and the following recommendations made:

- identified heritage sites be fenced prior to salvage. This includes site identified in the archaeological survey and the possible scarred tree identified by the Aboriginal stakeholders; and
- involvement of senior Aboriginal men with any heritage works planned for the general far north western corner of the project area which has been identified as a potential Men's area. More specifically this area is north of the access road and west from the possible scarred tree.

19.2.11 Visual

Objective

To minimise the visual intrusiveness of HVO north of the Hunter River to the surrounding locality.

Mitigation Measures

EMS Procedure 10.1 – Visual Management includes infrastructure design and lighting management to mitigate visual impacts as a result of mining operations at HVO north of the Hunter River.

These procedures include careful mine planning to minimise the intrusiveness of the development by ensuring the highest potential visual absorption capacity is maintained throughout the mine extension. Mine planning and mitigation measures include:

- tree screening along Lemington Road between the overpasses over the Western Haul Road and the Belt Line Road early in the mine plan;
- bunding along these sections of road as mining approaches to provide additional screening, if required;
- development of a rehabilitation schedule to ensure the maximum possible disturbed area is rehabilitated at any one time, increasing the absorption capacity of the development. The increased rate of mining at Carrington and increased rate of rehabilitation as a result together with the completion of mining in the Alluvial Lands will also reduce existing impacts; and
- affected property owners will be provided the opportunity to discuss the option of off-site treatments such as landscaping works at each location to minimise the visual impacts from affected properties.

19.2.12 Traffic and Transport

Objective

The objectives in relation to traffic and transport are to minimise the impacts of construction traffic on the local road network and the impacts of road closures as a result of blasting.

Mitigation Measures

The following safeguards will be implemented to minimise the extent of impacts associated with construction activities and the operation of the mine on traffic and access requirements in the surrounding area:

Construction

- consultation with SSC and the RTA will occur prior to any partial or full road closures;
- vehicle movements will be restricted to the minimum necessary to complete the works;
- materials and equipment will be delivered during typical working hours;
- construction vehicles will be required to stay on formed roads or designated laydown areas;
- vehicle and plant movements will be confined to areas previously cleared of vegetation; and
- materials and equipment will be stored securely on site.

Operation

- a management plan will be prepared for mining operations, providing details of road closures associated with blasting. The plan will be prepared in accordance with RTA guidelines and approval conditions; and
- the plan will include as a minimum road closure times, durations, location of any temporary traffic diversions and a specification for appropriate signage and notification. The RTA's NSW *Specification for Control of Traffic at Road and Bridge Works* will be followed in providing traffic control to maintain safe traffic flow; and
- ongoing maintenance of Pikes Gully Road.

19.3 Monitoring Program

Environmental monitoring will be carried out at all stages of the project to provide data that is sufficient to ensure the commitments made in this EIS are followed through both the construction and operation phases of the mine. In addition, real time monitoring for dust and noise will be undertaken to ensure that mine activities are moderated to comply with the standards required by regulating agencies. Detailed monitoring programs have already been developed and included in the EMS. These programs will be amended as required for this project and will include:

- the scope of the monitoring program;
- procedures for reporting non-conformances;
- responsibilities for rectifying non-conformances;
- mechanisms to improve the EMS procedures to prevent future non-conformance; and
- environmental audits of the EMS procedures will be periodically undertaken by accredited auditor(s).

19.4 Community Consultation

The EMS for HVO includes Procedure 1.9 - Communications which details the community liaison strategy for HVO. The objectives of the community consultation strategy are to:

- minimise the impact on community amenity by keeping them informed about the progress of the mine;
- provide advice regarding local issues to maximise community benefit; and
- consider community concerns in the construction and operation planning and the design of further mitigation measures.

The strategy includes procedures that will facilitate the following actions:

- maintain the CNA environmental contact line to report incidents and complaints;

- maintain a register of complaints including the details of actions taken in response to any complaints received; and
- provide the public with adequate notice, prior to the start of construction, via announcements in the local newspaper.

CHAPTER 20

justification

20 Justification

20.1 Introduction

This chapter outlines the justification for the proposal on the basis of Ecologically Sustainable Development (ESD) criteria which have regard for biophysical, social, economic and intergenerational considerations. The main thrust behind ESD is that current and future generations should leave a natural environment that functions as well or better than the one inherited.

20.2 Sustainable Development

20.2.1 Introduction

The commonly accepted 'Bruntland' definition of sustainable development (SD) is:

> *"Meeting the needs of the present without compromising the ability of future generations to meet their own needs"*

CNA is a subsidiary of Rio Tinto and is part of the Rio Tinto Energy (RTE) business group. Rio Tinto have developed a sustainable development policy which is:

> *"To ensure our businesses, operations and products contribute to the global transition to sustainable development"*

As part of the RTE group CNA have assisted in the development and implementation of a consistent approach to SD. This has included the development of a SD framework. The following sections describe the SD framework adopted by CNA. In addition, each of the principles of ESD are considered in relation to the proposal.

20.2.2 CNA Sustainable Development Framework

The Rio Tinto policy forms the basis of the RTE sustainable development framework which has the following goals:

- being the supplier of choice by improving the contribution that their products make to society by increasing their value and reducing the impacts of supply and use;
- being the miner of choice for host communities and governments through development of relationships of mutual benefit; and
- being an employer of choice by introducing sustainable development as a meaningful concept to employees and employment practices.

To realise these goals, CNA will undertake projects in six focus areas. This programme of work, supported by open governance frameworks and capacity building programs, will seek to enhance CNA's contribution to society's transition to SD.

The six focus areas are:

- economic viability;
- community relationships;
- governance including compliance, transparency, business systems and engagement mechanisms;
- capacity building including technical, organisational, employee, customer and community support;
- product stewardship such as providing solutions for disposal/use of energy by-products; and
- environmental stewardship.

In addition, the integration of the SD framework into CNA's business processes is an ongoing and evolving project which is reviewed and updated to meet CNA's SD goals.

20.2.3 Precautionary Principle

Interpretation

According to the *Protection of the Environment Administration Act 1991*, the precautionary principle means that if there are threats of serious or irreversible damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation.

This principle was developed in response to one of the great difficulties of interpreting scientific data. The scientific method produces results based on confidence limits. These are controlled by the scope of data acquisition, interpretation methods and general understanding within a particular scientific discipline of a particular phenomena. This has been used as a way of validating a lack of response to a potential threat of serious or irreversible environmental degradation.

In the application of this principle:

- careful application should always be undertaken to avoid serious or irreversible environmental damage; and
- an assessment of consequences of various options should be undertaken in formulating a proposal.

ESD requires that uncertainty and the associated risk level be considered in decision making.

Justification

The environmental consequences of the proposed extension to West Pit and the consolidation of approvals for HVO north of the Hunter River have been assessed as accurately as possible using appropriate specialists in relevant disciplines where required. The assessment process involved computer modelling, scientific analysis and interpretation of the individual and cumulative environmental impacts of the proposed development. This process has enabled the impacts of HVO north of the Hunter River to be predicted within a reasonable degree of certainty. All predictions, however, contain a degree of uncertainty, which reflects the variable nature of the environment. Where there has been any uncertainty in the prediction of impacts throughout the EIA process, for example, unfavourable weather conditions such as drought during flora and fauna surveys, a conservative approach was adopted to ensure the worst case scenario was predicted in the assessment of impacts.

The proposal is consistent with the precautionary principle to the extent that all potential threats to the environment have been identified and appropriate mitigation measures have been developed to minimise such impacts. These mitigation measures will be incorporated in the EMS for HVO and are based on the best management practices currently available.

The environmental investigations undertaken during the preparation of this EIS have identified potential impacts with adequate scientific certainty to justify proceeding with the proposed development. The proposal therefore follows the objectives of the precautionary principle of ESD.

20.2.4 Social Equity including Intergenerational Equity

Interpretation

Social equity involves value concepts of justice and fairness so that the basic needs of all sectors of society are met and there is a fair distribution of costs and benefits to improve the well-being and welfare of the community, population or society. Social equity does not imply equality but there should be equal access to opportunities for improved welfare, with a bias towards advantaging the least well-off sectors of society.

Social equity includes intergenerational equity, which requires 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.

Justification

The proposal is consistent with the principles of social equity and intergenerational equity through the efficient use of a resource that provides a number of fair and wide ranging benefits to society.

Whilst coal is a finite resource, the proposed extension to West Pit will ensure resource is utilised in an efficient and sustainable manner and that the existing benefits afforded to the community are maintained or enhanced throughout the 21 year mine extension providing both intra and intergenerational equity. Social and economic benefits to the local community through employment, income and output, together with broader economic benefits from local and regional economic development and strength in export markets, are detailed in Chapter 7.

A comprehensive rehabilitation strategy which covers all of HVO north of the Hunter River has also been developed as a part of the proposal. Progressive rehabilitation will occur following the individual mine plan for each pit. The shaping of emplacements and rehabilitation will follow active mining, minimising the area of disturbance at any point in time throughout the mine plan. In addition, by integrating mining operations across HVO north of the Hunter River, and developing a single rehabilitation strategy, CNA will connect adjacent patches of vegetation and regional corridors. This will develop and enhance existing regional corridors in accordance with the DMR's *Synoptic Plan: Integrated Landscapes for Coal Mine Rehabilitation in the Hunter Valley of New South Wales*.

In mitigating the visual impacts of the proposed West Pit extension, tree screening is proposed which will also form part of the overall rehabilitation program for West Pit. It is also proposed to establish 30 % of the rehabilitated area in the West Pit extension area as native habitat. These areas will link up with other rehabilitation measures being undertaken throughout HVO north of the Hunter River under existing approvals. The remaining areas are generally rehabilitated to their original land capability or better, contributing further to biodiversity values on the site.

The rehabilitation strategy will provide further assurance that the health, diversity and productivity of the environment is maintained for the benefit of future generations and the principles of intergenerational equity are maintained.

20.2.5 Conservation of Biological Diversity and Maintenance of Ecological Integrity

Interpretation

Biological diversity refers to the diversity of genes, species, populations, communities and ecosystems, and the linkages between them. Biological resources provide food, medicines, fibres and industrial products. They are also responsible for vital ecological services such as maintaining soil fertility and the supply of clean and fresh water. Maintaining biological diversity safeguards life support functions and can be considered a minimal requirement for intergenerational equity.

Justification

The proposal aims to conserve biodiversity and maintain ecological integrity. Where this is unavoidable, through clearing for vegetation, the proposal aims to minimise such impacts. A comprehensive assessment of flora and fauna within the study area has been undertaken as a part of the EIS. The gradual removal of regrowth woodland will result in the eventual loss of known and potential habitat for a number of species of flora and fauna, some of which are known to be threatened. However, because the majority of vegetation within the study area will already be cleared under existing approvals, the impact of the proposal on biodiversity is likely to be minimal.

This impact has been minimised by the proposed rehabilitation and regeneration strategies which connect isolated patches of vegetation to enhance regional corridors in accordance with the DMR's *Synoptic Plan*. These measures will conserve, enhance and manage habitat within HVO north of the Hunter River. It will mitigate against local fragmentation by enhancing habitats and increasing their potential as dispersal and colonisation corridors. Local populations will persist in the locality, and regional dispersal and connectivity corridors in the locality will be maintained throughout the proposal, ensuring adherence to the principles of conservation of biological diversity and ecological integrity.

20.2.6 Improved Valuation and Pricing of Environmental Resources

Interpretation

This principle is a component of intergenerational equity. The need to determine proper values for services provided by the natural environment, such as the atmosphere's ability to receive gaseous emissions, cultural values and visual amenity.

Applying standard methods of valuation and pricing to environmental resources is a difficult process. This is largely due to the intangible nature of much of the natural environment. The environment has conventionally been considered a free resource as environmental factors have been excluded from determining the real cost of an activity.

Improving valuing and pricing of the environment thus has two effects. Firstly, the real cost to the environment, and subsequently to society, becomes apparent and is thus included in the costs of a project. Secondly, the economic imperative of reducing costs *per se* will result in ESD. This does not simply mean that monetary values should be applied to the environment so that market forces will protect it. Significant qualitative analysis of particular activities is also feasible.

Justification

This EIS examined the environmental consequences of the project and has identified a number of mitigation measures for adverse impacts associated with the proposal.

The principle of improved valuation and pricing of environmental resources is satisfied through rehabilitation of the landscape after mining. In this way, the temporary visual and ecological impacts of mining are reduced by the investment by CNA in returning the landscape to its pre-mining character and in some areas returning land cleared for agriculture to bushland and woodland. In developing the proposed rehabilitation strategy, CNA will connect patches of vegetation resulting in enhanced connectivity of regional corridors and increasing their potential as dispersal and colonisation corridors.

The mitigation measures to be adopted as a part of the proposal are summarised in Chapter 19. An indirect indication of the value of these environmental resources would be the cost of the proposed mitigation measures. The costs of these have been factored into CNA's economic analysis, which indicates that the proposal is economically viable.

20.3 Findings of EIS

20.3.1 Introduction

The *EP&A Regulation* requires that an EIS include:

> *"the reasons for justifying carrying out the development or activity in the matter proposed, having regard to biophysical, economic and social considerations and the principles of ecologically sustainable development."*

The principles of ESD in relation to the proposal have been considered in the preceding section. The following sections provide an overview of the main findings of the EIS having regard to the biophysical, social and economic considerations.

20.3.2 Biophysical Considerations

Ecology

The subject site and study area contains vegetation, habitats and flora and fauna species of local, regional, state and national significance. Potential impacts of the proposed extension include gradual loss of vegetation and habitat over 21 years and a corresponding small, short-term reduction in local and regional connectivity. Impacts would be mitigated by the proposed rehabilitation and regeneration strategies that connect isolated patches of vegetation to enhance regional corridors in accordance with the DMR's *Synoptic Plan*. These measures will conserve, enhance and manage habitat within the study area.

The impact assessment prepared for all flora and fauna included threatened woodland birds, mammals, reptiles and amphibians in the state and national context. This assessment concludes that the impacts of the proposed extension are not likely to be significant.

Water Resources

Continued mining at HVO north of the Hunter River will result in ongoing loss of coal measures aquifer pressures for a period of more than 200 years. Depressurisation of the coal measures and depressurisation impacts are predicted to extend between 2 and 3 km from the pit perimeter at West Pit. Cumulative depressurisation arising from Carrington may extend the distance to about 3.5 km. This loss of pressure is not predicted to impact Hunter River alluvium or existing bores and wells.

The water quality will reflect that of the coal seams which have salinity levels observed to be 10,000 EC. Pumped pit water qualities reflect a composite but lower range of salinities, which range from less than 3,000 EC to more than 6,500 EC and represent a mix of coal measure water, seepage from the shallow regolith and rainfall runoff within the pit.

Clean water run-off will continue to be segregated from mine water via the maintenance of contour drains, sedimentation and mine water dams. Continued mining will have a negligible impact on local and regional catchments. Parts of Emu Creek and Farrells Creek catchments will be consumed by mining. However parts of Davis Creek and Parnells Creek catchments will be rehabilitated and natural run-off returned to these creeks. This will result in a net increase in catchment runoff within West Pit at the completion of mining.

Modelling indicates near balanced systems providing HRSTS discharges are utilised during high and flood flows in the Hunter River and make up water remains available from Liddell Dam 13 or the Hunter River. The demand for make up water and the need for discharges will be reduced if storage within the Alluvial Lands is utilised. Connection of the West Pit and North Pit water management system via a pipeline between Dam 9N and Parnells Dam will facilitate water transfers between the two systems and maximise use of this storage.

20.3.3 Social Considerations

Air Quality

Dust dispersion modelling demonstrated that all private residences surrounding HVO north of the Hunter River that are not currently inside a zone of affectation or subject to a private land holders agreement will experience dust levels below EPA amenity and health goals for the life of the proposed operations. Four residences that are currently inside a zone of affectation or subject to a private land holders agreement, including Property Nos. 8, 9, 10 and 12 are predicted to experience exceedances of the EPA's 50 $\mu g/m^3$ 24 hour PM_{10} criterion due to proposed operations at HVO north of the Hunter River alone.

Noise

The noise modelling for HVO north of the Hunter River has shown that under SI or calm weather conditions all surrounding private residences that are not currently within a zone of affection or subject to a private land holders agreement experience noise levels below the EPA's noise goals. Of the private residences currently inside a zone of affectation or subject to a private land holders agreement, noise levels at Property Nos. 9, 10 and 12 are predicted to exceed EPA goals.

The model has also shown that under worst case INP derived weather conditions, noise at most properties is below or marginally (less than 3 dB) above EPA noise goals that have been historically applied for calm weather. The exceptions are private residences in the vicinity of Property No. 4 where winds cause enhanced noise for these locations during the early stages of mine operations. However, the proposal's noise impacts at all these locations are predicted to remain similar to existing levels for the first 8 years of operation. After this time, Carrington is likely to cease operation, which will contribute to a marked reduction in noise at most residences. The exception being Property No. 12, where noise levels are predicted to remain relatively unchanged.

A comparison against possible acquisition limits imposed on similar mining operations indicates exceedances at four private residences currently inside a zone of affectation or subject to a private land holders agreement. These are Property Nos. 8, 9, 10 and 12. Again, mining noise at these locations is predicted to remain relatively unchanged compared to existing levels.

Real time noise monitoring will be used to assess the performance of the mining operations against the predicted noise levels.

Vibration

HVO's existing blast design will incorporate control on the MIC (maximum instantaneous charge) as described in the noise study to ensure acceptable limits are maintained. This will also be addressed through monitoring.

Aboriginal Heritage

A number of Aboriginal archaeological sites and associated landform zones will be either partially or completely removed by the proposed extension. The majority of sites are considered of low conservation significance, consisting of open artefact scatters many of which are already in disturbed contexts. The artefacts were of locally derived raw materials and generally did not contain any attributes that make them unique or rare in the Upper Hunter Valley.

However, the overall impact on Aboriginal cultural significance was considered to be substantial given the destructive nature of open cut coal mining. Whilst the in-situ conservation of a number of sites is unfeasible due to their relative positions within the extension area, appropriate management in consultation with the local Aboriginal community, including possible salvage operations and exclusion zones, will minimise the impacts on the conservation significance of the area.

Visual

West Pit will become increasingly visible along Lemington Road throughout the 21 year extension. However, the proposal forms an extension of existing operations at West Pit and will be visually integrated with surrounding mining operations throughout the locality.

The design of the mine plan and the proposed vegetation screening to be incorporated into the early stages of the mine plan, will provide significant screening of mining operations. As the mine approaches Lemington Road bunding will be installed, if required. The vegetation screening will ensure that the proposal is sympathetic to significant viewer locations.

Night lighting is not expected to create significant impacts due to the visual shielding of active mining areas. Lighting will be restricted to the minimum necessary for operational and safety requirements and be directed away from incoming views. Lighting above natural topographic screens will be directed downwards and light shields will be used as required to limit the effect of lighting.

The proposed increase in the rate of mining at Carrington will potentially increase the rate of rehabilitation. This will potentially lead to a reduction in the length of time visual impacts from this pit will be experienced by users of Lemington Road and residents along the Jerrys Plains Road section of the Golden Highway. The visual impacts from North Pit and the Alluvial Lands will continue to decrease over time as mining ceases at the end of 2003 and progressive rehabilitation proceeds.

Transport

Vehicle movements associated with construction activities are not expected to have a noticeable impact on the surrounding road network. While additional flows on Lemington Road, Pikes Gully Road and the West Pit Access Road represent between 3.7 and 9 % of existing flows, the existing level of service on these roads will be maintained. These roads currently carry only a small volume of traffic and have the capacity to cater for much larger volumes of traffic.

Additional traffic movements generated by additional employees on the New England and Golden Highways, represent less than 1 % of existing flows. While additional flows on Lemington Road, Pikes Gully Road and the West Pit Access Road represent between 5 and 11.9 % of existing flows, the existing level of service on these roads will be maintained.

Additional traffic flows as a result of intermittent haulage will increase flows to approximately 1,598 vehicle movements on Pikes Gully Road and approximately 1,358 vehicle movements on Liddell Station Road. While these movements will increase traffic flows on these roads by 66 and 89 %, they will have little effect on the operation and level of service of these roads, particularly as these flows will be generated on average 12 times per year. The roads currently carry small amounts of traffic and have the capacity to cater for significantly greater amount of traffic.

Social Amenity

Potential impacts upon social amenity such as air quality, noise and vibration have been outlined in the preceding sections. Social benefits to the community will be generated from the continued opportunities that are presented to local residents from CNA. The operations at HVO north of the Hunter River provide local residents with community and family open days, developing the skills of the employees through education and training programs and donations to the local schools, charity groups and emergency services.

The continuation of social networks, and the unified identity of the area as a coal mining locality will continue to strengthen with the continuing operations of HVO. The retention of employment will support the stability of the local population and therefore support the maintenance of services and industry. The consequences of the extension of West Pit not proceeding are outlined in Section 17.5.

20.3.4 Economic Considerations

The socioeconomic assessment concludes that the proposed 21 year extension to operations at West Pit will provide significant economic benefits to the local and regional economy.

If market conditions are favourable, HVO, at its peak, will employ up to 1,246 full time equivalent persons, an increase of 216 people over current employment levels. Of these additional employees, approximately 177 are expected to work principally or partly at HVO north of the Hunter River. This level of employment will provide a significant economic benefit to the community through an increased expenditure on salaries and subsequent local expenditure.

The West Pit extension will make a significant economic contribution to the economy at a local, national and international level. West Pit is expected to provide $4.42 billion in sales revenue and $219 million in royalties. Based on expenditure over the previous 12 months, HVO is expected to inject $219 million into the local economy per annum, which equates to $2.4 billion over the life of the mine.

20.4 Consequences of Not Proceeding with the Proposed Extension

There are a number of consequences of not proceeding with the proposed extension. These include:

- the objectives of the proposal outlined in Chapter 1 would not be realised;
- an existing coal mine, which produces approximately 7 Mtpa of processed coal principally for export, will be limited to operating under existing approvals;
- a less efficient mine plan would be adopted based on the existing approvals;
- mining operations will ultimately cease 8 years earlier in accordance with the existing approvals;
- the coal resource within the lease will not be fully developed or realised. While it is recognised that there are other project alternatives, such as underground mining, they are currently not economically viable;
- the 18 existing approvals will not be consolidated and the difficulties currently experienced by CNA and government agencies in the administration of these separate approvals will be maintained;
- opportunities to fully integrate rehabilitation strategies across HVO north of the Hunter River will be missed and outcomes for the environment will be reduced;
- opportunities to increase the efficiency of the operation of West Pit will be missed leading to slower rehabilitation of the pits;
- inflexible mining practices which have resulted from separate approvals will be maintained leading to a lack of improvement in the number of trucks using Pikes Gully Road for coal transport from the WPCPP;
- the increase in the rate of mining at Carrington will not occur leading to a decrease in the potential rate of rehabilitation; and
- environmental consequences associated with the proposed extension of West Pit and consolidation of approvals will not eventuate.

20.5 Conclusion

This EIS has presented the findings of an environmental assessment for the proposed extension of West Pit, minor modifications and the consolidation of approvals across HVO north of the Hunter River. HVO north of the Hunter River is an existing open cut mining operation.

Based on existing approvals mining at West Pit is expected to intersect existing approval boundaries by 2004. To allow continuity of West Pit and its efficient integration into HVO north of the Hunter River the following is required:

- a new mine plan which requires extension of West Pit to the east;
- minor modifications to operations within HVO north of the Hunter River; and
- the consolidation of the existing approvals.

If approval is not achieved, West Pit will not be fully integrated into mining operations within HVO north of the Hunter River and CNA and government agencies will continue to experience difficulty in the administration of the 18 separate approvals.

The proposal, which continues HVO's activities north of the Hunter River, involves consolidating the 18 separate approvals across HVO north of the Hunter River, the extension of West Pit east to the boundary with the Belt Line Road and the following additional activities:

- intermittent transport of product coal between the HVLP, NLP and RCT;
- intermittent haulage of coal from the HVCPP to the HVLP along the privately owned Belt Line Road;
- establishment of a location for the intermittent transfer of heavy equipment across the Hunter River; and
- construction of a conveyor between the HVLP and NLP.

Approval for the following approval modifications is also sought:

- increase in capacity of the HVCPP from 13 Mtpa ROM coal to 20 Mtpa ROM coal;
- increase in haulage of coal from mining areas south of the Hunter River to HVCPP from 8 to 16 Mtpa ROM coal;
- allowing the HVCPP and WPCPP to process coal from any of the mining areas in HVO (including south of the Hunter River) and the ability to dispose of reject from any CPP in any approved disposal area within HVO;
- upgrading the Belt Line Conveyor which transfers coal from the HVCPP to the HVLP along the Belt Line Road; and
- increasing production rates at Carrington from 6 Mtpa to 10 Mtpa.

PART E

references, list of abbreviations and glossary

E

REFERENCES

Australian and New Zealand Environment and Conservation Council (2000) **Australian Water Quality Guidelines for Fresh and Marine Waters.** Australian and New Zealand Environment Conservation Council.

Australian and New Zealand Environment and Conservation Council **Technical Basis for Guidelines to Minimise Annoyance due to Blasting Overpressure and Ground Vibration.**

Australian Bureau of Statistics, **2001 Census of Population and Housing, Basic Community Profiles,** for Singleton LGA, Muswellbrook LGA, Hunter SD and NSW

Australian Coal Website – www.australiancoal.com.au

Australian Greenhouse Office (2003) **AGO Factors and Methods Workbook.** Version 3, March 2003. Australia Greenhouse Office, Canberra.

Brayshaw H. (1981) **Archaeological Survey of Proposed Extensions to Howick-Liddell Open-Cut Coal Mine.** Report to Clutha Development Pty Limited through Sinclair Knight & Partners Pty Limited.

Brayshaw H. (1983) **Archaeological Survey of Additional Mining Extension Proposed at Howick–Liddell Open-Cut Coal Mine.** Report to Clutha Development Pty Limited through Sinclair Knight & Partners Pty Limited.

Brayshaw H. (1989) **Archaeology report: Proposed Southern Extension to Howick Coal Mine.** Report to Novacoal Australia Pty Limited.

Briggs J D and Leigh J H (1995) **Rare or Threatened Australian Plants.** CSIRO, Canberra.

Coal and Allied (2001) **Proposed Relocation of a Dragline and an Electric Rope Shovel – Ravensworth and Hunter Valley Operations, Statement of Environmental Effects.**

Coal and Allied (2002a), **Concise Annual Report.**

Coal and Allied 2002b, **Social and Environment Report.**

Croft and Associates (1984) **Hunter Valley No. 2 Mine Environmental Impact Statement.**

Department of Urban Affairs and Planning (1997) **Upper Hunter Cumulative Impact Study and Action Strategy.**

Dyall, L. (1976) **Environmental Studies – Mt. Arthur Project (Hunter Valley) Full Report on Aboriginal Relics.** Report to the Electrictricity Commission of NSW.

Ellliot, G.L. (1987) **The Movement of Soluble Material in Overburden from an Open Cut Coal Mine in the Upper Hunter Valley.** Groundwater Quality. In Coal Mine Rehabilitation, NSW Coal Association, January 1987.

Environment Australia (2000) **Revision of the Interim Biogeographic Regionalisation of Australia (IBRA) and Development of Version 5.1 - Summary Report.** Environment Australia, Department of Environment and Heritage.

EPA. **Approved Methods and Guidance for the Modelling and Assessment of Air Pollutants in NSW.**

ERM Australia Pty Limited (1998) **Hunter Valley No. 1 Mine South Pit Extension Environmental Impact Statement.**

ERM Australia Pty Limited (1999a) **Carrington Mine Environmental Impact Statement.**

ERM Australia Pty Limited (1999b) **Hunter Valley Operations – Western Haul Road Statement of Environmental Effects.**

ERM Australia Pty Limited (2001) **SEE of November 2001 for Hunter Valley Operations Section 96(2) Modification of Development Consent.**

ERM Australia Pty Limited (2002) **Extension of Warkworth Coal Mine Environmental Impact Statement.**

ERM Mitchell McCotter (1995) **Archaeology and Anthropology: Authorisation 72, Howick Coal Mine.** Report to Novacoal Australia Pty Limited.

ERM Mitchell McCotter (1997) **EIS of August 1997 for the Extension of Mining Operations at Ravensworth Mine.**

Haglund L. (1993) **Archaeological Investigation of Site 37-5-63 Hunter Valley No.1 Mine.** Report to Coal & Allied Operations Pty Limited.

Harden G J (Ed.) (2000) **Flora of New South Wales.** Volume 1. Revised Edition. New South Wales University Press.

HLA Envirosciences (2002) **United Colliery Extension of Mining Operations Environmental Impact Statement.**

HLA Envirosciences Pty Limited (2001) **Cumnock Colliery – Proposed 10 Year Mine Plan: Mining Impacts on Groundwater.** Report prepared for EIS on behalf of CumnockNo.1 Colliery.

HLA Envirosciences Pty Limited (2001) **EIS of November 2001 for the White Mining Limited Ashton Coal Project.**

Hunter Valley Research Foundation (2003a) ***Newcastle and the Hunter Region,*** 2003-2004

Hunter Valley Research Foundation (2003b) **Hunter Region Economic Indicators, March Quarter**

James B. Croft and Associates (1978) **Hunter Valley No. 1 Mine Environmental Impact Statement.**

James B. Croft and Associates (1979) **Hunter Valley No. 1 Mine Environmental Impact Statement for the Proposal to Construct Coal Preparation and Handling Facilities and to Expand Mine Production to an Average of 4 Mtpa.**

Mackie Environmental Research (1997) **Ravensworth West Extension Groundwater Study.**

Mackie Environmental Research (1999) **Carrington Mine Project - Groundwater and Surface Water Management Studies.**

Mackie Environmental Research (1999b) **Howick Mine Water Management Studies.**

Mackie Environmental Research (2000) **Hunter Valley North Mine – Water Management Studies.**

Mackie Environmental Research (2003) **Hunter Valley Operations West Pit Extension and Minor Modifications: Surface and Groundwater Management Studies.**

Mineral Resources NSW (2003) **NSW Coal Industry Profile.**

Mitchell McCotter (1992) **Hunter Valley Mine Extension of Mining Environmental Impact Statement.**

Mitchell McCotter and Associates (1987) **Hunter Valley No. 1 Mine Southern Extension Environmental Impact Statement.**

Muswellbrook Shire Council, **Muswellbrook Demographic Profile 1998.**

Muswellbrook Shire Council (1996) **Muswellbrook Local Environment Plan.**

Muswellbrook Shire Council (2001) **Muswellbrook Section 94 Contributions Plan.**

Novacoal Australia (1996) **Howick Joint Venture Proposed Expansion of Howick Coal Environmental Impact Statement.**

NSW Department of Housing (1998) **Managing Urban Stormwater – Soils and construction.**

NSW Department of Mineral Resources (1999) **Synoptic Plan: Integrated Landscapes for Coal Mine Rehabilitation in the Hunter Valley of New South Wales.**

NSW Minerals Council Website, **Minerals and Mining,** (www.nswmin.com.au/minerals).

Peake T (2000) The vegetation of the mid-Hunter Valley: what state is it in currently? In: **Vegetation Management and Biodiversity Conservation – Hunter Region** Proceedings of a workshop held in May 2000 organised by the Hunter Environment Lobby Inc. (Ed. M Falding).

Resource Strategies Pty Limited (2003) **EIS of June 2003 for the Expansion of Wambo Development Project.**

Sinclair Knight and Partners (1985) **Howick Coal Preparation Plant Environmental Impact Statement.**

Sinclair, Knight and Partners (1989) **Proposed Extension to Howick Environmental Impact Statement.**

Singleton Shire Council (1996) **Singleton Local Environmental Plan.**

Singleton Shire Council (1993) **Singleton Council Section 94 Contributions Plan. No. 1.**

Webber H. (1999) **Letter to Howick Coal** dated 24 May 1999.

ABBREVIATIONS

AADT	Annual Average Daily Traffic
AASC	Australian Archaeological Consultants
ABL	Assessment Background Level
ABS	Australian Bureau of Statistics
AEMR	Annual Environmental Monitoring Report
AHD	Australian Height Datum
AMBS	Australian Museum Business Services
ANZECC	Australian and New Zealand Environment and Conservation Council
AS	Australian Standard
AS/NZ	Australian/New Zealand Standard
CCHUAC	Combined Council of Hunter Valley Aboriginal Corporation
CL	Coal Lease
CNA	Coal and Allied Operations Pty Limited
CO	Carbon Monoxide
CPP	Coal Preparation Plant
DA	Development Application
dB	Decibels
DEP	Department of Environment and Planning
DIPNR	Department of Infrastructure, Planning and Natural Resources
DMR	Department of Mineral Resources
DUAP	Department of Urban Affairs and Planning
dt	Diesel Tonnes
EA	Environment Australia
EC	Electrical Conductivity
EIA	Environmental Impact Assessment
EIS	Environmental Impact Statement
EMR	Environmental Management Report
EMS	Environmental Management System
ENCM	Environmental Noise Control Manual
EP&A Act	*Environmental Protection and Assessment Act 1979*
EP&A Regulation	*Environmental Planning and Assessment Regulation 2000*
EPA	Environment Protection Authority
EPBC Act	*Environmental Planning and Biodiversity Conservation Act 1999*
EPI	Environmental Planning Instrument
ERM	Environmental Resources Management Australia Pty Limited
G	Gram
g/m^2/month	Grams Per Square Metre Per Month
GSS	Global Soil Systems
GST	Goods and Services Tax
GVM	Gross Vehicle Mass
ha	Hectare
HAS	Holmes Air Sciences
HRSTS	Hunter River Salinity Trading Scheme
HVCPP	Hunter Valley Coal Preparation Plant
HVLP	Hunter Valley Load Point
HVO	Hunter Valley Operations
HVO CCC	Hunter Valley Operations Community Consultative Committee
HVRF	Hunter Valley Research Foundation
INP	Industrial Noise Policy
kg/ha	Kilograms Per Hectare
kg/m^3	Kilograms Per Cubic Metre
km	Kilometres
km/hr	Kilometres Per Hour
km^2	Square Kilometres

L	Litre
$L/m^2/day$	Litres Per Square Metre Per Day
LEP	Local Environmental Plan
LGA	Local Government Area
LWTC	Lower Wonnarua Tribal Council
m	Metres
m^2	Square Metre
m^3	Cubic Metre
MER	Mackie Environmental Research
mg/m^3	Milligrams Per Cubic Metre
MGJ	Million Gigajoules
MIC	Maximum Instantaneous Charge
ML	Mega Litres
Mlpa	Million Litres Per Annum
MLpd	Million Litres Per Day
mm	Millimetres
MOP	Mine Operations Plan
MSC	Muswellbrook Shire Council
Mt	Million Tonnes
Mtpa	Million Tonnes Per Annum
MTCL	Mount Thorley Coal Loader
NCPP	Newdell Coal Preparation Plant
NES	National Environmental Significance
NHMRC	National Health and Medical Research Council
NLP	Newdell Loading Point
NO_2	Nitrogen Dioxide
NPWS	National Parks and Wildlife Service
PFM	Planning Focus Meeting
PM	Particulate Matter
PM_{10}	Particulate Matter with Aerodynamic Diameters less than 10 Micrograms
ppm	Parts Per Million
RBL	Rating Background Level
RCT	Ravensworth Coal Terminal
REP	Regional Environmental Plan
RLPB	Rural Lands Protection Board
ROM	Run of Mine
RoTAP	Rare or Threatened Australian Plant
RTA	Roads and Traffic Authority
SD	Statistical Division
SEPP	State Environmental Planning Policy
SI	Still Iso-Thermal
SIS	Species Impact Statement
SO_2	Sulphur Dioxide
SSC	Singleton Shire Council
t	Tonnes
tph	Tonnes Per Hour
TSC	*Threatened Species Conservation Act 1995*
TSP	Total Suspended Particulates
UAC	Ungooroo Aboriginal Corporation
UHWC	Upper Hunter Wonnarua Council
WLALC	Wanaruah Local Aboriginal Land Council
WMS	Water Management System
WNAC	Wonnarua Nation Aboriginal Corporation
%	Per Cent
WPCPP	West Pit Coal Preparation Plant
°C	Degrees Celsius
$\mu g/m^3$	Micrograms Per Cubic Metre

GLOSSARY

A1 Horizon: This is the upper most layer of a soil generally referred to as topsoil. It has a high content of organic matter relative to other horizons, a dark colour and maximum biological activity. This is the most useful part of the soil for revegetation and plant growth.

Acid Mine Drainage: Acid leachate flowing from overburden caused by oxidisation of pyritic materials to form sulphuric acid.

Alluvium: Sediment deposited by a flowing stream, consisting of unconsolidated material including gravel, clay, silt and sand.

Ambient Sound: The totally encompassing sound in a given situation at a given time, usually composed of sound from all sources near and far.

Apedal: A soil in which little or none of the material occurs in peds or aggregated in the moist state. Apedal soils are without apparent structure and are typically massive or single grained.

Aquifer: A porous soil or geological formation, often lying between impermeable subsurface strata, which holds water and through which water can percolate slowly over long distances to groundwater springs and wells.

Attenuation: The reduction in magnitude of some variable in a transmission system, for example, the reduction of noise with distance as it travels through air.

Base Line: Studies conducted to establish prevailing environmental conditions.

Batter: The excavated or constructed face resulting from earthmoving operations which generally has a uniform gradient.

Bench: A strip of relatively level ground breaking the continuity of a steep slope or stream.

Box-cut: A relatively narrow but deep excavation with steep faces on three sides usually sunk to allow access to underground workings or as the initial excavation in open-cut mines.

Catchment Area: The area from which a river or stream receives its water.

Cation Exchange Capacity: The capacity of the soil to hold and exchange cations such as calcium, magnesium, potassium and sodium usually expressed in centimoles of positive charge per kilogram of soil.

Cation: Ion with a positive charge.

Character: The total of the qualities making up the individuality of the noise. The pitch or shape of a sound's frequency content (spectrum) dictate a sound's character.

Coagulation: The destabilisation of colloidal particles brought about by the addition of a chemical reagant known as a coagulant.

Coal Reserves: Those parts of the coal resources which are planned to be mined.

Coal Resources: All of the potential useable coal in a defined area identified by geological data.

Coarse Rejects: Solid material from a coal washery consisting of coarse and fine rock fragments such as carbonaceous shales and up to 30 per cent carbon.

Coking Coals: Low volatile hard coking coal and low ash semi-soft coking coal is used for iron and steel production.

Cross Bank: Short bank of earth built across a vehicular track to divert runoff.

Daytime: For the purposes of industrial noise assessment the EPA defines daytime as the period between 7 am and 6 pm.

Decibel (dB): dB or decibel is a unit of relative noise level. Audible sound pressure varies across a range of 10^7 Pa from the threshold of hearing (20 μPa) to the threshold of pain (200 Pa). In order to express noise with more manageable numbers, a logarithmic scale called decibels is commonly used.

Decibel dB(A): The decibel scale can have a number of weighting filters applied to it, the most common being the A-weighting filter. The purpose of the filter is to apply weighting adjustments over the frequency range of human hearing so that measured levels better match perceived levels. The (A) denotes the use of this filter.

The following points give an indication of what the noise levels and differences represent in terms of perception, to an average person:

- 0 dB represents the threshold of human hearing (for a young person with ears in good condition).
- 140 dB represents the threshold of pain.
- noise level differences of less than 2 dB are generally imperceptible;
- differences of around 5 dB are usually significant; and
- an increase or decrease of around 10 dB appears to double or halve the loudness of a noise.

dB (L_{inPeak}): Units indicating the peak sound pressure level (not RMS) expressed as decibels with no frequency weighting.

Dip: The direction in which the rock strata is inclined.

Dispersible Soils: Sodic soils in which the clay fraction forms a suspension on wetting, often leading to severe tunnelling and gully erosion.

Dispersion Percentage: The percentage of clay and fine silt in a soil which disperses into suspension.

Duplex Soils: A soil in which there is a sharp change in texture between the A and B horizons.

Easement: A 'right of way' over a strip of land.

Effluent: The liquid waste of sewage and industrial processing.

Electrical Conductivity: The measure of electrical conduction through water or a soil-water suspension generally measured in millisiemens per centimetre or microsiemens per metre. An approximate measure of soil or water salinity.

Evening: For the purposes of industrial noise assessment the EPA defines Evening as the period between 6 pm and 10 pm.

Final Void: The excavation remaining at the cessation of open-cut mining.

Fine Rejects: Fine residual waste material separated in the coal preparation process.

Flocculation: The process by which destabilised colloidal or very fine clay particles, suspended in water, come together into larger masses which eventually settle out of suspension. Flocculation depends on the balance between exchangeable ions on the clay and those in solution, as well as the overall ionic strength of the solution.

Frequency [Hz]: Sounds have a pitch which is peculiar to the nature of the sound generator. For example, the sound of a tiny bell has a high pitch and the sound of a bass drum has a low pitch. Pitch can be measured on a frequency scale in units of hertz or Hz. The human ear can typically hear frequencies ranging from 20 Hz to 16,000 Hz.

Geophysical data: A description of geology with respect to its structure, composition and development.

Geotechnical: Relating to the form, arrangement and structure of the geology.

Groundwater: Subsurface 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.

Habitat: The environment in which a plant or animal lives, and often described in terms of their geography, climate and vegetation.

Hydrogeologic: The relation of hydrological phenomena to the surface geology.

Hydrology: Science that relates to the properties, distribution and circulation of the earth's water.

Igneous: Rock formed from magma which has cooled and solidified at the earth's surface (volcanic) or within the earth's crust (plutonic).

In-Situ: In its original place.

Indigenous: Native to, or originating in, a particular region or country.

Intrusion: The forcing of extraneous matter, like molten rock, into some other formation.

L_1: The level of noise exceeded for 1 % of the sample time. L_1 is often used when assessment of the effects of intermittent loud noise may be important (eg example in sleep disturbance).

L_{10}: The noise level which is exceeded for 10 % of the time and is approximately the average of the maximum noise levels;

L_{90}: The noise level exceeded for 90 % of the time and is approximately the average of the minimum noise levels. The L_{90} level is often referred to as the 'background' noise level and is commonly used as a basis for determining noise criteria for assessment purposes;

Land Capability: The ability of a parcel of land to be used for a given use sustainably, that is without permanent damage.

Leaching: The process of removing soluble matter(s) from soil or rock by water.

L_{eq}: L_{eq} is the continuous sound pressure level that embodies the equivalent sound energy as the fluctuating source measured, over the same time period. L_{eq} noise levels are often quoted with the time averaging period specified (eg $L_{eq,1hr}$).

Lithology: The physical characteristics of a rock.

L_{max}: The absolute single maximum noise level in a noise sample.

Loudness: A rise of 10 dB in sound level corresponds approximately to a doubling of subjective loudness. That is, a sound of 85 dB is twice as loud as a sound of 75 dB which is twice as loud as a sound of 65 dB and so on. That is, the sound of 85 dB is four times or 400 % the loudness of a sound of 65 dB.

Lw: Sound power level. This is a measure of the total power radiated by a source. The sound power of a source is a fundamental property of the source and is independent of the surrounding environment.

Magnetometer: An instrument used for measuring magnetic intensity. In ground surveys the magnetometer is used for measuring the vertical intensity, while aeromagnetic surveys usually measure the total intensity to determine the extent of geological resources.

Mean: The average value of some characteristics in a set of data.

Median Value: A value above and below which there are equal numbers of data values.

Meteorology: Science dealing with atmospheric phenomena and weather.

Mobile Plant: Construction equipment which can be readily moved around a site (eg bulldozers, scrapers, etc.).

Native: Belong to the natural flora or fauna in a region.

Noise Creep: Where several acceptable background noise sources collectively exceed the acceptable noise limit.

Octave Band: Noise related effects including perception and attenuation with distance are dependent on the frequency of the noise (among other factors). Standard frequency bands have been mathematically defined to assist in analysis of the frequency content of sounds. Each band is commonly referred to by its centre frequency value. Since the centre frequency doubles from band to band, the bands are collectively referred to as octave bands.

Out-of-Pit Emplacement: A stockpile of spoil or overburden transported and dumped away from the excavation of an open-cut mine.

Outcrop: Exposed bedrock at the ground surface.

Overburden to Coal Ratio: Ratio of coal to non coal rock material expressed in cubic metres of overburden to tonnes of coal.

Overburden: Rock and soil materials overlying a useful resource material such as coal.

Particulates: Fine solid particles which remain individually dispersed in gases.

Peak Particle Velocity: The maximum velocity of a particle of the transmission medium, used in assessment of vibration.

Permeability: The capacity of rock or solid to transmit fluids (through pores, bedding planes or joints).

pH: Scale used to express acidity and alkalinity. Values run from 0-14 with seven representing neutrality. Numbers less than 7 represent acidity.

Piezometer: A small diameter bore lined with a slotted tube used for determining the standing water level of groundwaters.

Reafforestation: The replanting of forest trees.

Real Time Monitoring: System or network that provides instantaneous access to data from monitoring station such as noise, dust or water monitoring station. Real time monitoring provides a proactive management tool that will allow ameliorative measures to be undertaken to prevent the occurrence of potenial noise impacts.

Recycling: The return of waste materials to the production system so that the need for raw materials is reduced.

Rehabilitation: The process of restoring to a condition of usefulness.

Revegetation: The process of re-establishing a vegetation cover.

Roosting: A place where animals rest or stay.

Saline (Soil): Contains mineral salts sufficient to impair productivity.

Salinity: A measure of the concentration of dissolved solids in water.

Seam: An identifiable discrete coal unit.

Sediment Control Structures: Barriers or other containing structures designed to prevent sediment from being washed into streams.

Sedimentation: A dam built to retard runoff from disturbed areas and allow sediment to settle out before letting clean water discharge.

SEL: Sound Exposure Level. The constant sound pressure level that if maintained for one second, would deliver the same total sound energy as the original source. It is usually used to describe discrete noise events. It is similar in function to L_{eq} and can be used to calculate the L_{eq} arising from multiple occurrences of discrete events, over any time period.

Sewage: Waste matter discharged to a sewer.

Sewerage: Works for collecting, treating and disposing of sewage.

Sigma-theta: The standard deviation of horizontal wind fluctuation

Sill: Is an igneous intrusion that is emplaced parallel to bedding.

Slurry: A fluid composed of part liquid, part solid which can be pumped.

Socioeconomic: Combination of social and economic factors.

Sodic Soil: Soils containing sufficient exchangeable sodium to adversely affect soil stability.

Spoil: The unconsolidated waste earth and rock excavated from a mine.

Spontaneous Combustion: Spontaneous ignition of some or all of a combustible material.

Subcrop: A unit of material that occurs just below the soil profile.

Temperature Inversion: A positive temperature gradient. A meteorological condition where atmospheric temperature increases with altitude to some height.

Thermal Coal: Medium to high ash, low sulphur thermal coals are used for domestic power generation and cement manufacture, whilst medium to low ash, high energy thermal coals are exported.

Threatened Species: Animals that are in danger of extinction or may now be considered extinct, but have been seen in the wild in the last 50 years.

Time of Concentration: The time required for all parts of a catchment to simultaneously contribute runoff flow to a given outlet point.

Topography: Description of all the physical features of an area of land and their relative positions, either in words or by way of map.

Total Suspended Particulates: A measure of the total amount of small solid or liquid particles suspended in or falling through the atmosphere.

Total Suspended Solids: A total of the total amount of undissolved matter in a volume of water.

Turbidity: A measure of the amount of suspended solids (usually fine clay or silt particles) in water.

Volatile Matter: Matter which is readily transformed to a gaseous state.

Woodland: Land covered by trees which do not form a closed canopy.

ANNEX A

director generals requirements

A

planningnsw

Henry Deane Building
20 Lee Street Sydney NSW 2000
GPO Box 3927 Sydney NSW 2001
T 02 9762 8000
www.planning.nsw.gov.au

Mr James Bailey
Coal & Allied Operations Pty. Ltd.
PO Box 315
SINGLETON NSW 2330

Telephone: 9762 8159
Facsimile: 9762 8707

Dear Mr Bailey

Proposed Expansion – Hunter Valley Operations
Our Reference: S02/02690

I refer to your recent request for the Director-General's requirements for the preparation of an Environmental Impact Statement (EIS) for the above proposal.

Statutory Issues

Attachment No. 1 outlines the statutory matters that must be included in any EIS under Clauses 71 and 72 of the *Environmental Planning and Assessment Regulation 2000* (the Regulation).

Specific Issues

Under Clause 73(1) of the Regulation, the Director-General requires you to address the following specific issues in the EIS:

- **Description of the Proposal**: Describe and justify the proposal, clearly identifying the resource, the proposed site, the proposed works (including any rehabilitation works), the proposed intensity of operations, and the likely inter-relationship between these proposed operations and the existing or approved mining operations at Hunter Valley Operations.
- **Permissibility:** Demonstrate that the proposal is permissible with consent.
- **Statutory Instruments/Policies**: Assess the proposal against the relevant provisions in *State Environmental Planning Policy No. 33 – Hazardous and Offensive Development, State Environmental Planning Policy No. 44 – Koala Habitat Protection, Hunter Regional Environmental Plan 1989, Hunter Regional Environmental Plan 1989 (Heritage), Singleton Local Environmental Plan 1996,* and any relevant Development Control Plans.
- **Key Issues**: Assess the following potential impacts of the proposal during construction and operation, and describe what measures would be implemented to manage, mitigate, or off-set these potential impacts:
  (a) Noise;
  (b) Blasting & vibration;
  (c) Air quality/odour;
  (d) Surface water;
  (e) Groundwater;
  (f) Heritage, both Aboriginal and European;
  (g) Fauna and flora, particularly on critical habitats, threatened species, populations, or ecological communities;
  (h) Traffic and transport;
  (i) Soil;
  (j) Hazards;
  (k) Visual;
  (l) Waste management;
  (m) Utilities & services; and
  (n) Social and economic.
- **Cumulative Impacts:** Assess the potential air, noise, surface & groundwater cumulative impacts of the proposal, taking into account the existing and proposed development at Hunter Valley Operations (South), Ravensworth West-Narama, and Cumnock mines.

- **Environmental Monitoring & Management**: Describe in detail how the environmental performance of the proposal would be monitored and managed over time.

You should note that if the Development Application (DA) to which these requirements relate is not made within two years of the date of this letter, Clause 73(6) of the Regulation requires you to re-consult with the Director-General before you lodge the DA.

Guidelines

During the preparation of the EIS, you must consider the Department's EIS guideline on *Coal Mines & Associated Infrastructure*.

Integrated Development Requirements

Under Section 91 of the *Environmental Planning & Assessment Act 1979* (the Act), development is classified as "integrated development" if it requires certain approvals in addition to development consent before it may be carried out.

In your Form A, you indicated that the proposal would require additional approvals from the Environment Protection Authority, Department of Sustainable Natural resources, NSW Fisheries, Mine Subsidence Board, and National Parks & Wildlife Service. These approval bodies have provided the Department with their requirements for your EIS (see Attachment No. 2), and you must address these requirements in your EIS.

If further integrated approvals are identified before you lodge the DA, you must consult with the relevant agencies, and address their requirements in your EIS.

Suggested Approach to Consolidating Approvals

The Department acknowledges the risks associated with "opening up" and/or surrendering existing development consents, and consolidating the approvals for Hunter Valley Operations (North), but is confident that the benefits of simplifying the regulation and operation of the mine will outweigh any costs.

The Department believes the EIS should:
- Describe Hunter Valley Operations (North) as one complex;
- Identify the interactions between Hunter Valley Operations (North) and Hunter Valley Operations (South);
- Assess the complex as a whole, rather than only assessing the proposed expansion of the West Pit and relying on previous approvals; and
- Rely on previous assessments, to the extent they are still relevant, but where necessary augment these assessments.

The agencies supported this approach at the PFM.

The Department would be happy to discuss this with you in more detail before you lodge the DA.

Environmental Monitoring & Management Plans

Given that the various mines at Hunter Valley Operations have been operating for many years, and the complex has a comprehensive environmental monitoring and management system, the Department would like you to consider any necessary changes to this system during the assessment process, rather than deferring this for future consideration.

To address this issue, you should provide specific details about the proposed monitoring program (including location, frequency, methods) and any mitigation measures in the EIS.

Again, the Department would be happy to discuss this with you in more detail before you lodge the DA.

Best Management Practice

During the preparation of the EIS, the Department would like you to review, identify, and implement current best management practice for the following environmental issues, using any relevant Australian and international literature:
- Air quality;
- Noise; and
- Surface and groundwater.

Again, the Department would be happy to discuss this with you in more detail before you lodge the DA.

Consultation

During the preparation of the EIS, you should consult with the relevant local, State, and Commonwealth government authorities, service providers and community groups in the area, and address any issues they may raise in the EIS.

In particular, you should consult the surrounding landowners and occupiers that are likely to be affected by the proposal.

Several agencies (see Attachment 3) have provided the Department with their requirements for the EIS, and you should consider these requirements in your EIS.

The EIS must include a report indicating who was consulted, what consultation occurred, and what issues were raised during this consultation.

Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*

If your proposal contains any actions that could have a significant impact on matters of National Environmental Significance, then it will require an additional approval under the Commonwealth *Environment Protection Biodiversity Conservation Act 1999 (EPBC Act)*. These approvals are in addition to any approvals required under NSW legislation. If you have any questions about the application of the EPBC Act to your proposal, you should contact Environment Australia in Canberra (6274 1111 or http://www.environment.gov.au).

State Significant Development Requirements

For all State Significant Development proposals, the Director-General requires the Applicant to:

- Nominate a contact person (with telephone number) to answer public enquiries about the proposal;
- Provide the Department with an electronic copy of the Executive Summary of the EIS when you lodge the DA for exhibition on the Department's website; and
- Advise the Department of the relevant newspapers circulating in the area affected by the proposal.

Administration

You should notify the Department at least 3 weeks before you lodge the DA for the proposal, so that it can make the necessary arrangements to exhibit the DA and EIS.

When you lodge a DA for the proposal, you must include:

- At least 40 hard copies and 20 CD copies of the EIS ;
- A cheque for the DA fee and advertising (see Clauses 246 & 252 of the Regulation), made payable to the Department;
- A cheque for $715, made payable to the Department, for designated development;
- A cheque for $250, made payable to each of the integrated approval bodies; and
- A cheque for $110, made payable to the Department, for integrated development administration.

Enquiries

If you have any enquiries about the above, please contact David Kitto 9762 8162.

Yours sincerely

13/5/03

Nick Agapides
Manager
Mining & Extractive Industries

Attachment No. 1

STATUTORY REQUIREMENTS FOR THE PREPARATION OF AN ENVIRONMENTAL IMPACT STATEMENT UNDER PART 4 OF THE ENVIRONMENTAL PLANNING AND ASSESSMENT ACT 1979

In accordance with the *Environmental Planning and Assessment Act 1979* (the Act), an environmental impact statement (EIS) must meet the following requirements.

Content of EIS

Pursuant to Schedule 2 and clause 72 of the *Environmental Planning and Assessment Regulation 2000* (the Regulation), an EIS must include:

1. A summary of the environmental impact statement.
2. A statement of the objectives of the development or activity.
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 or activity.
4. An analysis of the development or activity, including:
   (a) a full description of the development or activity; and
   (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
   (c) the likely impact on the environment of the development or activity, and
   (d) a full description of the measures proposed to mitigate any adverse effects of the development or activity on the environment, and
   (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.
5. A compilation, (in a single section of the environmental impact statement) of the measures referred to in item 4(d).
6. The reasons justifying the carrying out of the development or activity in the manner proposed, having regard to biophysical, economic and social considerations, including the following principles of ecologically sustainable development:
   (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:
      (i) careful evaluation to avoid, wherever practicable, serious or irreversible damage to the environment, and
      (ii) an assessment of the risk-weighted consequences of various options,
   (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,
   (c) Conservation of biological diversity and ecological integrity, namely, that conservation of biological diversity and ecological integrity should be a fundamental consideration,
   (d) Improved valuation, pricing and incentive mechanisms, namely, that environmental factors should be included in the valuation of assets and services, such as:
      (i) polluter pays, that is, those who generate pollution and waste should bear the cost of containment, avoidance or abatement,
      (ii) the users of goods and services should pay prices based on the full life cycle of costs of providing goods and services, including the use of natural resources and assets and the ultimate disposal of any waste,
      (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 or minimise costs to develop their own solutions and responses to environmental problems.

An environmental impact statement referred to in Section 78A(8) of the Act shall be prepared in written form. The prescribed form to accompany the environmental impact statement must comply with the requirements of clause 71 of the Regulation and be signed by the person who has prepared it.

Procedures for public exhibition of the EIS are set down in clauses 77 to 81 of the Regulation.

Attention is also drawn to clause 283 of the Regulation regarding false or misleading statements in EISs.

Note

If the development application to which the EIS relates is not made within 2 years from the date of issue of the Director-General's requirements, under clause 73(6) of the Regulation the proponent is required to reconsult with the Director-General.

– ✧ –

Attachment No. 2

Your Reference
Our Reference : 270731A12 NEF11048
Contact : Peter Hughes 4908 6825

NSW **EPA**

Coastal Regions

Mr N Agapides
PlanningNSW
Development and Infrastructure Assessment
GPO Box 3927
SYDNEY NSW 2001

- 9 APR 2003

Dear Mr Agapides,

HUNTER VALLEY OPERATIONS COAL MINE - PROPOSED EXTENSIONS TO WEST PIT

I refer to your request for the Environment Protection Authority's (EPA) requirements for the preparation of an Environmental Impact Statement (EIS) relating to the above stated development. The information specified in Attachment A must be provided in any Environmental Impact Statement (EIS) submitted in support of the development proposal to enable the EPA to adequately assess the impacts of the development on the environment to the extent that the impacts relate to the EPA's statutory responsibilities.

Based upon information provided at the Planning Focus meeting held on 2 April 2003 the EPA believes that the following issues will be the key considerations requiring detailed assessment and definitive measures to mitigate any impacts:

(a) The likelihood of increased noise impacts due to mining operations;
(b) The potential for dust generation during earthworks and open cut mining operations;
(c) The mine's water balance and water management systems.
(d) The need to effectively manage cumulative impacts.

The Hunter Valley Operations Coal Mine holds Environment Protection Licence No 640 under the Protection of the Environment Operations Act 1997. Consequently, if development consent is granted the proposed mining operations will require variations to this licence.

The EPA will require 4 copies of the EIS when the application is submitted. These documents should be lodged at the EPA's Newcastle office located in the Government Office Building at 117 Bull Street Newcastle and marked to the attention of the Regional Manager, Hunter. If you have any inquiries regarding this matter, please contact Peter Hughes 4908 6825.

Yours sincerely

MITCHELL BENNETT
Head, Regional Operations Unit, Hunter

INF
10 APR 2003

ATTACHMENT A - ENVIRONMENT PROTECTION AUTHORITY REQUIREMENTS FOR ENVIRONMENTAL IMPACT STATEMENT – HUNTER VALLEY OPERATIONS (West Pit) COAL MINE EXTENSIONS

1. EXECUTIVE SUMMARY

1.1 The executive summary should include a brief discussion of the extent to which the proposal achieves identified environmental outcomes.

2. THE PROPOSAL

2.1 The objectives of the proposal should be clearly stated and refer to:

- the size and type of the operation;
- the anticipated level of performance in meeting required environmental standards and cleaner production principles;
- the staging and timing of the proposal;
- the proposal's relationship to any other industry or facility.

2.2. A detailed description of the proposed development must be provided which includes but need not be limited to the following:

- An overall description of the proposed development including the rail and conveyor systems and coal storage, handling and loading facilities supported by detailed site layout and locality maps.
- Details of the coal handling arrangements during the initial development headings.
- A description of the operation of the proposed washery rejects emplacement facilities.
- Outline construction works including:
    - actions to address any existing soil contamination;
    - surface works including earthworks or site clearing; re-use and disposal of cleared material (including use of spoil on-site);
    - construction timetable and staging; hours of construction; proposed construction methods;
    - environment protection measures, including noise mitigation, dust controls and erosion and sediment control measures.

3. AIR

3.1 General

The EIS should demonstrate that the mine will be able to operate within the EPA's air quality objectives which are to control, to the maximum extent practicable, the generation of air pollutants on-site, to contain any pollutants generated within the property, to minimize adverse effects of the operation on the amenity of local residents and sensitive land uses and to limit the effects of pollutants on regional air quality. The EIS should also include:

- A description of existing air quality and meteorology, using existing information and site representative ambient monitoring data. The use of particular meteorological monitoring data sets should be justified. This should include an analysis of site representative data on the following meteorological parameters:
    - temperature and humidity;
    - rainfall and evaporation;
    - wind speed and direction.

- Provide a description of existing air quality, using existing information and site representative ambient monitoring data. This description should include the following parameters:
  - dust deposition;
  - total suspended particulates;
  - PM_{10} particulate matter.

- Identification and location of all fixed and mobile sources of dust/air emissions from the development including rehabilitation. The location of all emission sources should be clearly marked on a plan for key years of mine development. Identify all pollutants of concern and estimate emissions by quantity (and size for particles), source(s) and discharge point(s).

- Details of the project that are essential for predicting and assessing impacts on air quality including:
  - the quantity and physio-chemical characteristics of materials to be handled, stored or transported;
  - an outline of the procedures for coal handling, storage and transport;
  - the management of activities and areas with potential for impacts on air quality.

Note: emissions can be classed as either:
- point (eg emissions from stack or vent) or
- fugitive (from wind erosion, leakages or spillages, associated with loading or unloading, conveyors, storage facilities, plant and yard operation, vehicle movements (dust from road, exhausts, loss from load), land clearing and construction works).

- A description of the topography and surrounding land uses.

- Details of the exact locations of dwellings, schools and hospitals. Where appropriate provide a perspective view of the study area such as the terrain file used in dispersion models.

3.2 Impact Assessment

- Detailed dust emission inventory calculations showing the methodology and emission factors used. Suitable emissions factors may be obtained by a review of recent EIS's and reference to the following documents: *'Air Pollution from Surface Coal Mining: Measurement Modeling and Community Perception, National Energy Research and Development Council: Project No 921'*; and *' Section 11.9 Western Surface Coal Mining, Section 11.10 Coal Cleaning and Section 13.2.4 Aggregate Handling and Storage Piles, AP-42, Volume I, Stationary Point and Area Sources, USEPA* (or updated sections as appropriate*)'*.

- Estimate the resulting ground level concentrations of all pollutants. Use an appropriate dispersion model to predict ambient TSP and PM_{10} dust concentrations and dust deposition levels. Reference should be made to the EPA's *Approved Methods and Guidance for the Modelling and Assessment of Air Pollutants in New South Wales.*

- A detailed description of the methodology used to assess the air quality impacts of the development. The use of a particular dispersion model and model parameters used should be justified and discussed. The dispersion model input/output files should be included.

- Air quality impact predictions should include plans showing projected incremental levels of 24-hour average PM_{10} concentrations, annual average dust deposition rates and annual average total suspended particulate concentrations throughout the life of the mine.

- An assessment on the impact of the mine on local and regional air quality. Comparisons should be made with the *'National Environment Protection Measure for Ambient Air'* when assessing regional impacts. Local impacts should be assessed by considering background levels, the predicted project specific impacts and the cumulative impacts by comparison with the following dust deposition criteria:

Table 1: Health and Amenity Based Particulate Matter Standards/Goals/Criteria

Pollutant	Standard/Goal	Source Agency
Total Suspended Particulate (TSP) Matter	90 μg/m^3 (annual average)	NHMRC[1]
Dust Deposition	4 g/m^2/month (annual average)	SPCC[2]
Particulate Matter Less than 10 microns in Aerodynamic Equivalent Diameter (PM_{10})	50 μg/m^3 (24 hour average) 30 μg/m^3 (annual average)	NEPC[3] NSW EPA[4]

1 National Health and Medical Research Council.

2 NSW State Pollution Control Commission.

3 National Environment Protection Council. National Environment Protection Measure for Ambient Air Quality standard for reporting regional ambient air quality.

4 NSW EPA long term reporting goal for regional ambient air quality as published in Action for Air.

Table 2: NH&MRC Dust Deposition Criteria (Total Solids)

Existing Dust Level g/m^2/month (annual average)	Maximum Acceptable Increase Over Existing Dust Level g/m^2/month (annual average)	
	Residential Suburban	Other
2	2	2
3	1	2
4	0	1

- An assessment of cumulative air quality impacts and a description of the methodology used.

- An assessment of the potential impacts on air quality other than by dust, for example nitrogen oxide emissions from diesel equipment.

- Greenhouse gas emissions :

    - using the methodologies published with the National Greenhouse Gas Inventory (1994) estimate the total annual volume of all major greenhouse gases that are likely to be emitted from all aspects of the proposed development.
    - Estimate the net increase or decrease in greenhouse gas emissions from the proposed development and compare it to estimates in the 1990 National Greenhouse Gas Inventory for total Australian emissions and for the energy and transformation industry sector.
    - Specific consideration should be given to measures to minimise the emission of all major greenhouse gases from the proposed development.
    - The use of coal bed methane or renewable energy technologies such as solar and/or wind energy should be considered for on-site power generation.

- Describe the effects and significance of pollutant concentration on the environment, human health, amenity and regional ambient air quality standards or goals.

- Describe the contribution (if any) that the development will make to regional and global pollution, particularly in sensitive locations.

- An assessment of the impacts on air quality of dust and any other pollutants generated during construction works. In this context, particular attention should be given to:

    - The nature, extent and duration of dust generating activities, e.g. earthmoving equipment, exposed surfaces, material stockpiles, unsealed trafficked areas, spillages etc.
    - Consideration of the location of dust sources, particularly their proximity to sensitive receptors and prior to finalisation of any acquisition or similar processes.

- Details of an investigation of the propensity of coal seams to self heat and the likelihood of spontaneous combustion occurring on site.

- Odour from underground mine ventilation shafts has the potential to cause adverse impacts at the nearest residents. An odour impact assessment should be prepared for the proposed mine.

3.3 Mitigation

- Outline specifications of pollution control equipment (including manufacturer's performance guarantees where available) and management protocols for both point and fugitive emissions. Where possible, this should include cleaner production processes.

- Specific consideration should be given to measures to minimise the emission of all major greenhouse gases from the proposed development.

- Describe consideration of stockpile alignment and optimum stockpile height to minimise wind erosion.

- If spontaneous combustion is likely, details of a management program to minimize spontaneous combustion and to manage any occurrence of spontaneous combustion.

- Include details of an air quality monitoring program to determine effectiveness of mitigation and to verify predictions, including provision for investigations in response to complaints. The air monitoring program should reflect advances in technology for monitoring systems such as real time monitoring systems.

- Control measures to be implemented to minimize dust generation during construction activities.

- Details of contractual arrangements between the applicant and construction contractors aimed at attributing responsibility for controlling the generation and emission of air pollutants.

4. NOISE AND VIBRATION

4.1 General

The EIS must assess the likelihood and implications of intrusive noise and loss of amenity due to noise. The proposal will be assessed in accordance with the EPA's *Industrial Noise Policy* (INP) (2000). The EIS should also include:

- Identify all noise and vibration sources from the development (including both construction and operation phases). Detail all potential noise generating activities and equipment including off-site rail movements and conveyor use.

- Specify the times of operation for the construction and operational phases of the development and for all noise producing activities.

- Provide details of the rail and conveyor corridors and land use (particularly residential) along the proposed routes. Diagrams should be to a scale sufficient to delineate individual residential blocks.

- Specify noise monitoring locations. Particular attention should be given to any areas likely to be affected by the operations.

- Identify any noise sensitive locations likely to be affected by activities at the site, such as residential properties, schools, churches, and hospitals.

- Identify the land use zoning of the site and the immediate vicinity and the potentially affected areas.

4.2 Impact Assessment

- Determine existing background noise levels at noise sensitive locations in the area in accordance with the INP.

- Determine the expected noise levels and noise characteristics (eg: tonality, impulsiveness vibration, etc) likely to be generated from noise sources during:
  - site establishment;
  - construction;
  - operational phases;
  - transport including rail and conveyor noise generated by the proposal;
  - other services.

- Determine the noise levels likely to be received at the most sensitive locations under both prevailing and adverse meteorological conditions. (These may also vary during construction and operational phases of the development).

  Note:- *Computer modelling of noise impacts should be undertaken using a recognised computer model.*
  - *Maximum noise levels during night-time period (10pm-7am) should be assessed to analyse possible affects on sleep. This should include the maximum noise levels due to rail traffic, the extent these maximum noise levels exceed ambient noise levels and the number of noise events from rail traffic during the night on an hourly basis for a 'typical' night.*
  - *Noise predictions for individual receptors should be provided with one or more of the L_{Amax}, L_{A1}, L_{A10}, L_{Aeq}, L_{A90} descriptors reported for noise from stationary sources. For*

rail traffic noise, descriptors may include $L_{eq(1hr)}$, $L_{eq(15hr)}$, $L_{eq(9hr)}$ and maximum noise levels depending on the area classification and the types of land use involved.
- *For the assessment of existing and future rail noise, details should be included of assumed rail movements by time of day; and details of the calculation process.*

- Noise contours for both daytime (7am-6pm), evening (6pm – 10pm) and night time (10pm-7am) periods should be provided. Contours should include predicted noise levels under prevailing as well as "worst-case" scenarios during adverse meteorological conditions of wind and temperature inversions.

- Consider the influence of existing meteorological conditions such as winds and temperature inversions in the prediction model so as to provide a true representation of actual noise levels.

- Assess the effect of noise mitigation measures incorporated into the predictive modelling.

- Compare the predicted noise levels with the appropriate noise criteria for the phase of development or activity being considered (determine the appropriate noise criteria for the surrounding area using the INP. (For construction noise criteria refer to the EPA's *Environmental Noise Control Manual* (1994).

- The EIS must demonstrate that ground vibration and overpressure levels recommended by ANZECC will be achieved during blasting.

- The EIS must include a traffic noise assessment covering the expected movement of product off-site for the day, evening and night-time and proposed controls at the source and at affected received locations along the coal transportation routes. Reference should be made to the EPA's *Environmental Criteria for Road Traffic Noise* (1999).

4.3 Mitigation

- Discuss the findings from the predictive modelling and, where relevant noise criteria have not been met, recommend additional mitigation measures.

- Where relevant noise/vibration criteria cannot be met after application of all feasible and cost effective mitigation measures the residual level of noise impact needs to be quantified by identifying:
    - locations where the noise level exceeds the criteria and extent of exceedence;
    - numbers of people (or areas) affected;
    - times when criteria will be exceeded;
    - likely impact on activities (speech, sleep, relaxation, listening, etc);
    - change on ambient conditions.

- Determine the most appropriate noise mitigation measures including both noise controls and management of impacts for both construction and operational noise. This will include selecting quiet equipment and construction methods, noise barriers or acoustic screens, location of stockpiles, temporary offices, compounds and vehicle routes, scheduling of activities, community consultation, complaints handling/monitoring system etc.

- For rail noise impacts, provide a description of the ameliorative measures considered (if required), reasons for inclusion or exclusion, and procedures for calculation of noise levels including ameliorative measures. Also include, where necessary, a discussion of any potential problems associated with the proposed ameliorative measures, such as overshadowing effects. Appropriate ameliorative measures may include:
    - use of alternative transportation modes and alternative routes;

- control of rail traffic (eg: limiting times of access or speed limitations);
- use of noise barriers or bunds.
- provide details of a noise and blasting (vibration) monitoring program with monitoring to be undertaken at noise sensitive locations subject to the agreement of the owners/occupiers of those properties. The noise and vibration monitoring program should reflect advances in technology for monitoring systems such as integrated blast monitoring. In addition, if noise levels for the premise are to rely on inversion conditions, and inversion monitoring program for noise assessment purposes must also be included in the monitoring program.

5. WATER

5.1 General

- Provide details of the project relevant to any water impacts of the development such as drainage works and associated infrastructure, general earthworks, working capacity of structures, and water resource requirements of the proposal.

- Outline site layout, demonstrating efforts to avoid proximity to water resources (especially for activities with significant potential impacts eg effluent ponds) and showing potential areas of modification of contours, drainage, etc.

- Outline how total water cycle considerations are to be addressed showing total water balances for the development (with the objective of minimising demands and impacts on water resources). Include water requirements (quantity, quality and source(s)) and proposed storm and wastewater disposal, including type, volumes, proposed treatment and management methods and re-use options.

- Describe the catchment including proximity of the development to any waterways and provide an assessment of their sensitivity/significance from a public health, ecological and/or economic perspective.

- Describe existing surface water quality. An assessment needs to be undertaken for any water resource likely to be affected by the proposal and for all conditions (e.g. a wet weather sampling program is needed if runoff events may cause impacts).

- Provide historic stream flow data for the catchment where available.

- Provide site drainage details and surface runoff yield.

- Describe the condition of the local catchment, eg erosion levels, soils, vegetation cover, etc.

- Outline baseline groundwater information, including, but not restricted to, depth to watertable, flow direction and gradient, groundwater quality, reliance on groundwater by surrounding users and by the environment.

- Accurately map the location of all aquifers likely to affected by the proposal. Where alluvial aquifers exist accurately map the boundaries between them.

5.2 Impact Assessment

- Determine all cumulative changes to hydrology (including drainage patterns, surface runoff yield, flow regimes, hydrologic regimes and groundwater).

- Prepare a groundwater hydrogeological model for the proposal. The EIS should report and justify all assumptions used in the development of this model.

- Identify any potential impacts on quality or quantity of groundwater describing their source and significance.

- Assess the likely water quality and quantity impacts of any bedrock cracking on all surface and groundwater resources. This assessment should include:

  - mapping of the likely location, depth and width at the surface of bedrock cracking due to mining induced subsidence;
  - details of all computer modelling used to predict the extent and occurrence of land subsidence that might result from the proposal and discussion and justification of all assumptions used in the model; and
  - details of the design of the final landform and details of its drainage system and any ponding.

- Detail all likely impacts on the existing habitat values, hydrology and water quality of all watercourses proposed to be impacted by the proposed activities and their downstream receiving waters, such as Wollombi Brook and the Hunter River.

- Estimate the water quality outcomes in all waterbodies on the subject site and their receiving waters, such as Wollombi Brook and the Hunter River.

- Prepare a water and salt balance model to a assist in the development of strategies to negate and/or minimise environmental impacts on existing natural resources.

- Identify potential impacts associated with geomorphologic activities with potential to increase surface water and sediment runoff or to reduce surface runoff and sediment transport. Also consider possible impacts such as bed lowering, bank lowering, instream siltation, floodplain erosion and floodplain siltation.

- Develop short, medium and long term water management strategies aimed at minimising environmental impacts on existing water resources.

- Detail sewage effluent treatment and disposal arrangements. Effluent should be treated and used on the site. On-site effluent disposal should conform to the EPA's draft "*Environmental Guideline for the Utilisation of Treated Effluent by Irrigation*", 1995.

- Identify impacts associated with the disturbance of acid sulfate soils and potential acid sulfate soils.

  Note:- *The assessment of water quality impacts needs to be undertaken in a total catchment management context to provide a wide perspective on development impacts, in particular cumulative impacts.*

5.3 <u>Mitigation</u>

A water management plan and site water balance should be prepared which incorporates the following principles:

- Outline stormwater management to control pollutants at the source and contain them within the site. Also describe measures for maintaining and monitoring any stormwater controls.

- Outline erosion and sediment control measures directed at minimising disturbance of land, minimising water flow through the site and filtering, trapping or detaining sediment. Also include measures to maintain and monitor controls.

- Describe waste water treatment measures that are appropriate to the type and volume of waste water and are based on a hierarchy of avoiding generation of waste water; capturing all contaminated water (including stormwater) on the site; reusing/recycling waste water; and treating any unavoidable discharge from the site to meet specified water quality requirements

- Outline pollution control measures relating to storage of materials, possibility of accidental spills (eg preparation of contingency plans), appropriate disposal methods, and generation of leachates.

- Describe hydrological impact mitigation measures including:
  - site selection (avoiding sites prone to flooding and waterlogging, actively eroding or affected by deposition);
  - minimising runoff;
  - minimising reductions or modifications to flow regimes;
  - avoiding modifications to groundwater;
  - preventing coal spillage entering waters at stream crossings.

- Describe groundwater impact mitigation measures including:
  - site selection;
  - retention of native vegetation and revegetation;
  - artificial recharge;
  - providing surface storages with impervious linings;
  - monitoring program.

- Describe geomorphologic impact mitigation measures including:
  - site selection;
  - erosion and sediment controls;
  - minimising instream works;
  - treating existing accelerated erosion and deposition;
  - a monitoring program.

- Describe management procedures that will be adopted to prevent pollution of waters by minewater, effluent, stormwater runoff etc. The water management plan should also include a monitoring program to assess the impacts of the operation on the quality and quantity of surface and groundwaters.

- Identify and assess in detail the relative advantages and disadvantages of alternative mine plans that would minimise environmental impacts.

5.4 <u>Hunter River Salinity Trading Scheme (HRSTS)</u>

- If a wastewater discharge is proposed it must be justified and it must be demonstrated that controlled discharges can be managed in compliance with the requirements of the HRSTS.

- If a discharge under the HRSTS is found to be necessary and the discharge would be via a tributary of the Hunter River, the EIS must include a tributary impact assessment that addresses the following:

- Impacts on downstream landholders:

- A contact list of downstream landholder/tenants including a record of permanent or seasonal activities;
- A description and list of all crossings, culverts and other in-stream structures.

- Physical and biological impacts:

- existing flow and stream characteristics, including current bank and bed profiles, potential flow volumes at key points of inflection within the stream course, stability of stream banks and beds and an assessment of soil types.
- Assessment of likely impacts of proposed discharge including impacts on flow characterisics, potential for erosion of banks, bed or damage to riparian vegetation.

- Proposed measures to:

- minimise the impacts of discharge on downstream landholders, including a discharge notification procedure;
- reduce potential erosion hazards at vulnerable points in the stream banks, protect and maintain riparian vegetation and bank stability, and provisions for energy dissipation of discharge waters where necessary.

- In cases where more than one mine discharges to a tributary, each discharger must also address the collective impacts of discharge to that tributary.

6. WASTE AND CHEMICALS

6.1 General

- Provide details of:
  - the quantity and type of all liquid wastes and non-liquid wastes likely to be generated at the premises;
  - the method for storing and disposing of any wastes or recovered materials at the facility.
  - Details of sewage effluent treatment and disposal arrangements. Effluent should be treated and irrigated on site. The EIS should include a description of the effluent treatment and disposal system. On sit effluent disposal should conform to the EPA's draft "*Environmental Guideline for the Utilisation of Treated Effluent by Irrigation*" (1995).

6.2 Impact Assessment

- Identify potential impacts from the handling and storage of any wastes and/or chemicals.

- Measures to avoid or minimise the generation of waste and promote waste re-use and recycling.

- Identification of all wastes which cannot be re-used. Disposal options must also be identified in accordance with EPA *Environmental Guidelines, Assessment, Classification and Management of Liquid and Non-Liquid Wastes.*

6.3 Mitigation

- Outline measures to avoid the generation of waste and promote the re-use and recycling and reprocessing of any waste.

- Outline measures to support any approved regional or industry waste plans.

7. SOIL CONTAMINATION

7.1 General

- Provide details of site history – if earthworks are proposed, this needs to be considered with regard to possible soil contamination.

- Identify any stream crossings.

7.2 Impact Assessment

- Identify any likely impacts resulting from the construction or operation of the proposal – this should include the likelihood of:
  - disturbing any existing contaminated soil;
  - contamination of soil by operation of the activity;
  - soil erosion or instability;
  - disturbing acid sulfate or potential acid sulfate soils.

7.3 Mitigation

- Describe and assess the effectiveness or adequacy of any soil management and mitigation measures during construction and operation of the proposal including:
  - erosion and sediment control measures;
  - proposals for the management of any acid sulfate soils.

8. ESD

The basic principles of ESD should be addressed in the EIS.

- *The Precautionary Principle*

  - The proposal should include decision-making processes that are predictable and transparent. This should include:
    * making information available at an early stage so that major issues can emerge and be addressed during the project planning stage;
    * adopting consultative mechanisms between the proponent and the community as a means of minimising disputation at the formal environmental assessment stage;
    * establishing appropriate conflict resolution mechanisms for use during the project approval process.
  - Discussion of Best Practice Environmental Management techniques including the potential use of environmental management plans and environmental audits.
  - Ensuring that best practice monitoring and enforcement procedures are proposed.
  - Identifying the responsibilities of the proponent and government agencies for environmental management and enforcement.

- *Inter and Intra Generational Equity*

  - Overall project management and investment in plant and equipment that minimises pollution and waste and is energy efficient.

- Ensure rehabilitation of land disturbed during construction.

- *Conservation of Biodiversity and Ecological Integrity*

    - The identification and assessment of all environmental characteristics and habitat values that could be affected by the proposal.
    - The identification and assessment of the likely environmental impacts on these characteristics and values.
    - The implementation of measures designed to minimise likely environmental impacts.
    - Consideration given to adopting a whole of life cycle approach through:
        * use of environmentally benign materials, products and processes, eg. fuel-efficient motors, use of recyclable and recycled materials;
        * integrated waste minimisation, reuse and recycling.

- *Valuation and Pricing of Resources*

    - The costs and benefits of all aspects of the proposal should be considered. This should include non-economic environmental resources within a defined area around the subject site using methodologies such as contingency valuation.
    - Consideration could be given to measuring positive environmental initiatives (e.g. energy savings) for possible use as a trade off for other environmental concessions.

- Demonstrate that the planning process and any subsequent development incorporates objectives and mechanisms for complying with ESD principles.

9. CONSIDERATION OF ALTERNATIVES AND JUSTIFICATION FOR THE PROPOSAL.

- Consider the environmental consequences of adopting alternatives, including alternative:

    - sites and site layouts;
    - access modes and routes;
    - materials handling and loading processes;
    - waste and water management;
    - impact mitigation measures, particularly air quality and noise measures
    - energy sources.

- Selection of the preferred option should be justified in terms of:

    - ability to satisfy the objectives of the proposal;
    - relative environmental and other costs of each alternative;
    - acceptability of environmental impacts;
    - acceptability of any environmental risks or uncertainties;
    - reliability of proposed environmental impact mitigation measures;
    - efficient use (including minimising re-use) of land, raw materials, energy and other resources.

10. IDENTIFICATION AND PRIORITISATION OF ISSUES (SCOPING OF IMPACT ASSESSMENT)

- Provide an overview of the methodology used to identify and prioritise issues. The methodology should take into account:
  - relevant NSW government guidelines;
  - industry guidelines;
  - EISs for similar projects;
  - relevant research and reference material;
  - relevant preliminary studies or reports for the proposal;
  - consultation with stakeholders.

- Provide a summary of the outcomes of the process including:
  - all issues identified including local, regional and global impacts (eg increased/ decreased greenhouse emissions);
  - key issues which will require a full analysis (including comprehensive baseline assessment);
  - issues not needing full analysis though they may be addressed in the mitigation strategy;
  - justification for the level of analysis proposed (the capacity of the proposal to give rise to high concentrations of pollution compared with the ambient environment or environmental outcomes is an important factor in setting the level of assessment).

11. CUMULATIVE IMPACTS

- Identify the extent that the receiving environment is already stressed by existing development and background levels of emissions to which this proposal will contribute.

- Assess the long-term and short-term cumulative impacts of the proposal against the relevant air, noise and water quality objectives for the area or region.

- Identify infrastructure requirements flowing from the proposal (eg. water and sewerage services, transport infrastructure upgrades).

- Assess likely impacts from such additional infrastructure and measures reasonably available to the proponent to contain such requirements or mitigate their impacts (eg travel demand management strategies).

12. MANAGEMENT AND MITIGATION OF ENVIRONMENTAL IMPACTS

- Use environmental impacts as key criteria in selecting between alternative sites, designs and technologies, and to avoid options having the highest environmental impacts.

- Describe any mitigation measures and management options proposed to minimise identified environmental impacts associated with the proposal including an assessment of their effectiveness and reliability and any residual impacts after these measures are implemented.

- Outline any proposed approach (such as an Environmental Management Plan) that will demonstrate how commitments made in the EIS will be implemented. Areas that should be described include:
  - operational procedures to manage environmental impacts;
  - monitoring procedures;
  - training programs;
  - community consultation;
  - complaint mechanisms including site contacts;

- strategies to use monitoring information to improve performance;
- strategies to achieve acceptable environmental impacts and to respond in event of exceedences.

13. COMPILATION OF MITIGATION MEASURES

- Outline how the proposal and its environmental protection measures would be implemented and managed in an integrated manner so as to demonstrate that the proposal is capable of complying with statutory obligations under an EPA licence (eg. outline of an environmental management plan).

- The mitigation strategy should include the environmental management and cleaner production principles which would be followed when planning, designing, establishing and operating the proposal. It should include two sections, one setting out the program for managing the proposal and the other outlining the monitoring program with a feedback loop to the management program.

14. EPA LICENSING

- Identify licensing required by the EPA under environment protection legislation including details of all new scheduled development works, scheduled activities, ancillary activities and types of discharges (to air, land, water).

EPA
April 2003

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~~LAND & WATER CONSERVATION~~

SUSTAINABLE NATURAL RESOURCES

Manager, Coal Mining
Major Development and Infrastructure
Planning NSW
GPO Box 3927
Sydney 2001

Attn. D Kitto

Your ref
Our ref ER4311

14 April 2003

Dear Sir,

RE: HUNTER VALLEY OPERATIONS WEST PIT EXTENSION PROPOSAL, DIRECTOR GENERAL'S REQUIREMENTS

The integration of the extension proposal and consent/approvals applying across the site, requires careful assessment be given to the short and long term environmental impacts of the proposal. Since the development proposal is integrated under Parts 2 and 5 Water Act, 1912, and Section 138, Roads Act, 1938, the Department of Sustainable Natural Resources (DSNR) will require detailed investigation into a range of environmental issues.

DSNR General Requirements

The EIS must explain the potential changes in groundwater regime, resulting from the mining development to the post-mining equilibration of groundwater table levels. This must include an assessment of the cone of depression under the open cut mine, any linkage to nearby aquifers, leakage rates and volumes of groundwater intercepted in the open cut pit and longwall panels. Potential leakage into the proposed mine areas, and pre- and post- mining changes in hydraulic properties must be addressed.

The department requires that the following issues be addressed in the EIS.

1. Surface Water Management

- location and design specifications for all clean water diversions, including channel design, detention basin locations, and basin design and outlet fixtures,
- details of internal drainage of the contaminated water circuit, including any bunding, drainage channels, dewatering pits and storages and basins in the dirty water circuit,
- details in regard to any dirty water (discharge) storage proposed for the development. This should include design details, including the storm recurrence interval design intervals (which should be significantly above the 1:100 year flood level), construction designs and the outflow/bywash provisions,

DEPARTMENT OF SUSTAINABLE NATURAL RESOURCES

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- discussion of proposed monitoring programs and reporting procedures regarding chemical and biological parameters of water quality,
- projected requirements for water supply, identification of sources of water and the requirement for a licence under Part 2 or 5 of the Water Act,
- details of any proposed diversion of watercourses which will be either temporary or permanent diversions,
- description of the integrated water management system, including an assessment of the water management system under a range of conditions (including 10%, 50% and 90% wet years, and severe storm events),
- discussion of the proposed use of the Hunter River Salinity Trading Scheme, including monitoring requirements and discharge procedures to match high flows and flood flows, and
- description of all activities to be undertaken within and adjacent to any watercourse.

2. Groundwater Management

- description of different groundwater sources present in the area including their extent and inter-relationships,
- description of physical and chemical characteristics of groundwater sources,
- assessment of flow directions and rates of flow, and
- assessment of any connections to the surface water bodies or any dependent ecosystems.

The EIS should include details of any potential changes to the existing groundwater regime as a result of the development including changes associated with:

- implementation of the progressive mine plan
- impacts of dewatering
- emplacements
- waste management
- detailed descriptions of conceptual models and any other predictive tools used; and,
- impacts on existing and potential groundwater users including the natural environment

Under Part V of the Water Act (1912), all proposed groundwater works including bores for the purpose of extraction, dewatering, testing or monitoring must be licensed with DSNR prior to their installation. Therefore the EIS should include information regarding:

- locations and construction details of all proposed bores, including their purpose; and
- expected annual groundwater extractions from individual dewatering bores

A ground and surface water monitoring program must be provided by the Applicant. The monitoring program is to provide details on the pre-mining and post-mining phases, including:

- details of the proposed monitoring programs, including water levels and quality data;
- the reporting procedures for the monitoring program including mechanism for transfer of information;
- details of the projected effects of any final void on the groundwater regime;
- contingency plans for the rehabilitation of aquifers if there is any adverse impact on the beneficial use of the aquifer system as a result of development. ;
- details of existing and/or potential groundwater users within the area of the development.

- discussion of proposed monitoring programs and reporting procedures regarding chemical and biological parameters of water quality,
- projected requirements for water supply, identification of sources of water and the requirement for a licence under Part 2 or 5 of the Water Act,
- details of any proposed diversion of watercourses which will be either temporary or permanent diversions,
- description of the integrated water management system, including an assessment of the water management system under a range of conditions (including 10%, 50% and 90% wet years, and severe storm events),
- discussion of the proposed use of the Hunter River Salinity Trading Scheme, including monitoring requirements and discharge procedures to match high flows and flood flows, and
- description of all activities to be undertaken within and adjacent to any watercourse.

2. Groundwater Management

- description of different groundwater sources present in the area including their extent and inter-relationships,
- description of physical and chemical characteristics of groundwater sources,
- assessment of flow directions and rates of flow, and
- assessment of any connections to the surface water bodies or any dependent ecosystems.

The EIS should include details of any potential changes to the existing groundwater regime as a result of the development including changes associated with:

- implementation of the progressive mine plan
- impacts of dewatering
- emplacements
- waste management
- detailed descriptions of conceptual models and any other predictive tools used; and,
- impacts on existing and potential groundwater users including the natural environment

Under Part V of the Water Act (1912), all proposed groundwater works including bores for the purpose of extraction, dewatering, testing or monitoring must be licensed with DSNR prior to their installation. Therefore the EIS should include information regarding:

- locations and construction details of all proposed bores, including their purpose; and
- expected annual groundwater extractions from individual dewatering bores

A ground and surface water monitoring program must be provided by the Applicant. The monitoring program is to provide details on the pre-mining and post-mining phases, including:

- details of the proposed monitoring programs, including water levels and quality data;
- the reporting procedures for the monitoring program including mechanism for transfer of information;
- details of the projected effects of any final void on the groundwater regime;
- contingency plans for the rehabilitation of aquifers if there is any adverse impact on the beneficial use of the aquifer system as a result of development. ;
- details of existing and/or potential groundwater users within the area of the development.

Any reports or documents on groundwater studies, which are referenced in the EIS, should be made available to the DSNR for review.

A description of proposed groundwater monitoring should be fully described, including locations of piezometers, monitoring frequencies and parameters to be monitored by the proponent. Water quality data (EC or TDS) from monitoring bores should be incorporated along with bore hydrographs to study the changes in water quality over time in the EIS.

The EIS should present a mechanism to transfer monitoring data to the DSNR database and to produce annual reports with interpreted results.

The EIS should explain any potential effects on the groundwater system of leachates from contaminated areas particularly the proposed enlargement of the coal washery reject area. The EIS should explain how long term impacts on high quality groundwaters would be minimised for the development. The monitoring program identified in the EIS should target any potential leachates from the development.

3. Integrated water/waste disposal

DSNR recognises the opportunities involved in developing an integrated site management system, which will provide increased flexibility of operations, improved measures to manage water and waste/rejects on site and long term rehabilitation of the mined/industrial areas of Hunter Valley Operations North (HVON). The EIS should be used to provide a process to manage water and waste/rejects over the sites to lead to long term rehabilitation of HVON, as well as managing the rehabilitation of Hunter Valley West pit.

The integration of existing consents across the Hunter Valley Operations North is proposed in order to provide the opportunity for Coal and Allied to move water and tailings across the northern operations area, including pit/void spaces on the Carrington and Alluvial Lands sites, which are environmentally sensitive lands adjacent to or within alluvial groundwater recharge zones. DSNR requests that environmental impact assessment for the entirety of the Hunter Valley North Operations be assessed where alterations to the current operation regime will occur. To avoid duplication of existing environmental assessments applying to the numerous extraction areas across HVON the following information should be included in the EIS:

a. identification of water sources across the HVON to which the consent modification will apply, with indicative water balances for operational water use (ie river extractions, intercepted groundwater make and any clean catchment runoff taken and used within coal mining/processing operations
b. environmentally sensitive groundwater zones, defined as being within alluvial terraces or in direct connectivity to alluvial groundwater sources
c. sites of known/proposed encapsulation of tailings or other waste materials, and proximity to alluvial groundwater zones

The EIS should outline a procedure for assessment, monitoring and remediation within or adjacent to environmentally sensitive groundwater sources where operations are proposed or emplacement/encapsulation of tailings/washery rejects or other spoils are to be emplaced. This process should be used to develop an integrated site water management plan, which integrates the water circuitry for the Hunter Valley Operations North, and monitoring of ground and any affected surface water sources, combining existing environmental monitoring and management programs, including the Carrington and Alluvial Lands operations. DSNR has consulted Coal and Allied on the operation of the groundwater monitoring and remediation program for the Alluvial Lands site. The process must incorporate a procedure to establish indicative cut off criteria, piezometric locations, active management to prevent salt accumulation in the basal area of backfilled pits and void spaces, and sign off criteria.

4. Crown Land issues

Land Status

The EIS needs to identify the location and status of any Crown land (as defined by the Crown Lands Act 1989) or Crown public roads (administered under the Roads Act 1993), included or directly affected by the proposal. The status to also identify any interests in the land. Enquiries in relation to Crown land status should be directed to the department's Land NSW (Maitland Office) PO Box 6, East Maitland 2323 or telephone 4937 9300.

Mining Lease Issues

The EIS needs to clarify if any Crown land involved in the proposal is subject to mining leases inclusive of surface rights under Mining Act legislation. In the event that the Crown land involved is not subject to mining lease surface rights, authorisation for the use and occupation of the Crown land will require consideration under the provisions of the Crown Lands Act 1989, and have regard to any other interests in the land.

Crown Public Roads

The EIS should have regard to the following in respect of Crown public roads. The Department of Sustainable Natural Resources (DSNR) is the delegated roads authority for Crown public roads that are administered under the Roads Act 1993. Crown roads provide the public with the right to pass along the road and allows adjoining owners the right of access to the road. The EIS needs to clarify if the proposal to mine with surface and/or subsurface rights under mining legislation, includes or directly affects any Crown public roads.

The mining of a Crown road that restricts the right of access is not in the public interest and is inconsistent with the objects of the Roads Act. There is a need to preserve and maintain continuity of public access to land serviced by the Crown road network. DSNR therefore does not consider it appropriate to provide owner's consent to lodge a development application to mine a Crown road. However, an applicant may make application to DSNR to close and purchase non-essential Crown roads. This is considered the preferred course of action. If for any reason such an application is unsuccessful, the applicant will need to negotiate with DSNR for approval to mine the Crown road and to provide alternative access whilst mining and rehabilitation works are undertaken.

Section 138 of the Roads Act 1993 requires the consent of the roads authority for ancillary works and structures on public roads. DSNR is the approval body for integrated development in the above under Section 91 of the Environmental Planning and Assessment Act 1979.

Enquiries in relation to Crown roads should be directed to the department's Land Access (Maitland Office) PO Box 6, East Maitland 2323 or telephone 4937 9306.

Potential Impacts
The EIS needs to consider any potential impacts the development may have on the current/future use, management or amenity of any Crown land, as defined by the Crown Lands Act 1989, that is included or directly affected by the proposal
Native Title

The EIS to address the issue of any native title rights or interests that may exist in the Crown land under Commonwealth and State Native Title legislation.

Should you require further information, please contact Fergus Hancock at the Muswellbrook office of the Department on phone (02) 6542 4417 or Mark Mignanelli at Newcastle on (02) 4929 9850.

Yours faithfully

Hemantha De Silva
Atg. Resource Access Manager
Hunter Region

FAXED 7-5-03

NSW NATIONAL PARKS AND WILDLIFE SERVICE

ABN 30 841 387 271

Mr Chris Wilson
Major Development Assessment
Department of Urban & Transport Planning
GPO Box 3927
SYDNEY NSW 2001

Our ref: 96/388 mb
Your ref:

Dear Mr Wilson

Re: Proposed expansion of West Pit, Hunter Valley Operations

I refer to your letter dated 14 March 2003 requesting requirements from the National Parks and Wildlife Service (NPWS) for the Environmental Impact Statement (EIS) for this proposal.

The NPWS has statutory responsibilities for the protection and care of native flora, native fauna and Aboriginal objects and places, and for the management of NPWS lands. Accordingly, the NPWS has an interest in ensuring that potential impacts on these features are appropriately assessed and managed.

The NPWS understands that **the proposal** involves the extension of open cut mining operations in West Pit for a further 20 years, and the consolidation/rationalisation of 15 development consents which together currently apply to the Carrington Pit, North Pit, West Pit and the Alluvials. It is further understood that the proposal would allow for increased ROM coal throughput and changes to coal handling, but no major changes to infrastructure or current processing are proposed.

The NPWS notes the results of recent biodiversity surveys which indicate the presence of at least four **threatened fauna species** and the possible occurrence of *White Box Yellow Box Blakely's Red Gum Woodland*, an **endangered ecological community** listed under the Threatened Species Conservation Act. Planning NSW is also advised that there is a recent record (2000) of the threatened Green and Golden Bell Frog immediately to the east of the West Pit Extension area. On this basis, the potential for this species to occur should also be explored.

The aerial photo provided in the Background Paper for the Planning Focus Meeting indicates that the majority of the site to be impacted by open-cut mining is not vegetated. However a patch of vegetation occurs towards the south of the proposed mining area and a considerable area of **remnant vegetation** occurs immediately to the east of the lease area

INF 13 MAY 2003

Conservation Programs
& Planning Division
Central Directorate
Level 6
43 Bridge Street
P.O. Box 1967
Hurstville NSW
2220 Australia
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www.npws.nsw.gov.au

boundary. As the study area covered in the biodiversity surveys is not described in the Background Paper, it is not clear whether this area of vegetation was included. Notwithstanding this area is outside of the lease area boundary, the NPWS requests that this area be included in surveys for its considerable potential as 'refuge' and 'stepping stone' habitat in a heavily degraded landscape. The NPWS also requests that opportunities to link with this (and any other available) remnant vegetation be explored in planning post-mining revegetation/rehabilitation of the West Pit Extension area, in consultation with adjoining lease-holder(s) as necessary. Should the loss of remnant vegetation on the site be unavoidable, the EIS should also include measures to offset the loss.

In general terms, the EIS will need to provide an adequate level of detail and assessment on the following values:

- **vegetation communities** likely to be affected by clearing and/or disturbance including:
- their conservation significance at both a local and regional scale;
- the habitat values of the vegetation;
- the extent and impact of clearing;
- the extent and nature of revegetation proposed, how this will be integrated with rehabilitation previously undertaken on the site, and possible linkages beyond the site boundaries;

The description of vegetation communities should wherever possible be correlated with known classifications, such as those used in the Lower Hunter Central Coast Regional Environmental Management Strategy (REMS) (NPWS 2000), the NPWS Comprehensive Regional Assessment (CRA) or by the Hunter Catchment Management Trust. It is strongly recommended that the latter be contacted in relation to survey/conservation assessment undertaken for the Remnant Vegetation Project (Travis Peake: ph. 49 301030).

- **threatened flora** species listed as ROTAP (Rare or Threatened Australian Plants) or under the Commonwealth *Environment Protection and Biodiversity Conservation Act*;.
- threatened flora species, and **endangered ecological communities** under the NSW *Threatened Species Conservation Act* (including preliminary listings and/or determinations) and their conservation significance;
- other regionally significant flora;

- **threatened fauna** species under the *Threatened Species Conservation Act* (including preliminary listings and/or determinations) and their conservation significance including:
- those recorded on the site or in the vicinity of the site;
- those with the potential to occur;

- **known and potential Aboriginal heritage** including:
  - an archaeological assessment in accordance with the NPWS IDA Guidelines for Aboriginal Cultural Heritage (copy attached);
  - an Aboriginal cultural heritage assessment in accordance with the NPWS IDA Guidelines;
  - details (as indicated in the IDA Guidelines) of inclusive consultation with the local Aboriginal community including all relevant groups;
  - the undertaking of any test excavations, if required, should be part of the assessment process to assess areas of "potential heritage" and clearly define areas of sites and identify any possible constraints. The results of both the test excavations and the survey are to be incorporated with the outcomes of the Aboriginal community consultation to enable the preparation of an integrated management strategy for Aboriginal heritage;
  - the assessment of Aboriginal heritage values must be based on sound, measurable and supportable criteria.

If sites or areas of Aboriginal heritage significance are identified through the assessment process, consideration will need to be given to appropriate conservation options. These may include the identification of offsets for Aboriginal heritage as compensation for the destruction of sites and should be integrated with the consideration of compensatory habitat for the protection of biodiversity values.

I apologise for the delay in providing the NPWS requirements. Should you require any additional information please contact, Meredith Billington, Conservation Planning Officer on (02) 9585 6953.

Yours sincerely

Helen Mulligan 7 May '03

Helen Mulligan
A/Manager
Conservation Planning Unit

NSW NATIONAL PARKS AND WILDLIFE SERVICE

ABORIGINAL CULTURAL HERITAGE AND THE INTEGRATED DEVELOPMENT ASSESSMENT PROCESS

INFORMATION FOR LOCAL COUNCILS
Updated 20 February 2001

The NPWS recommends that the following information be read in conjunction with the "Guide to section 79C' prepared by the Department of Urban Affairs and Planning, which outlines Council's obligation to consider Aboriginal heritage issues in determining a development application.

The NPWS has a statutory responsibility for the identification, management and conservation of Aboriginal heritage under the *National Parks and Wildlife Act 1974.* The NPWS acknowledges that it is Aboriginal people who should determine the cultural significance of Aboriginal heritage, and the NPWS has a strong commitment to working in partnership with Aboriginal people to manage and conserve Aboriginal cultural heritage. The NPWS recognises that Aboriginal cultural heritage includes both traditional and contemporary associations of Aboriginal people with the environment as well as physical sites.

Aboriginal heritage issues should be addressed upfront as part of the planning process undertaken for developments, and prior to lodgement of a development application. The NPWS requires that options for conserving Aboriginal relics within development footprints be fully explored in discussion with the Aboriginal community as part of the development assessment process. Impacts on Aboriginal relics should only be considered where there are no viable alternatives. The NPWS will require a clear demonstration that alternatives to site destruction have been fully explored.

NSW National Parks and Wildlife Service
43 Bridge Street, Hurstville NSW PO Box 1967, Hurstville NSW 2220
Telephone (02) 9585 6444 Facsimile (02) 9585 6555
Internet Email: info@npws.nsw.gov.au

When is the NPWS an approval body in the IDA process ?

The NPWS is an approval body in the IDA process when a development will impact on an Aboriginal relic or Aboriginal place, thereby requiring a consent to destroy from the Director-General of the National Parks and Wildlife Service. Threatened species, populations and/or ecological communities do not trigger the IDA process as the *Environmental Planning & Assessment (EP&A) Act 1979* and *Threatened Species Conservation Act 1995* eliminated the need for separate licensing or approvals in relation to these issues.

The NPWS is an approval body for a development application under the IDA process when:

1) A 'relic' is known to exist on the land to which the DA applies; and/or the land to which the DA applies is an Aboriginal place, immediately before the DA is made (as per s.91 (2)(a-b), *EP&A Amendment Act 1997);* AND

2) The development proposal will destroy, deface or damage an Aboriginal 'relic' or Aboriginal place, and a consent to destroy from the Director-General of the National Parks and Wildlife Service will be required, as per section 90 of the *National Parks and Wildlife (NPW) Act 1974* (note damage to an Aboriginal relic or place may be direct damage or result from indirect impacts).

   Under the *NPW Act,* a '<u>relic</u>' is defined as any deposit, object or material evidence (not being a handicraft made for sale) relating to indigenous and non-European habitation of the area that comprises NSW, being habitation both prior to and concurrent with the occupation of that area by persons of European extraction, and includes Aboriginal remains (as defined within the meaning of the NPW Act). Relics are confined to physical evidence.

   Aboriginal 'relics' are commonly referred to as Aboriginal sites.

   An "<u>Aboriginal place</u>" is a place which has been declared so by the Minister for the Environment because he or she believes that the place is or was of special significance to Aboriginal culture. It may or may not contain physical relics.

It should be noted that *the NPW Act* does not provide protection for spiritual areas or natural mythological areas that have no physical remains of Aboriginal occupation, unless they have been declared an 'Aboriginal place'.

For the purposes of the IDA process, the NPWS considers that an Aboriginal site ('relic') may be considered to be 'known' if:

- It is registered on the NPWS Aboriginal Sites Register; and/or
- It is an Aboriginal site known to the Aboriginal community; and/or
- It is located during surveys (eg: archaeological, anthropological) or test excavations conducted prior to lodgement of the DA.

How to obtain information about known Aboriginal sites

In order to obtain information about the location of known sites it is necessary to:

- Consult with Aboriginal community groups to identify the location of Aboriginal sites. The community groups may be aware of Aboriginal sites that have not been registered with NPWS.
- Contact the Aboriginal Sites Registrar at NPWS and request a site search to obtain a listing of registered sites. The Register only includes those Aboriginal sites which have been reported to NPWS. **Attachment 1** provides general information on the Aboriginal Sites Register, and a site search request form.
- Undertake an assessment of the known Aboriginal site/s and/or undertake survey of the subject land to locate Aboriginal sites. Test excavations may be required as part of this investigation to verify the location, extent and/or geomorphic context of Aboriginal sites. Such excavations need to be undertaken **before** the DA is submitted. A permit is required from NPWS for such investigation and if all information is attached to the application the processing time is approximately 8 weeks.

How to find out whether land contains a gazetted Aboriginal place

An Aboriginal place may be considered known if it has been declared by the Minister, and gazetted. Information on whether a proposed development site contains an Aboriginal place may be obtained by contacting the NPWS Aboriginal Sites Register (refer **Attachment 1**).

Information required by the NPWS to provide general terms of approval

In responding to requests for general terms of approval under the IDA process, the NPWS requires the <u>same</u> level of information to make an 'in-principle' decision as to whether to issue its general terms of approval as it would require to make a decision on the subsequent Section 90 consent application. In order for the NPWS to be in a position to provide its general terms of approval, all issues regarding conservation and site management need to be resolved upfront.

The NPWS does not require that a Section 90 consent application be submitted with the Integrated Development Application. The NPWS will issue its general terms of approval to the consent authority, and these terms of approval are incorporated into the development consent. Once the development consent is granted, the proponent has up to three years to apply to the NPWS for a Section 90 consent. The NPWS is then bound to issue the Section 90 consent in accordance with the development consent conditions.

In providing general terms of approval, the NPWS will require some administrative information from Council and information on the development proposal and Aboriginal heritage values of the relic and/or Aboriginal place from the applicant, as follows:

1.0 ADMINISTRATIVE INFORMATION REQUIRED FROM COUNCIL

1.1 A clear indication from Council that the development application is being assessed under the integrated development assessment (IDA) process and therefore will, or is likely to require subsequent approvals from the NPWS with respect to Aboriginal heritage. Where possible, Council should include the reasons why it has reached this conclusion. If Council is unsure whether a subsequent approval from the NPWS is required, it is suggested that Council seek advice from the NPWS.

1.2 A clear statement from Council as to whether Council also wishes the NPWS to provide advice on flora, fauna and threatened species values and/or potential impacts on adjoining NPWS reserves with respect to the development proposal.

1.3 A clear statement of the time frames for comment, including:

- The date of receipt of the DA; and
- The date that general terms of approval must be back with Council (assuming that no additional information is required).

1.4 A list of other approval bodies to which the integrated development application has been referred.

1.5 A fee of $250 will be charged by the NPWS to process the application. This fee should be paid by cheque, made out to the National Parks and Wildlife Service, and <u>must</u> be attached to the application. If the cheque is not attached to the application, the NPWS will return the development application immediately upon receipt, and will not process the application until the fee is paid, in accordance with Schedule 1, Part 9, Division 1 (103)(3).

The $250 fee is solely for processing of the application. The applicant may be required to pay additional fees to the NPWS, such as a fee for obtaining a site search of the NPWS Aboriginal Sites Register, and a fee for processing an application for consent to destroy an Aboriginal site.

2.0 INFORMATION ON THE DEVELOPMENT AND ABORIGINAL CULTURAL HERITAGE

The NPWS requires two types of information from the applicant:

- <u>Aboriginal cultural heritage assessment</u> which involves consultation with the Aboriginal community groups. The NPWS is committed to working in partnership with the Aboriginal community groups in the management of Aboriginal sites and requires community assessment of any Aboriginal site management.
- <u>Archaeological assessment</u> which involves the assessment of Aboriginal sites and their management based on archaeological heritage criteria.

Council should give the applicant the NPWS's "Information for applicants' document to assist applicants in preparing their integrated development application. When Council refers a DA to the NPWS, Council should ensure the completeness of the applicant's information according to the requirements outlined below.

A flowchart is shown in **Attachment 2** that outlines the process for assessing the Aboriginal heritage values of an area to enable a decision to be made as to whether a development application will be an integrated development application for Aboriginal sites. It is essential that the outcomes of the Aboriginal cultural assessment and the technical assessment are integrated.

2.1 Aboriginal Cultural Heritage Assessment

Aboriginal sites can be the physical remains of Aboriginal occupation of an area or alternatively, an area that has particular meaning for Aboriginal people, for example, spiritual areas or natural mythological areas. It is important to consider that Aboriginal heritage is not only valuable to Aboriginal people but also to those people who are interested in learning from the early inhabitants of Australia. Proposed developments that alter landscapes can impact on these various types of Aboriginal sites.

Assessment of the cultural values of Aboriginal sites and places to the Aboriginal community is an important part of the assessment process, and the Aboriginal Cultural Heritage Assessment report (discussed below) <u>is</u> required by the NPWS in order for it to consider whether to issue general terms of approval.

2.1.1 <u>Aboriginal Community Group/s Consultation</u>

Applicants should contact (as early as possible) local Aboriginal community groups, including Local Aboriginal Land Councils, any known Tribal Elders Corporations and Native Title Claimants to ensure that proper consultation processes are carried out. Local Aboriginal community groups will require time to consider a proposal and to discuss any issues with its members, and sufficient time must be allowed for this to occur.

The purpose of Aboriginal participation in the assessment process is:

- To notify the local Aboriginal people in sufficient detail and in a timely manner about activities or developments which may impact on Aboriginal heritage, so that their concerns and possible options for action can be identified on a fully informed basis;
- To ensure that Aboriginal people who hold cultural knowledge, including native title holders or applications, are able to contribute to the assessment process in ways that are culturally acceptable to them;
- To identify locations and cultural values of Aboriginal sites and places of significance to the Aboriginal community that may be affected by the proposal so that potential impacts can be avoided wherever possible; and
- To identify whether there are culturally acceptable mitigative measures when impacts are considered to be unavoidable by the applicant.

It is essential that applicants provide NPWS with documentation from the Aboriginal community groups regarding their views and recommendations for actions.

The Environmental Planning and Assessment Regulation 2000 (cl. 111) allows 46 days (from the date of DA lodgement with the consent authority) for the Director-General of the National Parks and Wildlife to undertake any further Aboriginal community consultation, if the Director-General of the NPW considers that such consultation is required before the Director-General can make a decision concerning the general terms of approval, and consultation commences within 25 days after the date on which the DA is forwarded to the Director-General.

2.1.2 Aboriginal Cultural Heritage Assessment Report

The report should contain:

1. Information on the nature, timing and location of consultation, including the identification of individuals and/or groups consulted and copies of any correspondence from those individuals and/or groups;
2. A statement of the Aboriginal community group/s understanding of the values of the known Aboriginal site/s and/or Aboriginal place located on the development site. This may include social, spiritual, historic, and archaeological values.
3. A statement of the Aboriginal community groups response to the development and their recommendations (if any) for mitigation of impacts and/or conservation of known Aboriginal sites and/or Aboriginal place/s.

The results of this assessment must be integrated with the technical (archaeological) assessment and provide the basis for the final assessment of Aboriginal heritage values and recommendations for management options. The NPWS will also require a clear demonstration in the development application of how the proponent proposes to address any issues which have been raised as part of the Aboriginal cultural assessment, and whether this is acceptable to the Aboriginal community.

To obtain a list of Land Councils and Native Title claimants contact:

NSW State Aboriginal Land Council
PO Box W125
PARRAMATTA NSW 2150
Ph: (02) 9689 4444

Department of Aboriginal Affairs
Level 5, 83 Clarence Street
SYDNEY NSW 2000
Ph: (02) 9290 8700

2.2 Archaeological Assessment

The NPWS requires the information summarised below to evaluate reports on the assessment of Aboriginal sites. Further detail on this is located in the NPWS' *"Aboriginal Cultural Heritage Standards and Guidelines Kit" 1997*, which sets out NPWS requirements for reporting on Aboriginal sites and assessments (refer **Attachment 3** for information on this kit). The assessment of individual Aboriginal sites and the development of management strategies may not require that all of the categories under the following list of information requirements are addressed, however, their relevance needs to be considered for each proposal.

The assessment of Aboriginal sites should be directed towards their conservation and protection. While the *NPW Act* provides for the destruction of sites, this option should always be considered as a last option and must be well supported.

2.2.1 Locational Context:
- description of location of study
- legislative context
- cadastral context (eg: Lot, DP)
- identification of any associated Aboriginal cultural heritage studies undertaken in the study area

2.2.2 Description of Development Impact
- type of development
- extent of direct impacts
- extent of potential indirect impacts (eg: run-off, increased visitation)
- flexibility of project design
- staging and how this might effect present or future management decisions

2.2.3 Assessment Context
- the brief for the work being undertaken for this particular project
- objectives of the assessment

2.2.4 Archaeological Context
- targeted review of known archaeology of region and previous work in the study area to identify range of expected archaeological evidence relative to the project and landscape
- type/s of Aboriginal sites
- **synthesis** and **evaluation** of this information to identify archaeological issues. This will provide the basis for defining the archaeological assessment and management context relevant to this study, and the development of appropriate management options, with protection/conservation being the primary consideration. It should be noted that a summary of previous work is not adequate.

2.2.5 Landscape Context
- description of landscape classification and land units being used for the study (at the different levels of landscape, landscape unit, landform, topographic unit)
- identification of any paleo-features
- assessment of how the landscape context and previous land surface change is relevant to the study
- assessment of how the landscape relates to models of site location and archaeology (as per synthesis above), and development of a framework for assessing the sites and landscapes within the study area
- identification of areas of archaeological sensitivity

The landscape analysis may need to include a geomorphic study to ensure that significant features are identified and considered in the overall assessment (e.g.: paleofeatures with the potential to include older sites).

2.2.6 Condition of Landsurface

- identify previous land surface impacts across the study area, with the view to assessing whether sites may be buried such as campsites, burials, and the integrity of the landsurface in those locations
- description of ground surface conditions and supporting tabulated data (for surveys)
- assessment of how the landsurface conditions have revealed, concealed, destroyed, impacted on or preserved archaeological evidence and how this relates to archaeological potential, the condition of Aboriginal sites and the geomorphology in these contexts

2.2.7 Methodology for Investigation

- description of input from the Aboriginal community to the method proposed for undertaking the study
- the proposed field methodology, such as type of sampling strategies and survey coverage (this should be targeted to the objectives of the study)
- description of the scope and method of recording and analysis by which the objectives of the study will be achieved
- the method whereby a clear and supportable significance assessment will be undertaken a supportable rationale for any proposed test excavations
- the program of work
- rationale for any variation in the methods adopted
- test excavation methodology, if relevant

2.2.8 Survey Coverage Data

- description of survey coverage and the effectiveness of that coverage for detecting potentially buried Aboriginal sites (this needs to be fully described and evaluated within the context of the objectives and the study plan. Specific methods are detailed in the NPWS Standards & Guidelines Kit)

2.2.9 Analysis and Reporting

- detailed Aboriginal site description/s including tabulated data summarising site content and any analysis, as per the NPWS Guidelines
- comprehensive evaluation of the study results (for potentially buried archaeological deposits this includes incorporating the information on archaeological potential and the reliability of survey coverage)
- results of test excavations, if relevant

Diagrams and photos are considered to be an essential component of archaeological reporting.

2.2.10 Archaeological Significance Assessment

- the significance criteria and attributes used for the assessment need to be fully supported by the information presented on the archaeological and landscape context of the site/s (e.g.: representativeness, items and landscape elements considered to be rare, information potential, social/historical values). The criteria for assessment need to be measurable.

2.2.11 Conclusions of the Study
- evaluation of potential impacts on known Aboriginal sites and areas of
- archaeological sensitivity and potential (if relevant)
- establish clear relationship between significance assessment and impacts
- consideration of cumulative impact of development on comparable sites and landscapes at both a local and regional level
- consideration of various management options, **specifically identification of conservation options**, including on-site conservation and compensatory areas (for larger scale projects)
- description of mitigation works required for specific sites to be impact on

2.2.12 Management Options
- recommendations for conservation and other management options based on the results of the archaeological report and discussions with the land owner / manager and the Aboriginal community group/s
- incorporation of management options from Aboriginal community group/s where these relate to the management options being proposed for sites or places

The following maps are required as a minimum (more detailed specifications are set out in the NPWS Guidelines). Mapping should be at the same scale throughout the report.
- location of study area (1:25,000 map series where available, more detailed maps are useful additions)
- development layout if known, flexible components of design if applicable
- locations of previous survey undertaken and sites recorded (referred to in text)
- (for surveys) survey coverage data showing location and extent of different methods used
- land units and topographic information used
- land surface history highlighting the location and boundaries of the disturbed and intact deposits
- Aboriginal site locations

A comprehensive glossary of terms used should also be provided.

What happens if an Aboriginal site is found on the land after a development application is lodged or a development consent is granted ?

It is possible that an 'unknown' Aboriginal site could be identified on the land subsequent to the grant of development consent by Council or DUAP. The NPWS strongly advises that an adequate assessment of Aboriginal heritage values of the land be carried out prior to lodgement of the DA, so that this situation does not arise. However, in the event that this does occur, all works on or adjacent to the Aboriginal site must cease, and the applicant must seek a consent to destroy the relic from the Director-General of NPWS. A development consent granted under the *EP&A Amendment Act* does not equate to a Section 90 consent issued under the *NPW Act*. A consent to destroy an Aboriginal site must be granted pursuant to the *NPW Act* before an Aboriginal site or Aboriginal place can be destroyed. Failure to obtain this consent may result in prosecution.

Further Information

The National Parks and Wildlife Service has a Cultural Heritage Division which manages Aboriginal heritage. The Division includes 4 geographic units which deal with on- and off-park conservation planning and assessment issues. These boundaries are shown on **Attachment 4.**

For further information on these requirements, please contact the Aboriginal Heritage Unit in your area:

Manager, Central Aboriginal Heritage Unit
Cultural Heritage Division
NSW National Parks and Wildlife Service
PO Box 1967
HURSTVILLE NSW 2040

Ph: (02) 9585 6674
Fax: (02) 9595 6442

Manager, Northern Aboriginal Heritage Unit
Cultural Heritage Division
NSW National Parks and Wildlife Service
Locked Bag 914
COFFS HARBOUR NSW 2450

Ph: (02) 6659 8245
Fax: (02) 6651 6187

Manager, Southern Aboriginal Heritage Unit
Cultural Heritage Division
NSW National Parks and Wildlife Service
PO Box 2115
QUEANBEYAN NSW 2620

Ph: (02) 6298 9736
Fax: (02) 6298 4281

Manager, Western Aboriginal Heritage Unit
Cultural Heritage Division
NSW National Parks and Wildlife Service
PO Box 1007
DUBBO NSW 2830

Ph: (02) 6883 5345
Fax: (02) 6884 9382

ATTACHMENT 1

THE ABORIGINAL SITES REGISTER OF NSW
GENERAL INFORMATION

The National Parks and Wildlife Service maintains the Aboriginal Sites Register of NSW. The Register includes a computer database and site recording cards for all recorded Aboriginal sites in NSW, in addition to a database index of archaeological reports and a library of these reports. Information from the Register may be made available for a variety of uses.

<u>What information is available?</u>

Information relating to recorded Aboriginal sites in a particular area may be made available upon request. The information is generally available in the form of a standard report from the Register database. This report lists all recorded sites within and/or surrounding the area of interest, with each record including the site identifying number, site type, site location and Australian Map Grid co-ordinates, date of recording and the name of the recorder of the site.

If the area of interest is particularly large (e.g.. a river catchment), a Data Licence Agreement may be required. This agreement is a legal contract document between the Director-General of the National Parks and Wildlife Service and a named client, and is designed to ensure that any data supplied under the agreement is used appropriately.

In some cases, written support from the relevant Local Aboriginal Land Council may be required before information can be provided from the Register.

<u>How is the data provided?</u>

Site information will generally be provided as a standard computer print out, however, digital computer formats on disk may be available for specific purposes.

<u>Is there a charge for data?</u>

The cost for supply of a standard report is $30 per search area. An urgent database search may be conducted for $60. More complex reports may incur an additional charge.

In particular circumstances there may be no charge for a report (e.g.. for Aboriginal Land Councils, research purposes etc.). The waiving of any charge requires discussion with the Aboriginal Sites Registrar.

There is no charge imposed for a Data Licence Agreement, however, any data supplied under a Licence Agreement will generally be charged at the current "cost of transfer".

Are there any limitations in the data?

It is essential to note that a report from the Register does not represent a comprehensive list of all Aboriginal sites in a specified area. A report lists recorded sites only. In any given area there may be a number of undiscovered and/or unrecorded sites. As a result of this limitation, and the fact that all Aboriginal sites are protected under NSW legislation, the NPWS may recommend that a survey for Aboriginal sites is conducted where development is proposed.

Locational details are recorded as grid references. It is important to note that there *may* be errors in these recordings. If accurate site locations are required it may be necessary to confirm the locations on the ground.

If the information provided is to be used for ongoing purposes, it is recommended that regular updates are obtained as new records are continually being added to the database.

How to obtain Aboriginal sites data

To obtain information about recorded Aboriginal sites, a written request should be forwarded to the Aboriginal Sites Registrar (a request form is available if required). All requests must include;

- Company/organisation name (if applicable)
- Contact name, phone number and address details
- Purpose for which the information is required
- Copy of a topographic map with the area of interest clearly marked
- A cheque for $30 per search area, made out to the NPWS (unless other arrangements have been made with the Registrar)

Applications should be forwarded to:

The Aboriginal Sites Registrar
Cultural Heritage Division
NPWS
PO Box 1967
Hurstville, NSW 2220. **or fax (02) 9585 6466**

Further information

For further information about the Aboriginal Sites Register, please contact the Aboriginal Sites Registrar (02 9585 6471, fax 02 9585 6466).

ATTACHMENT 2

PROCESS

1. **Development proposal.**
2. **Investigative studies and assessments. This could include: Aboriginal heritage, flora and fauna, hydrology, air, noise, social / economic etc.**
3. **For Aboriginal heritage, information is required about:**
4. **Information sources:**
   NB: Test excavations may be required. This requires a permit from NPWS, allow 8 weeks for processing.
5. **Undertake assessment**
6. **Prepare report and recommend management options.**
7. **Apply this and information from other assessments to development concept and finalise development proposal. Avoiding impact on sites is the preferred strategy.**
8. **Lodgement of DA with consent authority**
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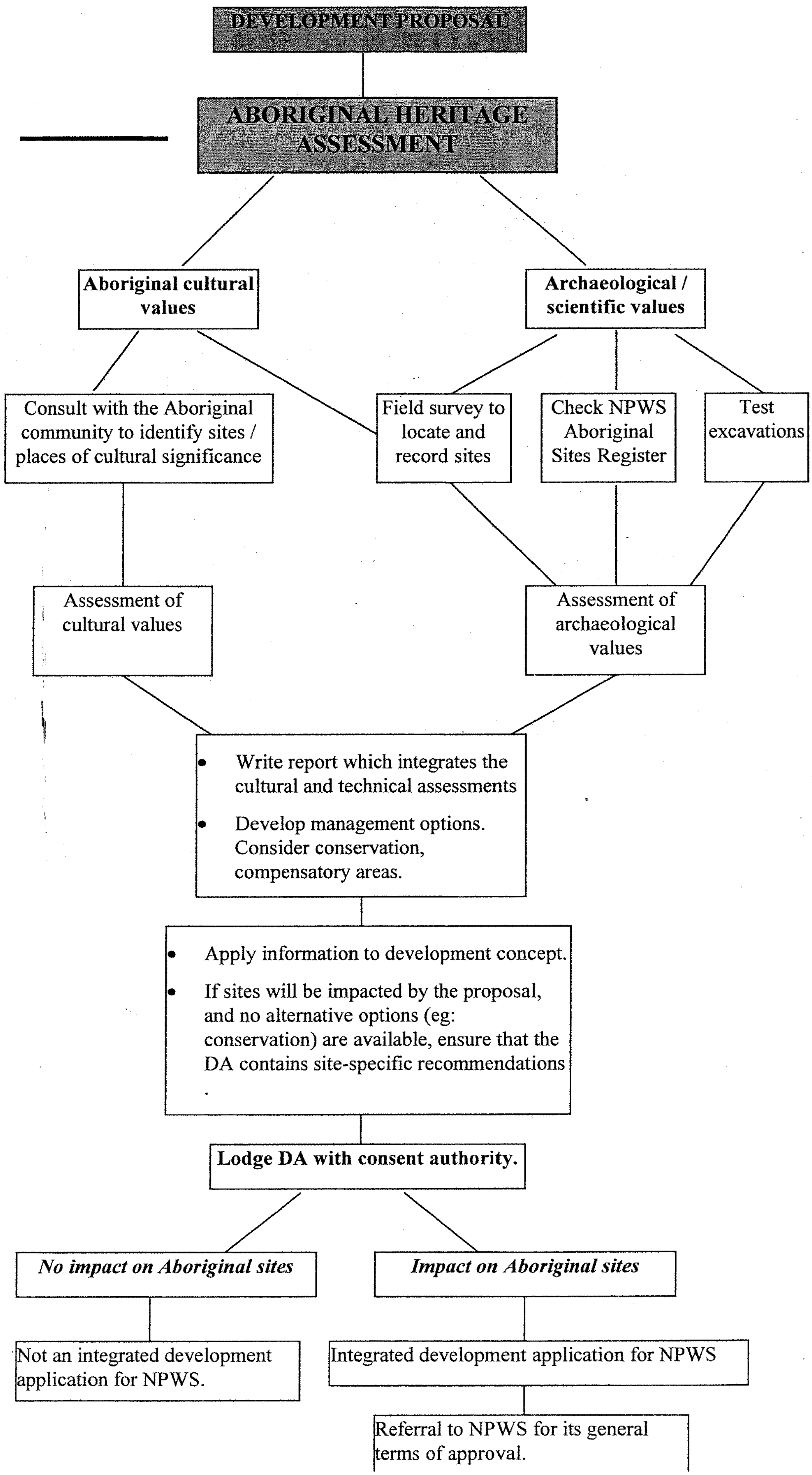

ATTACHMENT 3

Aboriginal Cultural Heritage Standards and Guidelines Kit

comprising

Guidelines for Aboriginal Consultants

These *Guidelines* aim to clarify for Aboriginal consultants the type of reporting required for heritage assessments. The *Guidelines* reflect the Service's commitment to partnership with Aboriginal stakeholders in protecting and managing Aboriginal cultural heritage.

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Standards Manual for Archaeological Practice in Aboriginal Heritage Management

The *Standards Manual* sets out current best practices in this diverse and developing field. The *Manual* encourages archaeological methodology to be relevant to the management context. It has been developed in partnership with the professional community and will be supplemented by regular updates.

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Guidelines for Archaeological Survey Reporting

These *Guidelines* set out in detail the requirements of NPWS for survey reports submitted by archaeologists. The object is to enhance the comparability of survey reports as well as to promote transparency and predictability in the industry by making clear the needs and expectations of NPWS as the reviewing agency.

•

Guidelines for Aboriginal Heritage Impact Assessment in the Exploration & Mining Industries

These *Guidelines* provide industry-specific advice to applicants of exploration and mining ventures. They were prepared by NPWS in co-operation with the NSW Minerals Council and the NSW Department of Mineral resources.

To obtain a copy of this valuable kit please send a cheque for $70 made out to NPWS to:
Cultural Heritage Division, NPWS, PO Box 1967, Hurstville NSW 2220
Enquires to:
Denis Byrne (02)9585 6571 *denis.byrne@npws.nsw.gov.au*
Anthony English (02)9585 6464 *anthony.english@npws.nsw.gov.au*

ATTACHMENT 4

NSW NATIONAL PARKS AND WILDLIFE SERVICE

ABORIGINAL CULTURAL HERITAGE AND THE INTEGRATED DEVELOPMENT ASSESSMENT PROCESS

INFORMATION FOR APPLICANTS
20 February 2001

This information is presented to assist you to lodge an integrated development application with your local council. Part 4 of *Environmental Planning and Assessment Act 1979* has recently been amended. The new *Environmental Planning and Assessment Amendment Act 1997* provides a single system for the development, building and subdivisions aspects of a proposal, and involves the linking of some approvals granted by State government agencies under other environmental legislation. Development proposals which require an approval or licence from one or more of these State agencies (refer to section 91 of the *EP&AA Act)* are known as an integrated approval. The basis of the IDA process involves applicants providing up-front the information necessary for agencies or approval bodies to determine if they will give the general terms of approval necessary for granting additional approvals.

The National Parks and Wildlife Service (NPWS) is one of the State government agencies which has been included in the IDA process, in relation to its responsibilities for Aboriginal relics and Aboriginal places under Section 90 of the *National Parks and Wildlife Act 1974.* Under Section 90, it is an offence to knowingly destroy, deface or damage a relic or Aboriginal place without the consent of the Director-General of the National Parks and Wildlife Service.

The NPWS acknowledges that it is Aboriginal people who should determine the cultural significance of Aboriginal heritage, and the NPWS has a strong commitment to working in partnership with Aboriginal people to manage and conserve Aboriginal cultural heritage. The NPWS recognises that Aboriginal cultural heritage includes both traditional and contemporary associations of Aboriginal people with the environment as well as physical sites.

NSW National Parks and Wildlife Service
43 Bridge Street, Hurstville NSW PO Box 1967, Hurstville NSW 2220
Telephone (02) 9585 6444 Facsimile (02) 9585 6555
Internet Email: info@npws.nsw.gov.au

Aboriginal heritage issues should be addressed upfront as part of the planning process undertaken for developments, and prior to lodgement of a development application. The NPWS requires that options for conserving Aboriginal relics within development footprints be fully explored in discussion with the Aboriginal community as part of the development assessment process. Impacts on Aboriginal relics should only be considered where there are no viable alternatives. The NPWS will require a clear demonstration that alternatives to site destruction have been fully explored.

When is the NPWS an approval body in the IDA process ?

The NPWS is an approval body in the IDA process when a development will impact on an Aboriginal relic or Aboriginal place, thereby requiring a consent to destroy from the Director-General of the National Parks and Wildlife Service. Threatened species, populations and/or ecological communities do not trigger the IDA process as the *Environmental Planning & Assessment (EP&A) Act 1979* and *Threatened Species Conservation Act 1995* eliminated the need for separate licensing or approvals in relation to these issues.

The NPWS is an approval body for a development application under the IDA process when:

1) A 'relic' is known to exist on the land to which the DA applies; and/or the land to which the DA applies is an Aboriginal place, immediately before the DA is made (as per s.91 (2)(a-b), *EP&A Amendment Act 1997);* AND

2) The development proposal will destroy, deface or damage an Aboriginal 'relic' or Aboriginal place, and a consent to destroy from the Director-General of the National Parks and Wildlife Service will be required, as per section 90 of the *National Parks and Wildlife (NPW) Act 1974* (note damage to an Aboriginal relic or place may be direct damage or result from indirect impacts).

   Under the *NPW Act,* a 'relic' is defined as any deposit, object or material evidence (not being a handicraft made for sale) relating to indigenous and non-European habitation of the area that comprises NSW, being habitation both prior to and concurrent with the occupation of that area by persons of European extraction, and includes Aboriginal remains (as defined within the meaning of the NPW Act). Relics are confined to physical evidence.

   Aboriginal 'relics' are commonly referred to as Aboriginal sites.

   An "Aboriginal place" is a place which has been declared so by the Minister for the Environment because he or she believes that the place is or was of special significance to Aboriginal culture. It may or may not contain physical relics.

It should be noted that *the NPW Act* does not provide protection for spiritual areas or natural mythological areas that have no physical remains of Aboriginal occupation, unless they have been declared an 'Aboriginal place'.

For the purposes of the IDA process, the NPWS considers that an Aboriginal site ('relic') may be considered to be 'known' if:

- It is registered on the NPWS Aboriginal Sites Register; and/or

- It is an Aboriginal site known to the Aboriginal community; and/or
- It is located during surveys (eg: archaeological, anthropological) or test excavations conducted prior to lodgement of the DA.

How do I find out if there is an Aboriginal site on the land ?

To find out whether the land you want to develop contains known Aboriginal site/s or an Aboriginal place, you need to:

- Consult with the Aboriginal community groups to identify the location of Aboriginal sites. They may be aware of sites that have not been registered with NPWS.
- Contact the Aboriginal Sites Registrar at NPWS and request a site search to obtain a listing of registered Aboriginal sites. The Register only includes those Aboriginal sites which have been reported to NPWS. **Attachment 1** provides general information on the Aboriginal Sites Register, and a site search request form.
- Undertake an assessment of the known Aboriginal site/s and/or undertake survey of the subject land to locate Aboriginal sites. Test excavations may be required as part of this investigation to verify the location of Aboriginal sites. Such excavations need to be undertaken <u>before</u> the DA is submitted. A permit is required from NPWS for such investigation and if all information is attached to the application the processing time is 8 weeks.

Once you have this information, you need to assess whether the development proposal will impact upon an Aboriginal site or an Aboriginal place. While the *NPWS Act* provides for the destruction of Aboriginal sites, this should always be considered as a last option, and in-situ conservation is the preferred option.

How to find out whether land contains a gazetted Aboriginal place

An Aboriginal place may be considered known if it has been declared by the Minister, and gazetted. Information on whether a proposed development site contains an Aboriginal place may be obtained by contacting the NPWS Aboriginal Sites Register (refer **Attachment 1**).

What information do I need to include with my development application ?

You need to clearly state in your development application to Council whether your proposal would impact on a known Aboriginal site or an Aboriginal place. The flowchart in **Attachment 2** outlines the process for assessing the Aboriginal heritage values of an area to allow you to determine whether your development application will be an integrated development application for Aboriginal sites. It is essential that the outcomes of the Aboriginal cultural assessment and the technical assessment are integrated. The results of the Aboriginal heritage assessment must be applied to define potential development constraints, and the development concept should these constraints into account. The development application should clearly indicate whether Aboriginal sites will be impacted or not, and if so, what is proposed for each of the impacted sites (this might include salvage excavations, collection of artefacts etc).

If the IDA process is triggered through the presence of known Aboriginal site/s and/or an Aboriginal place that would be impacted by a proposed development, Council will contact the NPWS seeking its general terms of approval. In order to provide general terms of approval the NPWS will need the same level of information required to make the actual decision.

Applicants need to include two types of information in their IDA application:

1. Aboriginal cultural heritage assessment which involves consultation with Aboriginal community groups. The NPWS is committed to working in partnership with Aboriginal community groups in the management of sites and requires community assessment of any Aboriginal sites.
2. Archaeological assessment which involves the assessment of Aboriginal sites and their management based on archaeological heritage criteria.

This information from each of these must be integrated to provide the basis for the final assessment of Aboriginal heritage values and recommendations for management options.

The following advice sets out the NPWS information requirements in more detail. Not all applications will attract the same information requirements. As some of this information is of a technical nature, the NPWS suggests that you consider engaging a reputable archaeologist to assist in the preparation of an IDA.

The NPWS advises that it does not require that a Section 90 consent application be submitted with the Integrated Development Application. The proponent will however be required to apply to the NPWS for a Section 90 consent within three years of the granting of development consent. This is explained in more detail below.

2.1 Aboriginal Cultural Heritage Assessment

Aboriginal sites can be the physical remains of Aboriginal occupation of an area or alternatively, an area that has particular meaning for Aboriginal people, for example, spiritual areas or natural mythological areas. It is important to consider that Aboriginal heritage is not only valuable to Aboriginal people but also to those people who are interested in learning from the early inhabitants of Australia. Proposed developments that alter landscapes can impact on these various types of Aboriginal sites.

Assessment of the cultural values of Aboriginal sites and places to the Aboriginal community is an important part of the assessment process, and the Aboriginal Cultural Heritage Assessment report (discussed below) is required by the NPWS in order for it to consider whether to issue general terms of approval.

2.1.1 Aboriginal Community Group/s Consultation

Applicants should contact (as early as possible) local Aboriginal community groups, including Local Aboriginal Land Councils, any known Tribal Elders Corporations and Native Title Claimants to ensure that proper consultation processes are carried out. Local Aboriginal community groups will require time to consider a proposal and to discuss any issues with its members, and sufficient time must be allowed for this to occur.

The purpose of Aboriginal participation in the assessment process is:

- To notify the local Aboriginal people in sufficient detail and in a timely manner about activities or developments which may impact on Aboriginal heritage, so that their concerns and possible options for action can be identified on a fully informed basis;
- To ensure that Aboriginal people who hold cultural knowledge, including native title holders or applications, are able to contribute to the assessment process in ways that are culturally acceptable to them;
- To identify locations and cultural values of Aboriginal sites and places of significance to the Aboriginal community that may be affected by the proposal so that potential impacts can be avoided wherever possible; and
- To identify whether there are culturally acceptable mitigative measures when impacts are considered to be unavoidable by the applicant.

It is essential that applicants provide NPWS with documentation from the Aboriginal community groups regarding their views and recommendations for actions.

The Environmental Planning and Assessment Regulation 2000 (cl. 111) allows 46 days (from the date of DA lodgement with the consent authority) for the Director-General of the National Parks and Wildlife to undertake any further Aboriginal community consultation, if the Director-General of the NPW considers that such consultation is required before the Director-General can make a decision concerning the general terms of approval, and consultation commences within 25 days after the date on which the DA is forwarded to the Director-General.

2.1.2 <u>Aboriginal Cultural Heritage Assessment Report</u>

The report should contain:

1. Information on the nature, timing and location of consultation, including the identification of individuals and/or groups consulted and copies of any correspondence from those individuals and/or groups;
2. A statement of the Aboriginal community group/s understanding of the values of the known Aboriginal site/s and/or Aboriginal place located on the development site. This may include social, spiritual, historic, and archaeological values.
3. A statement of the Aboriginal community groups response to the development and their recommendations (if any) for mitigation of impacts and/or conservation of known Aboriginal sites and/or Aboriginal place/s.

The results of this assessment must be integrated with the technical (archaeological) assessment and provide the basis for the final assessment of Aboriginal heritage values and recommendations for management options. The NPWS will also require a clear demonstration in the development application of how the proponent proposes to address any issues which have been raised as part of the Aboriginal cultural assessment, and whether this is acceptable to the Aboriginal community.

To obtain a list of Land Councils and Native Title claimants contact:

NSW State Aboriginal Land Council
PO Box W125
PARRAMATTA NSW 2150
Ph: (02) 9689 4444

Department of Aboriginal Affairs
Level 5, 83 Clarence Street
SYDNEY NSW 2000
Ph: (02) 9290 8700

2.2 Archaeological Assessment

The NPWS requires the information summarised below to evaluate reports on the assessment of Aboriginal sites. Further detail on this is located in the NPWS' *"Aboriginal Cultural Heritage Standards and Guidelines Kit" 1997*, which sets out NPWS requirements for reporting on Aboriginal sites and assessments (refer **Attachment 3** for information on this kit). The assessment of individual Aboriginal sites and the development of management strategies may not require that all of the categories under the following list of information requirements are addressed, however, their relevance needs to be considered for each proposal.

The assessment of Aboriginal sites should be directed towards their conservation and protection. While the *NPW Act* provides for the destruction of sites, this option should always be considered as a last option and must be well supported.

2.2.1 Locational Context:

- description of location of study
- legislative context
- cadastral context (eg: Lot, DP)
- identification of any associated Aboriginal cultural heritage studies undertaken in the study area

2.2.2 Description of Development Impact

- type of development
- extent of direct impacts
- extent of potential indirect impacts (eg: run-off, increased visitation)
- flexibility of project design
- staging and how this might effect present or future management decisions

2.2.3 Assessment Context

- the brief for the work being undertaken for this particular project
- objectives of the assessment

2.2.4 Archaeological Context

- targeted review of known archaeology of region and previous work in the study area to identify range of expected archaeological evidence relative to the project and landscape
- type/s of Aboriginal sites
- **synthesis** and **evaluation** of this information to identify archaeological issues. This will provide the basis for defining the archaeological assessment and management context

relevant to this study, and the development of appropriate management options, with protection/conservation being the primary consideration. It should be noted that a summary of previous work is not adequate.

2.2.5 Landscape Context

- description of landscape classification and land units being used for the study (at the different levels of landscape, landscape unit, landform, topographic unit)
- identification of any paleo-features
- assessment of how the landscape context and previous land surface change is relevant to the study
- assessment of how the landscape relates to models of site location and archaeology (as per synthesis above), and development of a framework for assessing the sites and landscapes within the study area
- identification of areas of archaeological sensitivity

The landscape analysis may need to include a geomorphic study to ensure that significant features are identified and considered in the overall assessment (e.g.: paleofeatures with the potential to include older sites).

2.2.6 Condition of Landsurface

- identify previous land surface impacts across the study area, with the view to assessing whether sites may be buried such as campsites, burials, and the integrity of the landsurface in those locations
- description of ground surface conditions and supporting tabulated data (for surveys)
- assessment of how the landsurface conditions have revealed, concealed, destroyed, impacted on or preserved archaeological evidence and how this relates to archaeological potential, the condition of Aboriginal sites and the geomorphology in these contexts

2.2.7 Methodology for Investigation

- description of input from the Aboriginal community to the method proposed for undertaking the study
- the proposed field methodology, such as type of sampling strategies and survey coverage (this should be targeted to the objectives of the study)
- description of the scope and method of recording and analysis by which the objectives of the study will be achieved
- the method whereby a clear and supportable significance assessment will be undertaken a supportable rationale for any proposed test excavations
- the program of work
- rationale for any variation in the methods adopted
- test excavation methodology, if relevant

2.2.8 Survey Coverage Data

- description of survey coverage and the effectiveness of that coverage for detecting potentially buried Aboriginal sites (this needs to be fully described and evaluated within the context of the objectives and the study plan. Specific methods are detailed in the NPWS Standards & Guidelines Kit)

2.2.9 Analysis and Reporting

- detailed Aboriginal site description/s including tabulated data summarising site content and any analysis, as per the NPWS Guidelines
- comprehensive evaluation of the study results (for potentially buried archaeological deposits this includes incorporating the information on archaeological potential and the reliability of survey coverage)
- results of test excavations, if relevant

Diagrams and photos are considered to be an essential component of archaeological reporting.

2.2.10 Archaeological Significance Assessment

- the significance criteria and attributes used for the assessment need to be fully supported by the information presented on the archaeological and landscape context of the site/s (e.g.: representativeness, items and landscape elements considered to be rare, information potential, social/historical values). The criteria for assessment need to be measurable.

2.2.11 Conclusions of the Study

- evaluation of potential impacts on known Aboriginal sites and areas of
- archaeological sensitivity and potential (if relevant)
- establish clear relationship between significance assessment and impacts
- consideration of cumulative impact of development on comparable sites and landscapes at both a local and regional level
- consideration of various management options, **specifically identification of conservation options**, including on-site conservation and compensatory areas (for larger scale projects)
- description of mitigation works required for specific sites to be impact on

2.2.12 Management Options

- recommendations for conservation and other management options based on the results of the archaeological report and discussions with the land owner / manager and the Aboriginal community group/s
- incorporation of management options from Aboriginal community group/s where these relate to the management options being proposed for sites or places

The following maps are required as a minimum (more detailed specifications are set out in the NPWS Guidelines). Mapping should be at the same scale throughout the report.

- location of study area (1:25,000 map series where available, more detailed maps are useful additions)
- development layout if known, flexible components of design if applicable
- locations of previous survey undertaken and sites recorded (referred to in text)
- (for surveys) survey coverage data showing location and extent of different methods used
- land units and topographic information used
- land surface history highlighting the location and boundaries of the disturbed and intact deposits
- Aboriginal site locations

A comprehensive glossary of terms used should also be provided.

Subsequent to the grant of development consent.

Please note that while you may have been granted a development consent, you are still required to apply to the NPWS for a Section 90 consent to destroy an Aboriginal site and/or Aboriginal place. You have up to three (3) years to apply to the NPWS for a consent to destroy an Aboriginal site or an Aboriginal place. This will involve the submission of an application to the NPWS and the payment of a fee to have the application assessed. For more information about how to applying for a consent to destroy, contact the relevant NPWS office (see below).

What happens if an Aboriginal site is found on the land after a development application is lodged or a development consent is granted ?

It is possible that an 'unknown' Aboriginal site could be identified on the land over which a development application has been lodged or development consent has been granted. The NPWS strongly advises that an adequate assessment of Aboriginal heritage values of the land is carried out prior to lodgement of the DA, so that this situation does not arise. However, in the event that this does occur, all works on or adjacent to the Aboriginal site must cease, and you must identify a conservation option to project the Aboriginal site or seek a consent to destroy the Aboriginal site from the Director-General of NPWS. A development consent granted under the *EP&A Act* does not equate to a Section 90 consent issued under the NPW Act. A consent to destroy an Aboriginal site must be granted pursuant to the *NPW Act* before an Aboriginal site or Aboriginal place can be destroyed. Failure to obtain this consent may result in prosecution.

Fees

The NPWS will charge a fee of $250 to process the development application for an integrated approval. This fee should be paid by cheque and attached to the integrated development application. The cheque should be made out the National Parks and Wildlife Service.

This fee is only for the processing of an integrated development application. You may be required to pay separate fees to the NPWS to obtain a site search from the NPWS Aboriginal Sites Register, and/or a fee if you apply to the NPWS for an application for consent to destroy an Aboriginal site.

Contacts

The National Parks and Wildlife Service has a Cultural Heritage Division which manages Aboriginal heritage. The Division includes 4 geographic units which deal with on- and off-park conservation planning and assessment issues. These boundaries are shown on **Attachment 4.**

For further information on these requirements, please contact the Aboriginal heritage unit in your area:

Manager, Central Aboriginal Heritage Unit

Manager, Northern Aboriginal Heritage Unit

Cultural Heritage Division
NSW National Parks and Wildlife Service
PO Box 1967
HURSTVILLE NSW 2040

Ph: (02) 9585 6674
Fax: (02) 9595 6442

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If the area of interest is particularly large (e.g.. a river catchment), a Data Licence Agreement may be required. This agreement is a legal contract document between the Director-General of the National Parks and Wildlife Service and a named client, and is designed to ensure that any data supplied under the agreement is used appropriately.

In some cases, written support from the relevant Local Aboriginal Land Council may be required before information can be provided from the Register.

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How to obtain Aboriginal sites data

To obtain information about recorded Aboriginal sites, a written request should be forwarded to the Aboriginal Sites Registrar (a request form is available if required). All requests must include;

- Company/organisation name (if applicable)
- Contact name, phone number and address details
- Purpose for which the information is required
- Copy of a topographic map with the area of interest clearly marked
- A cheque for $30 per search area, made out to the NPWS (unless other arrangements have been made with the Registrar)

Applications should be forwarded to:

The Aboriginal Sites Registrar
NPWS
PO Box 1967
Hurstville, NSW 2220. **or fax (02) 9585 6466**

Further information

For further information about the Aboriginal Sites Register, please contact the Aboriginal Sites Registrar (02 9585 6471, fax 02 9585 6466) or the Database Co-ordinator (02 9585 6843, fax 02 9585 6466

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3. **For Aboriginal heritage, information is required about:**

4. **Information sources:**
NB: Test excavations may be required. This requires a permit from NPWS, allow 8 weeks for processing.

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6. **Prepare report and recommend management options.**

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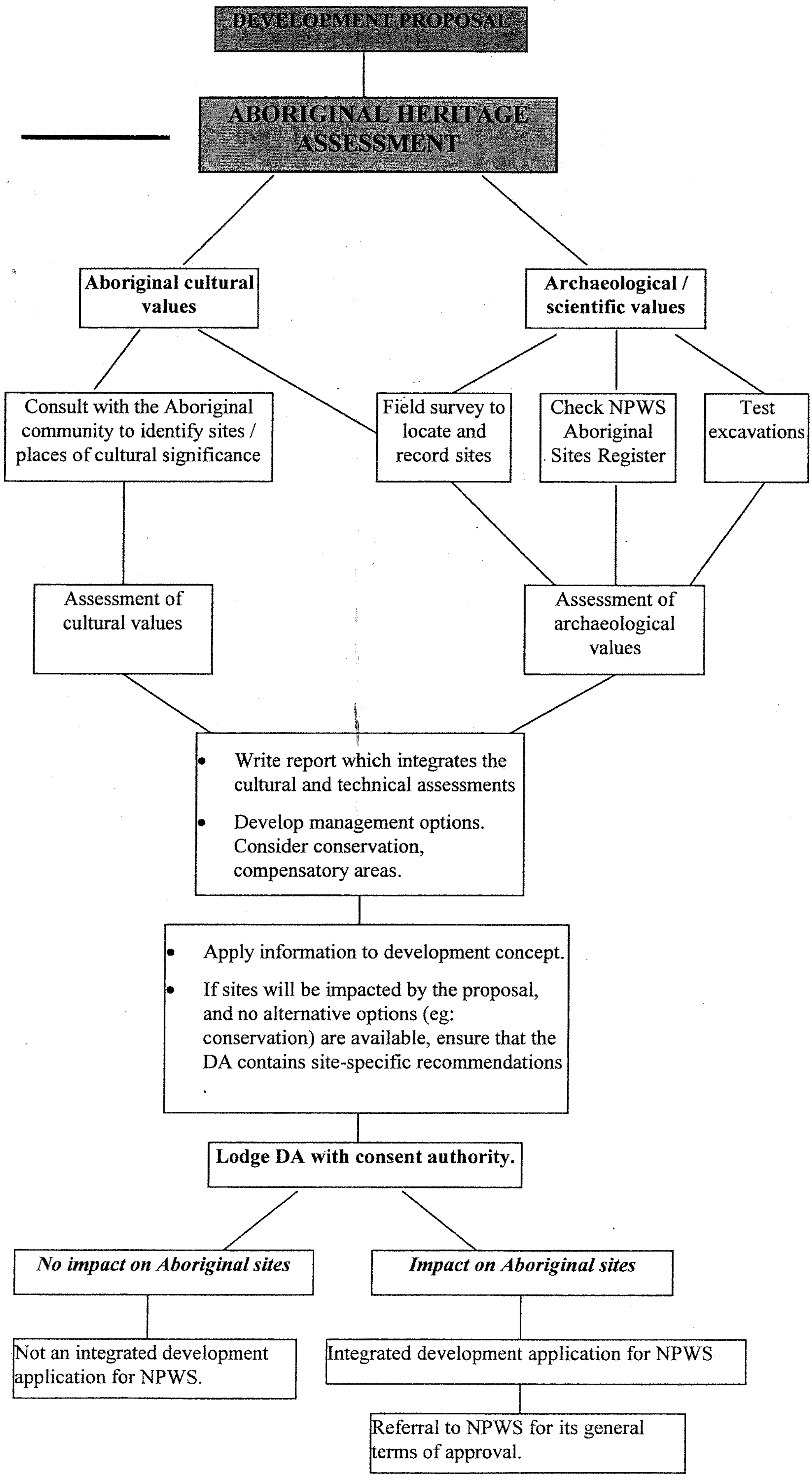

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•

Guidelines for Archaeological Survey Reporting

These *Guidelines* set out in detail the requirements of NPWS for survey reports submitted by archaeologists. The object is to enhance the comparability of survey reports as well as to promote transparency and predictability in the industry by making clear the needs and expectations of NPWS as the reviewing agency.

•

Guidelines for Aboriginal Heritage Impact Assessment in the Exploration & Mining Industries

These *Guidelines* provide industry-specific advice to applicants of exploration and mining ventures. They were prepared by NPWS in co-operation with the NSW Minerals Council and the NSW Department of Mineral resources.

To obtain a copy of this valuable kit please send a cheque for $70 made out to NPWS to:
Cultural Heritage Services Division, NPWS, PO Box 1967, Hurstville NSW 2220
Enquires to
Denis Byrne (02)9585 6571 *denis.byrne@npws.nsw.gov.au*
Anthony English (02)9585 6464 *anthony.english@npws.nsw.gov.au*
Daphne Siu (02) 9586 6642

D. Kitto

In reply please send to: Singleton

Our reference: 86/00117S GM:SA

Your reference: ENQ: 03/00435

Contact: Garry Moore

14 APR 2003

RECEIVED AM

14 APR 2003

CCSU RECORDS MANAGEMENT

PlanningNSW
Henry Deane Building
GPO Box 3927
SYDNEY 2001

8th April 2003

ATTENTION: DAVID KITTO

Dear Sir

PROPOSED EXPANSION - WEST PIT
HUNTER VALLEY OPERATIONS
PLANNING FOCUS MEETING

Thankyou for your invitation to the above meeting.

The Board makes the following comments in relation to the preparation of the Environmental Impact Statement:-

1. The proposed extension of the open cut mine area falls within the Patrick Plains Mine Subsidence District and therefore the Board's prior approval is required for the construction of all improvements, including those related to the mine buildings and associated works.

   Any relocation or diversion of existing infrastructure or improvements will also require the Board's approval.

The Mine Subsidence Board is an Integrated Development Approval Body but does not charge a fee from the processing of approvals.

Yours faithfully

Garry Moore
District Manager

MINE SUBSIDENCE BOARD

HEAD OFFICE:
PO Box 488G
Newcastle 2300
Telephone: (02) 4908 4395
Facsimile: (02) 4929 1032

NEWCASTLE:
NSW Government Offices
117 Bull Street
Newcastle West 2302
PO Box 488G
Newcastle 2300
Telephone: (02) 4908 4300
Facsimile: (02) 4929 1032
DX 4322 Newcastle West

SPEERS POINT:
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Speers Point 2284
PO Box 9 Boolaroo 2284
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DX 7820 Newcastle

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1 Civic Avenue
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Telephone: (02) 6572 4344
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PICTON:
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EMAIL:
mail@minesub.nsw.gov.au

WEBSITE:
www.minesub.nsw.gov.au

NSW FISHERIES

Office of Conservation Central Region
Email copy

Your Ref:
Our Ref: 03-089-sc

20 March 2003

David Kitto
PlanningNSW
GPO Box 3927
SYDNEY 2001

Dear David,

Re: Directors requirements, West Pit Expansion, Hunter Valley Coal

Thank you for your letter requesting EIS requirements from NSW Fisheries for the proposal cited above. The information listed below may be of some assistance in the preparation of the EIS for this proposal.

Definitions
The definitions given below are relevant to these requirements:

Fish means any part of marine, estuarine or freshwater fish or other aquatic animal life at any stage of their life history (whether alive or dead). Fish include oysters and other aquatic molluscs, crustaceans, echinoderms and beachworms and other aquatic polychaetes.

Marine vegetation means any species of plant that at any time in its life must inhabit water (other than fresh water).

Waters refers to all waters including tidal waters below mean high water mark as well as flowing streams, irregularly flowing streams, gullies, rivers, lakes, coastal lagoons, wetlands and other forms of natural or man made water bodies on both private and public land.

Useful Information
To help you in the preparation of an EIS, the publication "*Guidelines for the Assessment of Aquatic Ecology in EIA*" (Draft 1998) produced by the Department for Urban Affairs and Planning may prove useful in outlining appropriate procedures and methodologies for conducting aquatic surveys.

Should you require any further information on these requirements please contact the Office of Conservation at Port Stephens on 4916 3929.

Yours sincerely

Scott Carter
Senior Conservation Manager – Central

PORT STEPHENS RESEARCH CENTRE
Private Bag1 NELSON BAY NSW 2315 - Australia
Telephone: (02) 4916 3929 • **Facsimile:** (02) 4982 2306

Matters to be Addressed

1. General Requirements

The EIS must include the information outlined below:

- A topographic map of the locality at a scale of 1:25 000 should be provided. This map should detail the location of all component parts of the proposal, any areas locally significant for threatened species (such as aquatic reserves), and areas of high human activity (such as townships, regional centres and major roads).

- A recent aerial photograph (preferably colour) of the locality (or reproduction of such a photograph) should be provided, if possible. This aerial photograph should clearly show the subject site and indicate the scale of the photograph.

GENERAL REQUIREMENTS

- Area which may be affected either directly or indirectly by the development or activity should be identified and shown on an appropriately scaled map (and aerial photographs).
- All waterbodies and waterways within the proposed area of development are to be identified.
- Description of aquatic vegetation, snags, gravel beds and any other protected, threatened or dominant habitats should be presented.
- Area, density and species composition should be included and mapped.
- Identification of recognised recreational and commercial fishing grounds, aquaculture farms and/or other waterways users.
- Presented maps or plans
- Description of proposal and study area
- Details of the location of all component parts of the proposal, including any auxiliary infrastructure, timetable for construction of the proposal with details of various phases of construction
- Size of the area affected
- Aspects of the management of the proposal, both during construction and after completion, which relate to impact minimisation eg Environment Management Plans
- Plan of study area
- Locations and types of landuses present
- Locations of streams and other waterbodies
- Land tenure details for all land parcels
- For each freshwater body identified on the plan, the plan should include, either by annotation or by an accompanying table, hydrological and stream morphology information such as: flow characteristics, including any seasonal variations, bed substrate, and bed width
- For each marine or estuarine area identified on the plan, the plan should include, either by annotation or by an accompanying table, hydrological and stream morphology information such as: tidal characteristics, bed substrate, and depth contours

DREDGING AND RECLAMATION ACTIVITIES

- Purpose of works
- Type(s) of marine vegetation in the vicinity of the proposed works
- Distance of adjacent marine vegetation from the outer boundary of the proposed works
- Method of dredging to be used
- Duration of dredging works
- Time of dredging works
- Dimension of area to be dredged
- Depth of dredging activities
- Nature of sediment to be dredged, including Acid Sulphate Soil
- Method of marking area subject to works
- Environmental safeguards to be used during and after works
- Measures for minimising harm to fish habitat under the proposal
- Spoil type and source location for reclamation activities
- Method of disposal of dredge material
- Location and duration of spoil stockpiling, if planned
- Volume of material to be extracted or placed as fill

ACTIVITIES THAT BLOCK FISH PASSAGE

- Type of activity eg works in a stream that change flow or morphological characteristics
- Length of time fish passage is to be restricted
- Timing of proposed restriction
- Remediation works

THREATENED SPECIES

- Threatened aquatic species assessment (Section 5c, EP&A Act 1979)
- Eight Part Test

2. Initial Assessment

A list of threatened species, endangered populations and endangered ecological communities must be provided. In determining these species, consideration must be given to the habitat types present within the study area, recent records of threatened species in the locality and the known distributions of these species.

In describing the locality in the vicinity of the proposal, discussion must be provided in regard to the previous land and water uses and the effect of these on the proposed site. Relevant historical events may include land clearing, agricultural activities, water abstraction/diversion, dredging, de-snagging, reclamation, siltation, commercial and recreational activities.

A description of habitat including such components as stream morphology, in-stream and riparian vegetation, water quality and flow characteristics, bed morphology, vegetation (both aquatic and adjacent terrestrial), water quality and tide/flow characteristics must be given. The condition of the habitat within the area must be described and discussed, including the presence and prevalence of introduced species. A description of the habitat requirements of threatened species likely to occur in the study area must be provided.

In defining the proposal area, discussion must be provided in regard to possible indirect effects of the proposal on species/habitats in the area surrounding the subject site: for example, through altered hydrological regimes, soil erosion or pollution. The study area must extend downstream and/or upstream as far as is necessary to take all potential impacts into account.

Please Note: Persons undertaking aquatic surveys may be required to hold or obtain appropriate permits or licences under relevant legislation. For example:

Fisheries Management Act 1994

- Permit to take fish or marine vegetation for research or other authorised purposes (Section 37)
- Licence to harm threatened (aquatic) species, and/or damage the habitat of a threatened species (Section 220ZW).

Animal Research Act 1985:

- Animal Research Authority to undertake fauna surveys.

It is recommend that, prior to any field survey activities taking place, those persons proposing to undertake those activities give consideration to their obligation to obtain appropriate permits or licences which may be required in the specific context of the proposed survey activities.

3. Assessment of Likely Impacts

The EIS must:

- describe and discuss significant habitat areas within the study area;
- outline the habitat requirements of threatened species likely to occur in the study area;
- indicate the location, nature and extent of habitat removal or modification which may result from the proposed action;
- discuss the potential impact of the modification or removal of habitat;

- identify and discuss any potential for the proposal to introduce barriers to the movement of fish species; and
- describe and discuss any other potential impacts of the proposal on fish species or their habitat.

For all species likely to have their lifecycle patterns disrupted by the proposal to the extent that individuals will cease to occupy any location within the subject site, the EIS must describe and discuss other locally occurring populations of such species. The relative significance of this location for these species in the general locality must be discussed in terms of the extent, security and viability of remaining habitat in the locality.

4. Ameliorative Measures

The EIS must consider how the proposal has been or may be modified and managed to conserve fisheries habitat on the subject site and in the study area.

In discussing alternatives to the proposal, and the measures proposed to mitigate any effects of the proposal, consideration must be given to developing long term management strategies to protect areas within the study area which are of particular importance for fish species. This may include proposals to restore or improve habitat.

Any proposed pre-construction monitoring plans or on-going monitoring of the effectiveness of the mitigation measures must be outlined in detail, including the objectives of the monitoring program, method of monitoring, reporting framework, duration and frequency.

In the event of a request for concurrence or consultation of the Director of NSW Fisheries, one (1) copy of the EIS should be provided to NSW Fisheries in order for the request to be processed.

It should be noted that NSW Fisheries has no regulatory or statutory role to review draft EISs unless they are accompanied by or are requested as part of a licence application under Part 7A of the FM Act. However, NSW Fisheries is available to provide advice to consent and determining authorities regarding Fisheries' opinion as to whether the requirements have been met if requested, pending the availability of resources and other statutory priorities.

Attachment No. 3

RTA

File No: 402DA6;1
Peta Phillips
Telephone: (02) 4924 0684
Facsimile: (02) 4924 0659
E-mail: david_n_young@rta.nsw.gov.au

Director General
Planning NSW
GPO Box 3927
SYDNEY NSW 2001

Attention: David Kitto

PROPOSED EXPANSION – WEST PIT, HUNTER VALLEY OPERATIONS

Dear David

I refer to your letter dated 14 March 2003 regarding the planning focus meeting and your request for EIS requirements.

The RTA's primary interest is in the broader transport issues and State road network, in particular the New England Highway (SH9) and the Golden Highway (SH27). The background paper indicates that the transport of coal will be primarily by internal haul roads and local roads to the rail heads. It is noted that the proponent will also be seeking approval to modifications to and consolidation of other operations to enable them to be fully integrated. The full implications of the rationalisation/integration of these activities needs to be fully addressed in the EIS, particularly in relation to traffic and transport impacts on the road network.

The RTA's preferred position on transport is to minimise or eliminate transport of coal on public roads in preference to off-road transport.

The proposed development application will need to be referred to the Hunter Regional Development Committee under the requirements of SEPP 11 – Traffic Generating Development. The EIS therefore should incorporate a traffic report as part of the overall transport considerations.

Please contact me on 4924 0688 if you require further advice.

Yours faithfully

Dave Young
Manager, Land Use Development
Hunter Client Services
8 April 2003

14 APR 2003

MINERAL RESOURCES NEW SOUTH WALES
NSW DEPARTMENT OF MINERAL RESOURCES
Level 1, 1 Civic Avenue (PO Box 51)
Singleton NSW 2330 Australia
INSPECTORATE: Phone (02) 6572 1899 Fax (02) 6572 1201
GEOLOGY: Phone (02) 6572 4200 Fax (02) 6572 1201
MINING TITLES: Phone (02) 6572 4200 Fax (02) 6572 1201
www.minerals.nsw.gov.au
DX 7071
ABN: 68 040 288 347

Mr David Kitto
Senior Planning Officer
Mining & Extractive Industry
Planning NSW
GPO 3927
SYDNEY NSW 2001

Our Ref: C98/2232

Dear Sir,

Proposed Expansion – West Pit, Hunter Valley Operations

I refer to your letter of 14 March 2003 requesting comments on the above proposal. After attending the Planning Focus Meeting and reviewing the documentation provided, the Department of Mineral Resources (DMR) wishes to offer the following comments:

Rehabilitation
The application gives the proponent the opportunity to update their rehabilitation plans for the site. This has already commenced with the redesign of the West Pit. As a haul road is now planned to remain open long after rehabilitation is completed on the Hunter Valley North site, a description of its rehabilitation showing proposed landforms will be required. The planned accelerated mining of Carrington may also need some changes for its expected rehabilitation outcomes.

Tailings Dams
The application proposes to free up the current requirements for the emplacement of course and fine reject. As a part of this, a schedule of Hunter Valley Operation's tailings dams construction, closure and rehabilitation will be required.

West Pit Drainage
The mine plan shown for the West Pit appears to result in a very large surface area draining into the pit. This will contribute significantly to the mine water make and will need to be addressed. Conceptual plans on how drainage from the rehabilitated overburden dumps is kept out of the mine water system will need to be shown.

Visual and Safety Issues
The mine plan results in a highwall next to the Lemington road. This will raise considerable visual and safety issues that will need to be addressed.

Drainage
The existing Belt Road is planned to be used for periodical haulage of coal. Unavoidable spillage and dust will contaminate the existing road, leading to the contamination of runoff water. Water runoff from the haul road will need to be treated prior to discharge. The DMR would support the Planning NSW position of maximising the use of conveyors where ever possible.

Resource/Reserve Statement
The proponent should submit a comprehensive Resource/Reserve Statement to the Coal and Petroleum Geology Branch of the DMR, with a brief summary of this information to be incorporated in the EIS.

For any further information regarding environmental issues, please contact Mr Scott Brooks, Environmental Officer, or for geological issues, Ms Julie Moloney, Principal Geologist, on the phone number above.

Yours faithfully,

7/4/03

David Agnew
Manager – Coal & Petroleum Titles

Agricultural Centre
Tocal
NSW Agriculture
ABN 86 308 026 589

PATERSON, NSW 2421
AUSTRALIA

Telephone (02) 4939 8888
Facsimile (02) 4938 5549
http://www.agric.nsw.gov.au

20 February 2003

Planning NSW
Major Development Assessment
GPO Box 3827
SYDNEY NSW 2001

Attention D Kitto

Proposed Extension of West Pit and Consolidation of Mining Approvals

NSW Agriculture notes that the proposed area for the extension of operations at West Pit within Coal and Allied's Hunter Valley Operations is already within mine ownership and has relatively limited agricultural potential (proximity of adjoining mines, inherent natural constraints and past management). Cumulative impacts, however, still need to be assessed.

The outlined proposed development also involves the consolidation of existing approvals for Coal and Allied Operations to enable increased flexibility in relation to the handling of coal and waste material as well as water management. The consolidation also creates scope for enhanced environmental and land use outcomes and is generally supported.

The indicated area for integrated approvals extends from the Hunter River to the New England Highway and encompasses Mining Leases associated with the former Howick Mine (West Pit), Mitchell Pit, Carrington Mine, the original Hunter Valley Open Cut Mine and the Alluvial pilot. Identified opportunities for improved outcomes include: an enhanced rate of rehabilitation within West Pit operations, better management of predicted mining voids and better water management.

Preparation of an EIS for adjoining Coal and Allied mining lease areas north of the River also provides an important opportunity to review and enhance existing land management and rehabilitation practices and future land use options.

The combined holding includes substantial former grazing lands and natural resources that have previously been assessed (and largely managed) on a piecemeal basis. NSW Agriculture consequently recommends that the EIS includes / summarises;

- A general description of the combined area (eg topography, capability or suitability, vegetation, drainage patterns and land use) prior to mining.
- The current status of lands within the combined leases. In particular the relative extent and nature of; undisturbed (eg buffers, yet to be mined areas), disturbed and rehabilitated areas.
- Existing monitoring of revegetation and agricultural use outcomes, possibly including a summary of relevant research / trials and results to date.
- Current agricultural features and land use options within the combined mining lease areas
- Proposed rehabilitation and final land use objectives.
- Indicative final land form, land capability, voids, high walls, drainage and vegetation patterns, including the total area to be disturbed, predicted farming and conservation areas and the size of all final voids within the combined lease.

- Options for integrating proposed land forms, vegetation, water and land management with adjoining mines.
- How the proposed rehabilitation practices, land form, vegetation patterns, water and land management would contribute to the realisation of rehabilitation and land use goals.
- Proposed future monitoring of rehabilitation and land management including options for integration with existing EMS.

Such assessment should be able to be derived by combining and critically reviewing existing information, practices and opportunities, rather than requiring substantial new research.

NSW Agriculture additionally recommends that the assessment of cumulative future environmental impacts documents:

- The location and nature of agricultural enterprises on other properties within the locality.
- Potential impacts on agricultural activities and uses that may result from mining or associated activities, including changes to surface and ground water flows, salinity, noise, dust, blasting impacts, the size and nature of final voids and any further changes to local / regional infrastructure.
- Proposed mitigatory / compensatory actions as relevant.

Yours faithfully

Glenda Briggs
Agricultural Environmental Officer, Hunter Region

David Kitto - Howick Planning Focus Meeting

From: "Ihlein, Mark" <mihlein@singleton.nsw.gov.au>
To: "'David.Kitto@planning.nsw.gov.au'" <David.Kitto@planning.nsw.gov.au>
Date: 1/04/2003 2:35 PM
Subject: Howick Planning Focus Meeting

Dear David,

Unfortunately I am unable to arrange for an officer of Singleton Council to attend tomorrows PFM. I have however been briefed on the project on two occasions recently, and am also familar with the issues surrounding the potential consolidation of various consents within the C&A Hunter Valley Operations. I therefore am well placed to provide you with issues to be considered in the EIS process from Singleton Councils perspective.
The issues are;

- no existing residence should be further impacted by updated conditions which might allow a more 'generous' performence criteria. Of particular concern will be application of the EPA INP and the extent to which revised noise criteria is higher than any historical criteria.
- cumulative impacts associated with air quality, noise, vibration and blasting.
- the benefits of higher rail coal haulage versus road.
- impact of increased rail coal haulage through the Singleton township.
- negotiation of an appropriate Community Enhancement project.
- clarification of implication for Councils public roads, in terms of closeures or works, or traffic.

Regards
Mark Ihlein
Manager Planning and Development Services

HUNTER CATCHMENT MANAGEMENT TRUST
Care for the land

Private Bag 2010
PATERSON 2421
816 Tocal Road, Paterson
Phone: (02) 4930 1030
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ABN 35 554 004 710

Email: hunter.trust@hcmt.org.au
Web site: www.hcmt.org.au

FAXED 9/4/03

Our ref:

Your ref:

14 APR 2003

Mr David Kitto
Senior Planning Officer
Planning NSW
GPO Box 3927
Sydney NSW 2001

Dear David

Re: Proposed Expansion - West Pit, Hunter Valley Operations

Thank you for the invitation to the Hunter Trust to comment on the above project. Staff at the Hunter Trust were unable to attend the Planning Focus Meeting of April 2nd, however we have reviewed the Planning Focus Document and provide the following comments for your consideration.

General Ecological Issues

Although the existing Hunter Valley Operations are located in an area largely devoid of native forest or woodland, the results of the preliminary assessments referred to in the Planning Focus Document suggest that the regrowth and scattered trees provide habitat suitable for threatened fauna species. The regrowth patch in the southern part of the study area probably acts as a "stepping stone" in a regional valley-wide corridor.

The Integrated Catchment Management Plan for the Hunter Catchment identifies the area subject to mining as a high priority land system for revegetation initiatives. This is based on the Hunter Remnant Vegetation assessment conducted by the Hunter Trust, which found that only 20% of forest and woodland cover remains on the central Hunter Valley floor.

Although the Planning Focus Document does not indicate this, the proposed project appears to require the removal of a reasonably-sized area of regrowth vegetation in the southern portion of the study area, possibly 100 hectares or more This is likely to cause a significant impact on the availability of habitat for flora and fauna species, a much reduced regional wildlife corridor and habitat function for the area, and increased edge to area ratio of resulting fragments which would increase the likelihood of weed invasion and general ecological deterioration of the remaining vegetation.

Because of the possible regional significance of the impact on habitat by the proposed development, the Environmental Impact Statement should map and document the presence of vegetation communities, fauna habitat, habitat linkages (corridors) and potential linkages both on the site and to adjacent sites based on standard assessment of threatened species, populations and ecological communities. In addition, assessment of the presence of regionally significant flora, as documented by the Hunter Region Botanic Gardens, and regionally significant fauna and habitat, should be undertaken. This information can be located on the Hunter Region Botanic Gardens website at the following address: http://www.huntergardens.org.au/

The Hunter Trust would be pleased to assist the consultant with the provision of information from its Hunter Remnant Vegetation Project, and can also assist with the delineation of potential regional corridors.

Specific Ecological Issues

The Planning Focus Document does not indicate what vegetation communities are present on the site, however there is some likelihood that White Box – Yellow Box – Blakely's Redgum Woodland and Central Hunter Spotted Gum – Ironbark – Grey Box Forest are present. The former community is listed on the *Threatened Species Conservation Act 1995*. The latter, while not listed, is recorded by the Regional Biodiversity Conservation Strategy[1] as being a heavily cleared vegetation community. Preliminary results of the Hunter Remnant Vegetation Project support this assessment and, as such, the vegetation community should be adequately assessed if present in the study area.

An assessment of the likely impacts of the development on the threatened fauna species listed on page 35 of the Planning Focus Document should be undertaken. In addition, the following threatened flora species should be considered in the assessment: *Bothriochloa biloba*, *Lepidium hyssopifolium*, *Goodenia macbarroni*, *Swainsona sericea* and *Diuris tricolor* (synonym: *D. sheaffiana*). All of these species have been recorded in the mid or upper Hunter in valley or pasture environments, and so should be targeted by surveys and considered in the assessment. Further, *Isotropis foliosa* and *Macrozamia flexuosa*, while not listed as threatened species, are Rare or Threatened Australian Plant species with some likelihood of occurrence, and should also be considered.

Finally, ecological surveys should be undertaken in a manner that is consistent with data collection procedures employed by National Parks and Wildlife Service and the Department of Land and Water Conservation. This will allow the use of the data when agencies undertake regional ecological assessments, and so extend the life and usefulness of the data beyond this project. It is noted that surveys to date may have been undertaken during severe drought conditions, and as a result many of the threatened flora species mentioned above may have been very difficult to detect. It is suggested that further surveys be undertaken during autumn when, presumably, more moisture will result in the easier detection of rare or uncommon plant species.

Impact Amelioration and Offsets

The Integrated Catchment Management Plan for the Hunter Catchment encourages developments to ensure that any impacts resulting from clearing are offset by increased protection of similar vegetation types on-site or elsewhere, as well as restoration of vegetation communities that are to be cleared for development. It is recommended that the following issues be considered in the development of an offsets package:

- Restoration of forest and woodland that is to be cleared in an area of similar landform at a ratio of at least two to one (2:1) or greater, to be protected for conservation,
- Revegetation to commence as soon after mine approval as possible to minimise time lags in habitat provision;
- Protection of an equal or larger area of similar forest and woodland adjacent to or close to any remaining fragments of the southern remnant; and
- Appropriate revegetation of post-mined areas, using best practice techniques in seed, topsoil and tree hollow collection, storage and replacement, to ensure that ecosystems are restored, rather than simply revegetated.

---

[1] Lower Hunter and Central Coast Regional Environmental Strategy

No exotic plant species should be used in rehabilitation activities, and measures should be implemented to limit the impact that weed species have on restored and rehabilitated areas.

The cumulative impact of the proposed project and other approved and proposed mines should be assessed, as well as the opportunities for the development of regional corridors and protected areas through collaboration between mines. Furthermore, the Environmental Impact Statement should consider the ecological benefits of not proceeding with the proposed development.

If we can assist with any further matters, please do not hesitate to contact Travis Peake at the Hunter Trust.

Yours faithfully

Dean Chapman
for
Glenn Evans
Chief Executive Officer

9 April 2003

LOCAL ABORIGINAL LAND COUNCIL
WANARUAH

P.O. BOX 127
19 MAITLAND STREET,
MUSWELLBROOK 2333
ABN 33 251 730 169

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EMAIL:wanaruah@hunterlink.net.au

David Kitto
Senior Planning Officer
Mining and Extractive Industry
Planning NSW
GPO Box 3927
Sydney 2001

FAXED

Re: Extension of West Pit at Hunter Valley Operations

Dear David,

The Wanaruah Local Aboriginal Land has the following requirements in regards to the Extension of West Pit at Hunter Valley Operations:

1. We would like to see details of all surveys conducted across the combined lease areas for their currency. If any survey was conducted more than two years ago, the areas involved will need to be re surveyed.

2. That Wanaruah Local Aboriginal Land Council insists on being involved in any Archaeological Surveys conducted on Aboriginal Sites with in the project area.

3. We would like to see all current plans of management for Aboriginal Culture and Heritage for the combined lease areas. We would like to see details of what measures and procedures will be in place to ensure that these plans are amalgamated and not lost. Wanaruah Local Aboriginal Land Council insists on being involved in the development and implementation of a NEW plan of management for all the Aboriginal Sites across the project area.

4. Wanaruah Local Aboriginal Land Council insists on being involved in the negotiation and salvage of any Aboriginal Site that may be destroyed, including all negotiations and approvals for consents to excavate, consents to salvage and consents to destroy.

5. We would like to see details of all existing and proposed "Offset Protection Areas" for Aboriginal Culture and Heritage within the combined lease areas. We would like to see details of what measures and procedures will be in place to protect them. Wanaruah Local Aboriginal Land Council insists on being involved in the development and implementation of a NEW plan of management for all existing and

proposed "Offset Protection Areas" for Aboriginal Culture and Heritage across the project area.

6. That Wanaruah Local Aboriginal Land Council would like to be considered for involvement in the development and implementation of a plan of management for the rehabilitation of the project area.

Thank you for this opportunity for input,

Noel Downs
Co-Ordinator 9/4/03

ANNEX B

eis study team

B

This EIS has been prepared by ERM in association with a number of specialist companies. These companies have been detailed in the following table. The study team responsible for both inputs to and the preparation of this EIS are as follows.

Study Team

Company / Consultant	Area of Responsibility
Environmental Resources Management (ERM)	
David Snashall	Project Director
Brett McLennan	Project Manager, Planning and Statutory Framework and Transport and Traffic
Dr Lynette Coleman	Project Coordinator, Visual and Land Management
Linden Edgell	Socioeconomics
Melissa Salisbury	Socioeconomics
Dr Alison Hunt	Ecology
Will Introna	Ecology
Najah Ishac	Noise and Vibration
Greg Stewart	Noise and Vibration
Neville Baker	Aboriginal Cultural Heritage
Andrew Collis	Aboriginal Heritage
Gabor Vasarhelyi	GIS
Derek Mascarenhas	Graphics
Tim Osborne	Graphics
Global Soil Systems (GSS)	
Rod Masters	Soils and Land Capability
Mackie Environmental Research (MER)	
Col Mackie	Surface and Groundwater Management
Holmes Air Sciences (HAS)	
Dr Nigel Holmes	Air Quality
Judith Cox	Air Quality
Australian Museum Business Services (AMBS)	
Andrew Collis	Aboriginal Archaeology
Alison Nightingale	Aboriginal Archaeology
Australian Archaeological Survey Consultants (AASC)	
Dave Johnston	Aboriginal Cultural Heritage
Huonbrook Environment and Heritage	
Phillip Hughes	Aboriginal Archaeology
Northern Transport Planning and Engineering	
Ron Brown	Transport and Traffic
Total Print Control	
Sean Burrell	Desktop Publishing
John Burrell	Print Production

ANNEX C

community newsletters


C

Extension of West Pit

at Hunter Valley Operations

NEWSLETTER

COAL & ALLIED
A Rio Tinto Group Company

1
March 2003

Introduction

Coal & Allied is proposing to extend its existing mining activities at West Pit (formerly known as Howick Mine) at Hunter Valley Operations (HVO). Environmental Resources Management Australia (ERM) has been commissioned by Coal & Allied to prepare an environmental impact statement (EIS) to accompany a development application (DA) for the proposed extension.

The purpose of this newsletter is to inform the community about the proposed extension, the statutory planning approvals process, the issues that will be addressed as part of the EIS and the planned public consultation process. Further newsletters will be prepared and distributed during preparation and exhibition of the EIS.

Location

HVO is located to the north west of Singleton, approximately half way between Singleton and Muswellbrook. The operations are bisected by the Hunter River.

HVO's activities north of the Hunter River consist of four mining areas and three Coal Preparation Plants (CPPs). The mining areas are known as West Pit, Alluvials, Carrington and North Pit. The CPPs are known as West Pit CPP (WPCPP), Hunter Valley CPP (HVCPP) and Newdell CPP (NCPP). Processed coal is loaded onto trains at either the Hunter Valley Loading Point (HVLP) or the NCPP for transport to the Port of Newcastle.

The location of West Pit and HVO can be seen in Figure 1.

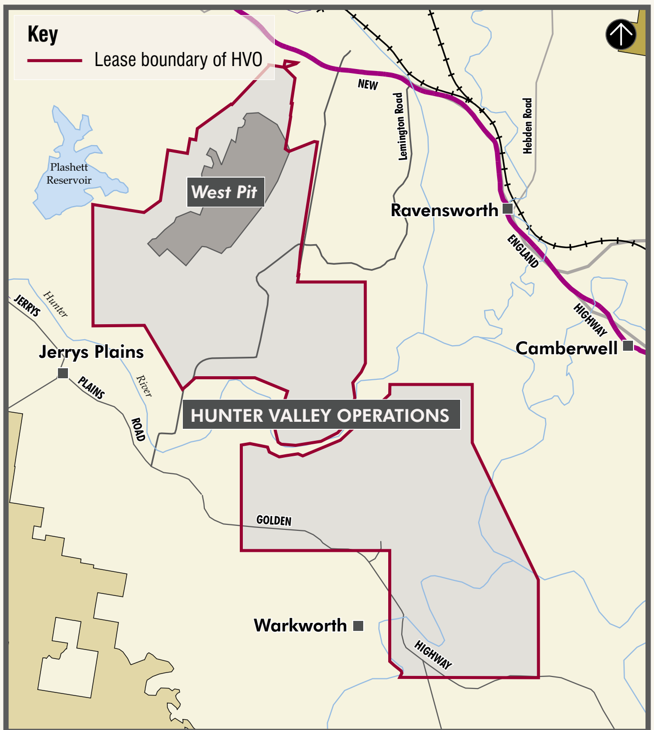


Figure 1 *Location of West Pit and HVO*

Overview of Proposal

Extension of West Pit

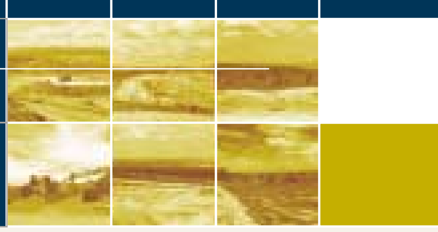
Current operations at West Pit were approved by the Minister for Planning in 1996 for the production of 12 million tonnes per annum (Mtpa) of raw or run-of-mine (ROM) coal by both dragline and truck and shovel methods. Based on current mining rates, the existing eastern development consent boundary is expected to be intersected by mid 2004. To ensure continuity of the operation, a new consent for the proposed extension is required by this date.

West Pit will continue to operate using both dragline and truck and shovel methods, 24 hours a day seven days a week and will provide continued employment for the next 20 years. The extension will include mining approximately 200 hectares immediately to the east of the existing operations on land owned by Coal & Allied.

The proposed extension can be seen in Figure 2.

Figure 2 *Proposed Extension of West Pit*

Extension of West Pit
at Hunter Valley Operations



Consolidation of Government Consents for HVO's Operations North of the Hunter River

HVO's activities north of the Hunter River are covered by 15 separate government approvals as a result of the purchase of adjacent mines and the expansion of the operation since 1979. Each mining area and CPP operates under its own approval, and in most cases, multiple approvals.

Today there is a high degree of interaction between the mining areas and plants to the extent that they, in essence, constitute a single mining complex.

The proposed extension of West Pit provides a good opportunity to restructure and rationalise the approvals for HVO's activities north of the river to create a fully integrated operation with best practice environmental controls and management.

As part of the restructure, the need for consent for the following activities has been identified:

- increasing the capacity of the HVCPP from 13 Mtpa ROM coal to 20 Mtpa ROM coal;
- increasing the haulage of coal from the Riverview and Cheshunt Pits located south of the Hunter River to the HVCPP from 8 to 16 Mtpa ROM coal;
- allowing the HVCPP, WPCPP and NCPP to process coal from any of the mining areas in HVO (including operations south of the Hunter River) and the ability for reject from any of the CPPs to be disposed in any approved disposal area within HVO;
- upgrading the Belt Line Conveyor which transfers coal from the HVCPP to the HVLP;
- allowing the intermittent haulage of coal from the CPPs along Coal & Allied's privately owned Belt Line Road, to either the HVLP or NCPP; and
- allowing the intermittent haulage of coal between the HVLP and the NCPP.

Increasing both the capacity of the HVCPP and the haulage of coal from the Riverview and Cheshunt Pits to the HVCPP will allow coal currently processed at the Lemington CPP (LCPP) to be processed at the HVCPP. This may reduce the amount of public road haulage of coal from the LCPP to the Mount Thorley Coal Loader (MTCL).

Planning Framework

The proposed extension of West Pit and associated activities will require development consent under the provisions of the Singleton Local Environmental Plan 1996. However, given the scale and the significance of both the existing and proposed operations to the State, the Minister for Planning will be the consent authority.

The proposed extension and associated activities are classified as designated development under the provisions of the Environmental Planning and Assessment Act 1979, and as such, an EIS will be required to accompany the DA.

Potential Environmental Issues

As part of the EIS process, a number of specialist studies will be undertaken to assess:

- potential noise and vibration impacts associated with the proposed extension of West Pit and associated activities;
- potential impacts on air quality associated with the proposal;
- potential impacts on flora and fauna within the proposed extension area;
- potential impacts on existing surface and groundwater regimes;
- the impact that the proposed extension will have on the visual character of the area;
- socioeconomic impacts that the proposed extension and associated activities will have on the local, regional and State economies;
- potential cultural heritage impacts (Aboriginal and European); and
- potential impacts that the proposal will have on traffic utilising local roads, including Pikes Gully Road and Lemington Road.

Community Consultation

There will be a number of opportunities for the community to provide input into the preparation of the EIS. These opportunities include:

- two public information sessions to be held at the community hall at Jerry's Plains where representatives from Coal & Allied will be available to answer questions on the proposed extensions and to note any concerns; and
- public exhibition of the EIS (following its finalisation) where any individual or group is able to make a formal submission to the Minister on the proposal.

The first public information session will be held in the Jerrys Plains Community Hall on Friday 4 April 2003 from 4.00pm to 8.30pm and Saturday 5 April from 9.00am to midday.

West Pit Extension EIS Team

A specialist team has been selected to work on the EIS for the extension of West Pit. The team will include:

- Nik Senapati - General Manager, HVO
- James Bailey - Manager Environmental Services, Coal & Allied
- Sarah Fish - Project Manager, Coal & Allied

ERM environmental consultants conducting detailed environmental studies and preparation of the EIS. ERM team members include:

- David Snashall - Project Director
- Brett McLennan - Project Manager
- Dr Lynette Coleman - Project Coordinator

Futher Information

Should you have any queries regarding the proposed extensions and the preparation of the EIS, please contact:

James Bailey

Coal & Allied

PO Box 315

SINGLETON NSW 2330

Phone: 6570 0252

Email: James.Bailey@cna.riotinto.com.au

The first public information session will be held in the Jerrys Plains Community Hall on Friday 4 April 2003 from 4.00pm to 8.30pm and Saturday 5 April from 9.00am to midday.

COAL & ALLIED
A Rio Tinto Group Company

Hunter Valley Operations

Extension of West Pit and Minor Modifications

NEWSLETTER

2
August 2003

Introduction

The purpose of this newsletter is to provide the community with an update on the progress of the preparation of the environmental impact statement (EIS) for the proposed extension of the West Pit at Hunter Valley Operations (HVO) north of the Hunter River.

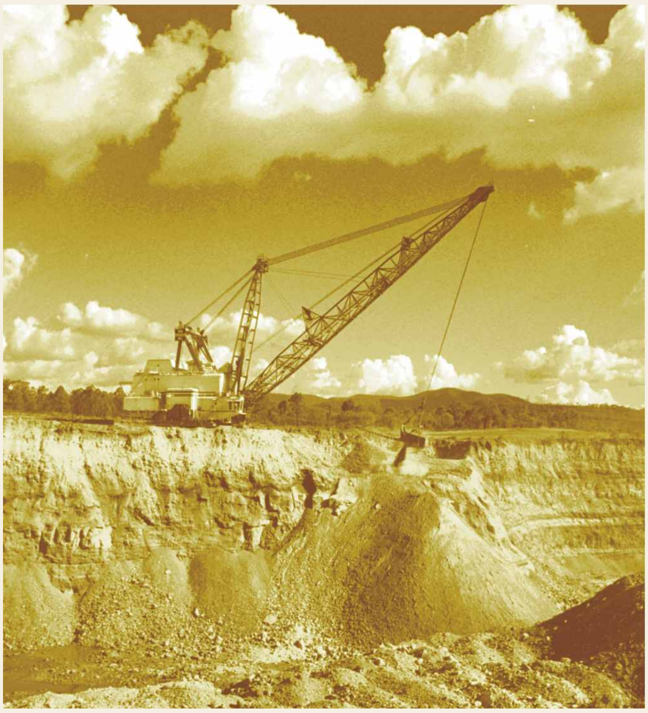
In March 2003 we prepared and distributed the first newsletter on the proposed extension of West Pit. It provided an introduction to the project including, an overview of the:

- proposed extension and associated infrastructure required;
- the environmental approval framework for the proposed extension;
- the issues that will be addressed as part of the environmental investigations; and
- the consultation process that is being undertaken as part of the preparation of the EIS.

Update on proposal

There has been no change or modification to the mine plan or area of the proposed extension. However, the proposal has been modified to include:

- an increase in the rate of mining at Carrington from 6 million tonnes per annum (Mtpa) to 10 Mtpa with no change in the approved footprint of the mine;



- a temporary crossing of the Hunter River upstream of the existing haul road bridge. This crossing will be constructed immediately before the transfer of heavy machinery such as a dragline or shovel and will be dismantled immediately after the crossing is complete; and
- intermittent haulage of coal between the Hunter Valley Load Point (HVLP), Newdell Coal Preparation Plant (NCPP) and the Ravensworth Coal Terminal (RCT). Haulage will occur at a maximum rate of 15,000 tonnes per day using highway rated trucks.

Figure 1 shows the approved extent of mining at HVO, north of the Hunter River and the proposed West Pit extension.

These modifications will allow HVO north of the Hunter River to operate with the flexibility required to meet environmental and market demands.

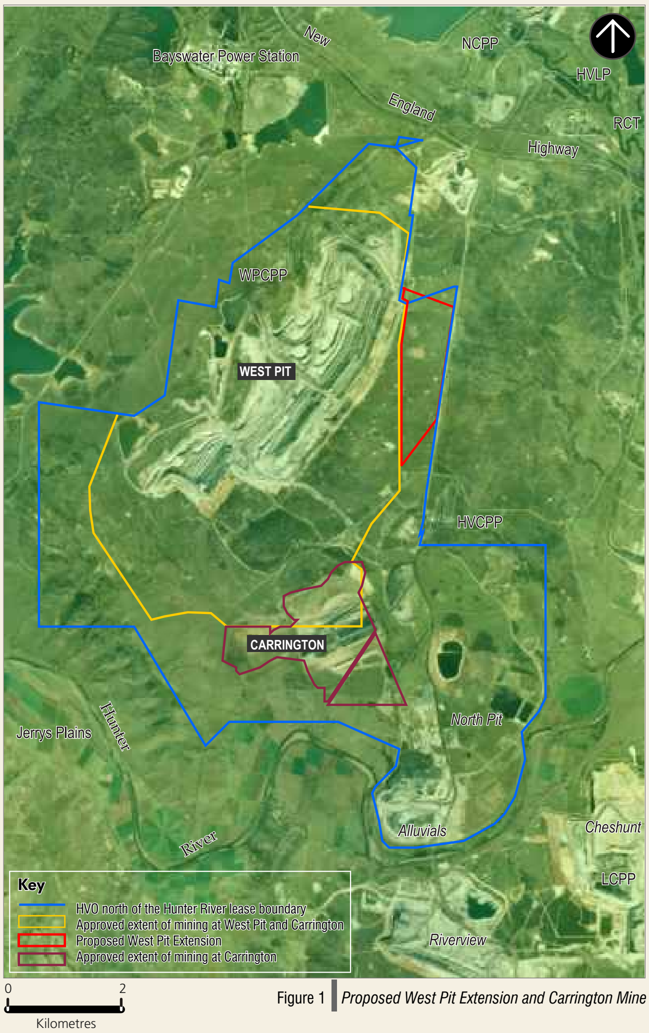


Figure 1 *Proposed West Pit Extension and Carrington Mine*

Hunter Valley Operations

Extension of West Pit and Minor Modifications

Community consultation

A community information session was held at the Jerrys Plains Community Hall on 4 and 5 April 2003.

The information session provided an opportunity for the community to obtain information regarding the proposal, view maps and aerial photographs of the site and provide the opportunity for residents to discuss issues of concern directly with the EIS project team. Representatives from Coal & Allied and Environmental Resources Management Australia (ERM) were on hand at each occasion to discuss the project.

The information session was attended by a total of 16 residents over the two days. A number of key issues were identified for assessment in the EIS. These issues particularly relate to potential impacts on the quality of life in the local area.   The major issues of concern included noise, vibration and air quality.

A second community information session will be held during the exhibition period of the EIS which is expected to be held in early November. The information session and EIS exhibition will be advertised in the next edition of the newsletter, as well as in the local newspaper.

Environmental Aspects

As part of the EIS, a number of specialist studies are being under taken. These studies include an assessment of the potential impacts to:

- air quality associated with the proposal

- noise and vibration associated with the operations within the HVO north of the Hunter River;
- existing surface and groundwater regimes;
- the visual character of the area;
- the social and economic impacts that the proposed extension to West Pit will have on the local, regional and State economies;
- Aboriginal and European heritage; and
- traffic impacts on local roads including Pikes Gully and Lemington Roads as a result of the proposal.

All of the above studies have been commenced and results will be presented in the EIS.

Initial noise and dust modelling has been completed which indicate that the proposal complies with EPA noise and dust criteria

West Pit extension and minor modifications EIS team

A specialist team has been selected to work on the EIS for the extension of West Pit within HVO north of the Hunter river. These include:

- Nik Senapati - General Manager, HVO
- Paul Ernst - Mine Manager, HVO
- James Bailey - Manager Environmental Services, Coal & Allied
- Sarah Fish - Project Manager, Coal & Allied

ERM environmental consultants conducting detailed environmental studies and preparation of the EIS. ERM team members include:

- David Snashall - Project Director
- Brett McLennan - Project Manager
- Lynette Coleman - Assistant Project Manager

Further information

Should you have any queries regarding the proposed extensions and the preparation of the EIS, or to obtain a copy of the previous newsletter, please contact:

James Bailey

Coal & Allied
PO Box 315
SINGLETON NSW 2330
Phone: 6570 0252
Email: James.Bailey@cna.riotinto.com.au

Further consultation

The next newsletter will be distributed when the EIS is placed on exhibition later this year. A second community information session will also be held at this time. The dates for these information sessions will be advised in the next newsletter.

ANNEX D

eis certificate

D

SUBMISSION OF A DEVELOPMENT APPLICATION

prepared under Section 78A(8) of the *EP&A Act and Clause 71 of the EP&A Regulation*

EIS prepared by

Names	David Snashall	Brett McLennan	Dr Lynette Coleman
Qualifications	*BEc MEnvPlanning*	*BTP(Hons) BSc(Part)*	*BSc(Hons) MSc PhD*

Address

Environmental Resources Management Australia
Building C, 33 Saunders Street
Pyrmont NSW 2009

Development Application

Applicant name

James Bailey
Manager, Environmental Services
Coal & Allied Operations Pty Limited

Applicant address

PO Box 315
Singleton NSW 2330

Land to be developed

Property description of land to be developed is contained in DA form.
A map showing land to be developed is contained in Volume 4 of EIS.

Proposed development

Hunter Valley Operations Extension of West Pit and Minor Modifications

Environmental Impact Assessment

☑ An EIS is attached which addresses all matters listed in Clause 72 and Schedule 2 of the EP&A Regulation.

Certificate

I certify that I have prepared the contents of this EIS and to the best of my knowledge:

- it is in accordance with Clauses 72 and 73 of the EP&A Regulation;
- it contains all available information that is relevant to the environmental assessment of the development to which the EIS relates; and
- it is true in all material particulars and does not, by its presentation or omission of information, materially mislead.

Signature			
Name	David Snashall	Brett McLennan	Dr Lynette Coleman
Date	*17 October 2003*	*17 October 2003*	*17 October 2003*

October 2003

Prepared by
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Hunter Valley Operations West Pit Extension and Minor Modifications

Volume 1 Environmental Impact Statement (Part A-E)

Volume 2 Technical Reports (Part F-H)

Volume 3 Technical Reports (Part I-L)

Volume 4 Environmental Impact Statement Figures