

Connell Hatch
ABN 21 646 421 651
7 Warabrook Boulevard
Warabrook
New South Wales 2304 Australia

Telephone: +61 2 4968 6888
Facsimile: +61 2 4968 6895
Email: chntl@connelhatch.com
www.connelhatch.com

**s96 Application – Ventilation shaft,
electricity supply and underground
workings
Statement of Environmental Effects
Resource Pacific Ltd**

27 March 2007
Reference HP57
Revision 1

Document Control



Document ID: O:\PROJECTS\INDUSTRIAL\ENVIRONMENTAL\HP 64 - NEWPAC INFRASTRUCTURE\REPORT\SEE_V2\SEE.DOC

Rev No	Date	Revision Details	Typist	Author	Verifier	Approver
0	18 December 2006	Statement of Environmental Effects	MM	MM	JE	NN
1	27 March 2007	Statement of Environmental Effects	MM	MM	JE	NN

A person using Connell Hatch documents or data accepts the risk of:

- a) Using the documents or data in electronic form without requesting and checking them for accuracy against the original hard copy version.
- b) Using the documents or data for any purpose not agreed to in writing by Connell Hatch.

Contents

Section	Page
1. Introduction	1
1.1 Proponent	1
1.2 Address of site	1
1.3 Site location	1
1.4 Proposal	1
1.5 Purpose of SEE	1
2. The proposal	3
2.1 Background	3
2.2 Previous approvals	3
2.3 Project justification	3
2.4 Mine operation and layout	3
2.5 Site evaluation and assessment	3
2.6 Previous consent	4
2.7 Implications of the proposed modifications	4
2.8 Proposed construction	4
3. Planning context	7
3.1 NSW legislative requirements	7
3.1.1 Ecologically sustainable development	7
3.1.2 Environmental Planning and Assessment Act, 1979	7
3.1.3 S79(C) Assessment	7
3.2 State environmental planning policies	8
3.2.1 State Environmental Planning Policy (mining, petroleum and extractive industries) 2007	8
3.2.2 State Environmental Planning Policy (Major Projects) 2005	8
3.2.3 State Environmental Planning Policy 44 – Koala Habitat Protection	9
3.3 Planning policies and guidelines	9
3.3.1 Guidelines to the mining, rehabilitation and environmental management process	9
3.3.2 Planning for Bushfire Protection, 2006	9
3.4 Local planning framework	10
3.4.1 Singleton local environmental plan	10
3.4.2 Development Control Plan – erosion and sediment control	10
3.4.3 European Heritage	11
3.5 Commonwealth legislative requirements	11
4. Assessment of environmental impact	12
4.1 Context and setting	12
4.1.1 Existing improvements to site	12
4.1.2 Streetscape and local character	12
4.1.3 Bulk, scale and density	12
4.1.4 Adjoining development	13
4.2 Privacy and overshadowing	13
4.3 Access, transport and traffic	13
4.4 Heritage	13
4.4.1 European Heritage	13
4.4.2 Aboriginal Heritage	14
4.4.3 Consultation	15
4.4.4 Natural Heritage items	16
4.5 Natural hazards	16

4.5.1	Mine subsidence	16
4.5.2	Contaminated land	16
4.5.3	Flooding	16
4.5.4	Bushfire protection	16
4.5.5	Erosion and sediment control	16
4.6	Water management	17
4.6.1	Stormwater	17
4.6.2	Effluent	17
4.6.3	Water bodies	17
4.7	Flora and fauna	17
4.7.1	Threatened Species Conservation Act, 1995	18
4.7.2	Environmental Protection and Biodiversity Conservation Act, 1999	18
4.7.3	SEPP 44 - Koala Habitat Protection	19
4.8	Waste management	19
4.9	Noise and vibration	19
4.10	Air quality and odour	21
4.11	Socio-economic impact	22
4.12	Greenhouse emissions	22
4.13	Rehabilitation	22
4.14	Ongoing environmental management	22
4.15	Cumulative impact	22
5.	Summary and conclusion	24
6.	References	25
 Appendix A Legislation		
 Appendix B Visual Impact		
 Appendix C Traffic assessment report		
 Appendix D Indigenous heritage plans		
 Appendix E EPBC assessment of significance		
 Appendix F Noise impact assessment		

1. Introduction

Connell Hatch has been engaged by Resource Pacific Ltd to prepare a Statement of Environmental Effects (SEE) to provide the Department of Planning (DoP) with a sound basis for decision-making concerning the proposed establishment of a ventilation shaft, fans and associated electricity supply for the Newpac No.1 Colliery at Ravensworth. Allied aims are to ensure state and regional planning issues, policies and guidelines are taken into consideration in the development of the mine to achieve the objectives of the *Environmental Planning and Assessment Act* (EP&A Act) (as amended).

1.1 Proponent

The proponent, Resource Pacific Ltd, currently operate the Newpac No.1 Colliery which is currently utilising longwall extraction methods to gain coal from underground reserves. The site that is the subject of the application is outside of the current area of operation. Figure 1.1 presents the subject location in relation to other facilities at the mine and external to the area.

1.2 Address of site

The subject site is known as Lot 1 DP 738417, Ravensworth.

1.3 Site location

The site is within an area of 8.4 hectares and is located southeast of the intersection of the New England Highway and the Old New England Highway, Ravensworth. The site was previously owned by Macquarie Generation and formed part of a coal unloading facility. The Great Northern Railway is located to the east and the New England Highway to the west. Adjoining the site to the south is an existing Daracon truck depot and to the north is Macquarie Generation owned land associated with its coal unloading facility.

1.4 Proposal

The proposal is to provide a ventilation shaft, two fans and associated underground workings. Although changes are proposed to the operation, the proposed modifications are generally in keeping with the original Environmental Impact Statement (EIS) prepared by HLA Envirosciences Pty Ltd and Development Consent (N95/00395/001) from the Department of Planning (DoP). Newpac No.1 Colliery requires additional infrastructure to allow longwall mining to proceed.

The proposal involves infrastructure such as:

- Ventilation shaft
- Two ventilation fans
- Main control switch rooms (x2 – one for each fan)
- Transformer and circuit breaker yards (x2 – one for each fan)
- Trench under the New England Highway for electricity supply
- Underground workings (series of mains for services to underground operations that at some time in future may provide additional access for men and materials to access longwall)

Note the switch rooms will be located on the northern boundary. However, the final design may result in amending the location for operational reasons including potential future infrastructure. The proposed layout of the infrastructure is presented in Figure 1.2.

1.5 Purpose of SEE

The SEE has been prepared subject to the *Environmental Planning and Assessment Act 1979* (EP&A Act) and relevant regulations. The purpose of the SEE includes the following:

- Support the application for a modification to the existing consent

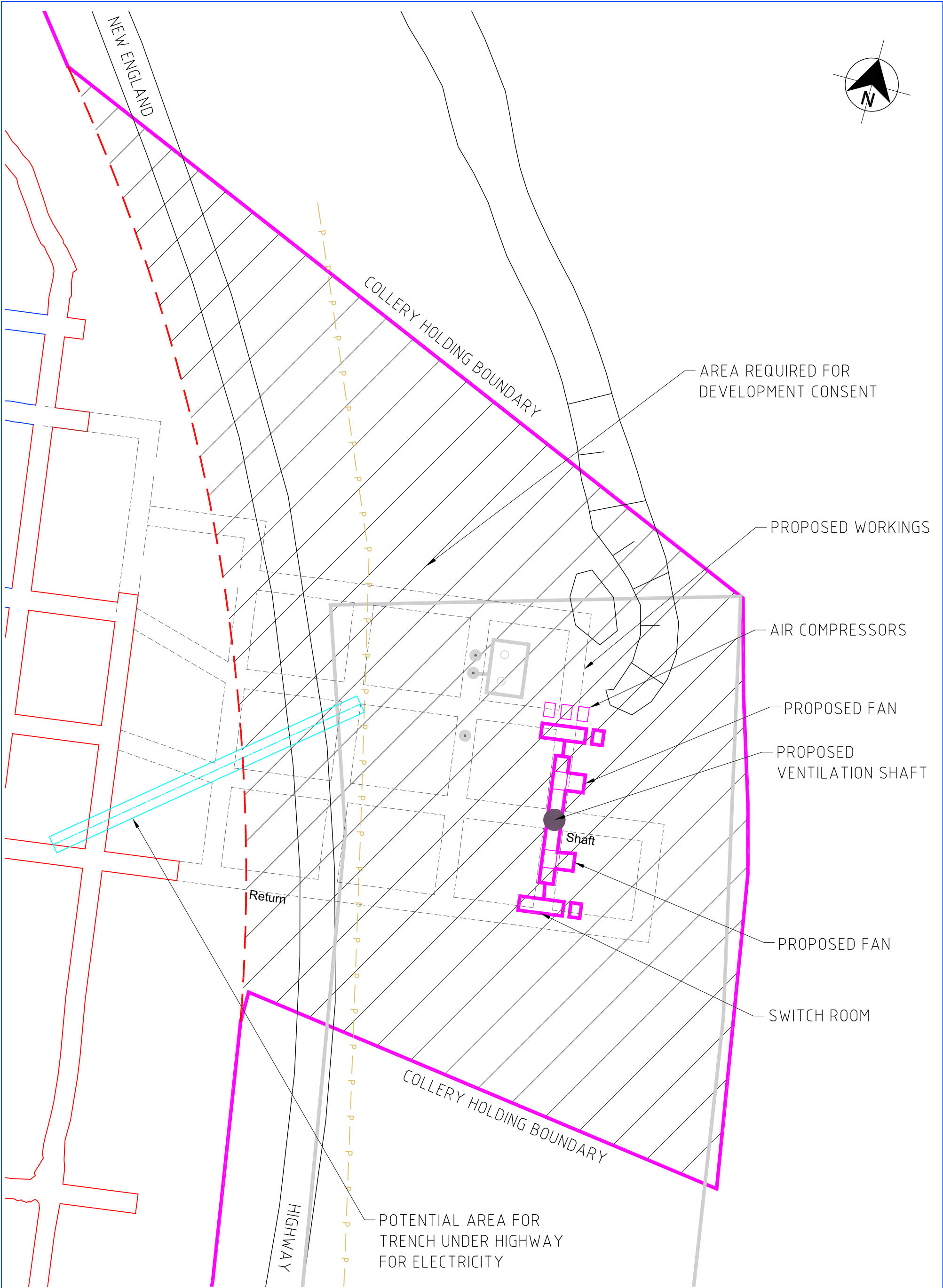
- Form part of a formal request for a modified development consent
- Provide a description of the project proposal
- Assess the proposal against the EP&A Act
- Address significant issues related to assessment of the proposal



HP64-01-01-00
RESOURCE PACIFIC
VENT SHAFT

400 200 0 400 800 1200 1600 2000m
SCALE 1:20000 @ A3

FIG-1.1
SITE PLAN
HP64-F-01



HP64-01-01-00
RESOURCE PACIFIC
VENT SHAFT

20 10 0 20 40 60 80 100m
SCALE 1:1000 @ A3

FIG-1.2
INFRASTRUCTURE LAYOUT
HP64-F-03

2. The proposal

2.1 Background

Nardell Coal Corporation was granted development consent for an underground coal mine activity in 1996. The former Nardell Colliery is now known as Newpac No.1 Colliery and is under the new company name of Newpac Pty Ltd. Newpac No.1 Colliery began operating in 2001 with a total resource of 252 million tonnes of high quality coal in five seams. Newpac currently utilise longwall mining methods to extract the coal resource. The resource is located beneath the former Ravensworth No. 2, Ravensworth South and Narama open cut mines.

2.2 Previous approvals

An Environmental Impact Statement (EIS) for the underground coal mine was prepared by HLA-Envirosciences in 1996. Nardell Coal Corporation was granted development consent to construct and operate an underground coal mine by the Minister for Urban Affairs and Planning in November 1996 (DA 104/96, File No, N95/00395/001).

A modification to the development consent was issued in January 1998 to modify the road haulage conditions. The development consent was modified in March 2001 to allow construction of a 100 ML mine storage dam approximately 350 metres south of the Nardell mine Pit Top. The modification to the development consent in 2001 allowed deferment of further mine water storage requirements, temporary emplacement of coal washery reject material within an area adjacent to the mine water dam site, associated road upgrading, water management controls, minor modifications to Pit Top layout and variations to the timing of reporting.

In October 2005 the Department of Planning approved a development application (DA161-7-2005) for development of a coal stockpile facility at the site. The consent was modified in 2007 to allow installation of a solcenic borehole, two solcenic tanks and a concrete borehole at the site that is the subject of this application and a second modification, approved in 2007, allowed erection of a substation.

2.3 Project justification

Continuation of the Newpac No.1 Colliery and expansion into longwall methods requires the provision of adequate ventilation to the underground operations. The proposed site will provide a suitable location for development of the shaft and fans and will allow for long-term operation of the mine. The site of the proposed infrastructure is currently heavily disturbed and the proposed development will not create a significant negative impact on the environment.

2.4 Mine operation and layout

The mine operation and layout is as per the EIS (HLA-Envirosciences, 1996), and subsequent approved minor variations, and a summary is provided in the Statement of Environmental Effects prepared by Umwelt (2000) as follows. In 1996 development consent was issued for underground coal mining of the Pikes Gully, Upper Liddell, Middle Liddell and Barrett coal seams. The Upper and Middle Liddell seams are not mineable in the same plan locality due to their close proximity, nor are they mineable in areas where they are separated by ply thickness. Coal will be extracted using continuous mining methods during the initial mining phase (Phase 1). Continuous mining will continue for a period of approximately two to three years in order to allow extraction of coal from an area intersected by faults and dykes. Once the main roadway is driven beyond the area of faulting, longwall mining (Phase 2) will commence.

2.5 Site evaluation and assessment

The land is currently a vacant cleared paddock with limited value for grazing or cropping due to the degraded nature of the vegetation which largely consists of weeds (dominated by Galenia). The

paddock is currently grazed occasionally. The site is located between the New England Highway and the Great Northern Railway. Access to the site is gained via the existing access at the Daracon property to the south of the site.

2.6 Previous consent

In Section 4.4.4 of the original EIS it was highlighted that as the mine develops underground towards the south an additional ventilation shaft may be required. The purpose of the current application is to provide the additional ventilation shaft presented in the original EIS. Activities associated with the Colliery will generally be in keeping with the 1996 consent and subsequent modifications. The ventilation shaft and associated trench for power will provide ventilation to the underground workings to allow ongoing development of the mine in accordance with the consent.

As stated previously changes to the current consent are sought in relation to infrastructure such as ventilation fans, main control switch rooms, transformer and circuit breaker yards and trench under the New England Highway for electricity supply.

There is an existing approval for an internal access road to the site to allow the construction and operation of solcenic boreholes and associated infrastructure.

2.7 Implications of the proposed modifications

There will be no changes to maximum production levels, mining methods production levels or environmental controls as originally approved. The location of the proposed activity is on the route to the pit top for the colliery.

The proposed modifications are required to service the continued operation of the mine and are implicit in the original approval granted in 1996. The mine has progressed to a point where the surface infrastructure described above is required to facilitate the continuation of longwall mining. It is considered the current proposal is substantially the same development as originally approved, and can therefore be assessed as an amendment in light of the original impact assessment contained in the 1996 Environmental Impact Statement.

Newpac No.1 Colliery will remain substantially the same development as originally proposed and approved. Matters relating to coal extraction and environmental protection measures of the operations will not be altered. It is considered that the Minister, as Determining Authority, can assess the proposed modifications in accordance with the provisions of Section 96(2) of the EP&A Act. An assessment of the likely environmental impacts resulting from the proposed modification to consent is provided in Section 4.

2.8 Proposed construction

Proposed Underground Workings

The proposed underground workings consist of approximately 1000m of roadways, with a cover depth of 150-155 m, driven to:

- Access the bottom of the ventilation shaft from the mine's workings and provide sufficient airways to provide adequate ventilation for the mine
- Provide access to the base of the service boreholes for the services to be reticulated into the current mine workings
- Provide access to the base of the ballast borehole for LHD vehicles.

Roadways to be driven in the area will be 5.5 m wide and approximately 2.5 m high (thickness of the seam).

Pillar sizes of the proposed workings are in accordance with dimensions as approved by the Department of Primary Industries and have been assessed by geotechnical consultants engaged by Resource Pacific Ltd as having a safety factor of 1:4 with a probability of failure $> 1:1 \times 10^6$.

Shaft Construction

The shaft will have a finished diameter of 5 m and will have a concrete pad constructed at the surface to accommodate the ventilation fans.

The shaft will be constructed by the raise bore method which entails:

- The boring of a 300 mm borehole from the surface to the seam
- The provision at the surface of a raise boring rig to ream the 300 mm diameter borehole to a 5m diameter shaft
- The deposition of all debris from the shaft construction to the seam below, for final stowage underground or conveying to the surface at the main mine entry for deposition with the normal reject of the coal

The equipment on the surface will include;

- The raise bore
- Power pack for the bore
- Generator to provide power
- Control room for the raise bore
- Racks to hold drill rods
- A small lockable storeroom
- A ground sump (4 x 3) for recirculating water
- Pumps for recirculating water
- A water tank for holding water

Proposed controls for the raise boring operation will include:

- A temporary security fence around the operation
- Fuel tank in generator double skinned
- Silt fences erected around areas of disturbance
- All personnel inducted in environmental awareness and spill remediation

Once the shaft is completed, the area will be rehabilitated by the shaft sinkers with the sump being filled in, consolidated and seeded. All other equipment associated with the shaft sinking shall be demobilised and removed at the completion of the work.

Construction of Ventilation Fan

When the shaft sinking has been completed the contractor for the ventilation fan installation will commence work on site. The foundations for the ventilation fan and associated works will be installed by a local contractor in accordance with plans issued by the fan manufacturer. Foundations will be required for the evasee, motor house and the transformer switchyard. The control room will be a demountable type of building that will require minimal footings.

Fan Installation

The fan components will be shipped up individually by semi-trailer and deposited on the site. The build up will commence from the shaft elbows and the motor houses.

Dimension for twin fans

Motor house to motor house	total length	36m
Width at evasee		6.5m
Height		12.4m
Control room	total length	9.5m
	total width	3.8m
	total height	3.8m

The colour of the installation will be green to blend in with the landscape.

The contractors for the manufacture and installation of the fan and associated structures will be Flakt Woods of Melbourne, a firm that has installed the majority of mine ventilation fans in the country in the previous 20 years. The proposed fan layout is presented in Figure 2.1.

Power to site

It is proposed that power be transmitted to the site from an existing power line located on Macquarie Generation land on the western side of the New England Highway via a horizontal borehole under the Highway. Once terminated under the Highway the power will be reticulated to the fans and other equipment.

The horizontal borehole under the Highway will be in accordance with an approval from the RTA and the borehole will carry the power cable at 11kV and some small communication cables. From the exit of the underbore on the eastern side of the Highway the power cable will be trenched in accordance with AS3000 and relevant Energy Australia guidelines to the site of the fans and other equipment.

Fan Operation

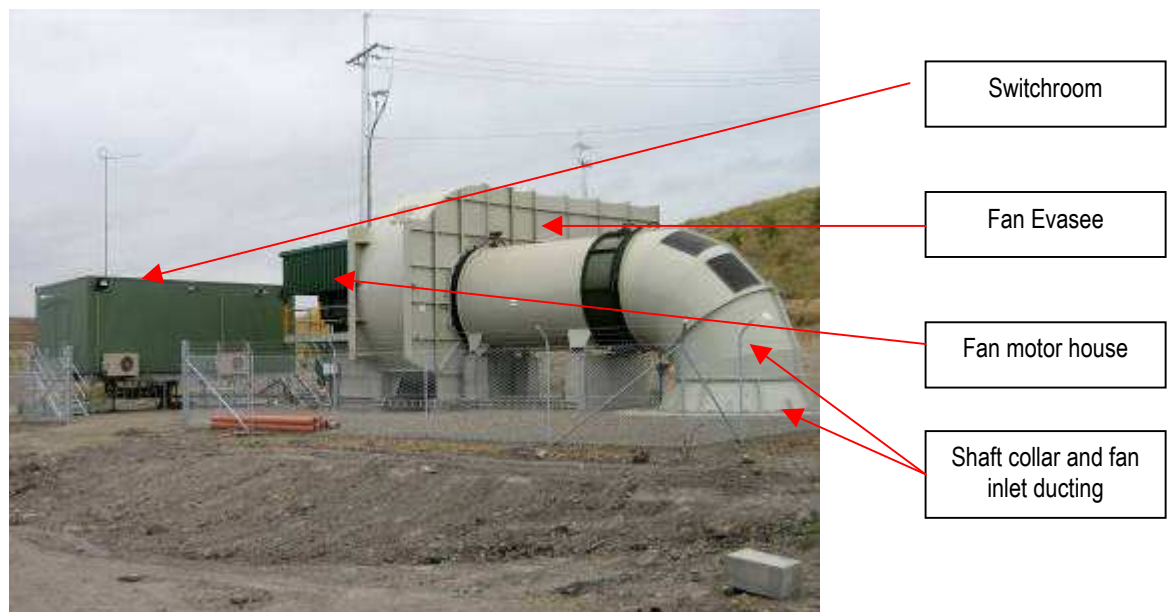
Once all equipment is installed the site will be surrounded on its perimeter by a man proof fence approximately 60m x 25m and the area will be restored. The fan has been designed to have the evasee vertical.

Relocation of Current Ventilation Fan

The current ventilation fan is situated at the top of No.2 Shaft. When the ventilation fan at No.3 shaft is operational, the No.2 Shaft fan will be de-commissioned and dismantled. The No.2 Shaft fan that is currently ventilating the mine will be overhauled where necessary and then transported to the No.3 Shaft site.

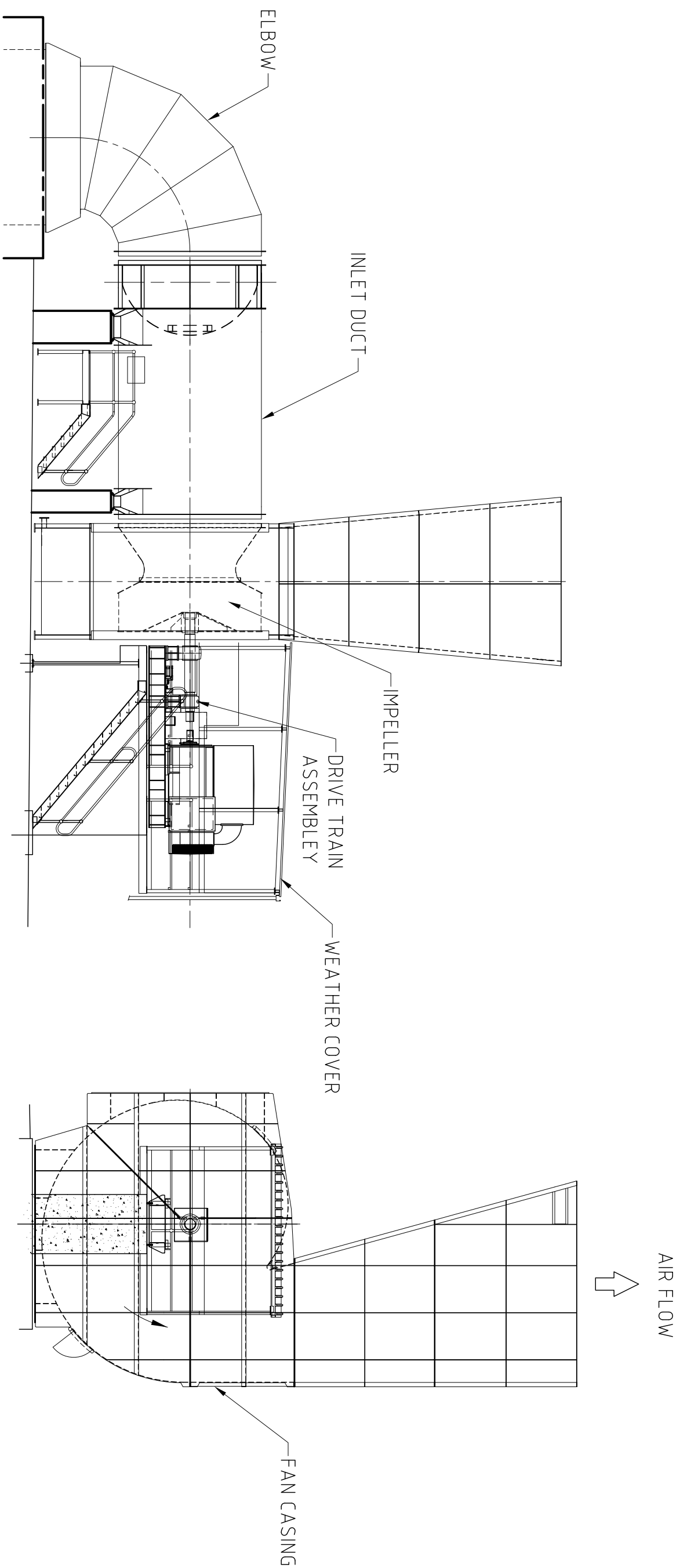
No.3 Shaft will have an identical fan erected over it and will also have this No.2 fan relocated and installed in parallel so that the No.3 shaft will have twin fans. The twin fan installation has the potential to be sufficient for the life of mine ventilation requirements.

The evasee of each of the fans at No.3 shaft will be turned so that they discharge the air vertically from the fans to the atmosphere.



Construction of Air Compressor House

Air compressors will be installed on the north side of the ventilation fan assemblies. Air compressors will be housed in a shed structure that will measure approximately 18 x 8 metres x 4 metres high. The foundations for the compressors and the enclosing shed will be of a raft type concrete construction.



HP64-01-01-00
RESOURCE PACIFIC
VENT SHAFT

FIG-2.1
FAN LAYOUT
HP64-F-04

3. Planning context

3.1 NSW legislative requirements

3.1.1 Ecologically sustainable development

Development in NSW is regulated through the EP&A Act. Ecologically Sustainable Development (ESD) principles were formalised into the planning legislation with the enactment of the *Environmental Planning and Assessment Regulation 1994* (these are also included in the *Environmental Planning and Assessment Regulation 2000* [EP&A Regulation]). Subsequently, ESD principles have been explicitly incorporated into a number of Acts including the *Protection of the Environment Administration Act 1991* (by way of an amendment in 1997) and the *Water Management Act 2000*.

Consideration has been given to how the proposed modifications accord with ESD principles throughout the SEE, particularly with regard to the environmental constraints posed by the study area.

3.1.2 Environmental Planning and Assessment Act, 1979

Development in New South Wales falls under the provisions of the EP&A Act and subordinate legislation. According to s96(2) of the Act a consent authority may, on application being made by the applicant or any other person entitled to act on a consent granted by the consent authority and subject to and in accordance with the regulations, modify the consent if:

- a) it is satisfied that the development to which the consent as modified relates is substantially the same development as the development for which consent was originally granted and before that consent as originally granted was modified (if at all), and
- b) it has consulted with the relevant Minister, public authority or approval body (within the meaning of Division 5) in respect of a condition imposed as a requirement of a concurrence to the consent or in accordance with the general terms of an approval proposed to be granted by the approval body and that Minister, authority or body has not, within 21 days after being consulted, objected to the modification of that consent, and
- c) it has notified the application in accordance with:
 - i) the regulations, if the regulations so require, or
 - ii) a development control plan, if the consent authority is a council that has made a development control plan that requires the notification or advertising of applications for modification of a development consent, and
- d) it has considered any submissions made concerning the proposed modification within the period prescribed by the regulations or provided by the development control plan, as the case may be.

The proposal is substantially the same as the original consent and is considered a modification to the same development. The proposed shaft, ventilation fans and associated infrastructure are required to permit the ongoing operation of the previously approved longwall operation and do not represent a significant change from the original consent. Additional ventilation was mentioned in the 1996 EIS as being potentially required and as such the current proposal can be considered a modification to the original application.

3.1.3 S79(C) Assessment

Under s79(C) of the EP&A Act there are specific matters that are relevant to development that a consent authority must consider in determining an application. The specific matters for consideration are discussed below.

S79(C)(1)(a) (provisions of environmental planning instruments and regulations)

The proposal is permissible with consent in the zone and is an expansion of a current use that has gained development consent. Further discussion on permissibility of the proposal and relevant environmental planning instruments is presented in the remainder of Section 3 of this report.

S79(C)(1)(b) (likely impacts)

There are several issues that must be considered in relation to environmental impact of the proposal including visual, heritage, flora and fauna and noise. An assessment of potential environmental impact is presented in Section 4 of this report. The assessment found that, where required, the potential environmental impact could be ameliorated through control measures. The proposal was found to provide positive social and economic impacts to the locality.

S79(C)(1)(c) (suitability of the site)

The subject site is located between the New England Highway and the railway line and is within an area that contains similar land uses. The site has been extensively cleared and is heavily disturbed. A Section 90 application under the *National Parks and Wildlife Act, 1974*, is currently being assessed. The site is suited to the proposed development.

S79(C)(1)(d) (submissions)

The application will be exhibited for a period of two weeks and submissions will be considered.

S79(C)(1)(e) (public interest)

There is no perceived negative impact on the public in terms of the proposed development. Where potential issues have been identified, such as noise, appropriate measures to mitigate impacts will be implemented. The proposal will provide a positive impact in terms of ongoing employment and is in the public interest.

There is a range of legislation that is potentially related to the proposal that is further discussed in Appendix A.

3.2 State environmental planning policies

3.2.1 State Environmental Planning Policy (mining, petroleum and extractive industries) 2007

The State Environmental Planning Policy (SEPP) aims to:

- Provide for the proper management and development of mineral, petroleum and extractive material resources for the purpose of promoting the social and economic welfare of the State
- Facilitate the orderly and economic use and development of land containing mineral, petroleum and extractive material resources
- Establish appropriate planning controls to encourage ecologically sustainable development through the environmental assessment, and sustainable management, of development of mineral, petroleum and extractive material resources

The SEPP provides for development that may be carried out with consent, without consent and is exempt or complying. The proposal is not considered exempt development and requires a modification to an existing consent and as such no further consideration of the SEPP is required.

3.2.2 State Environmental Planning Policy (Major Projects) 2005

The SEPP aims to:

- a) To identify development to which the development assessment and approval process under Part 3A of the Act applies
- b) To identify any such development that is a critical infrastructure project for the purposes of Part 3A of the Act
- c) To facilitate the development, redevelopment or protection of important urban, coastal and regional sites of economic, environmental or social significance to the State so as to facilitate the orderly use, development or conservation of those State significant sites for the benefit of the State

- d) To facilitate service delivery outcomes for a range of public services and to provide for the development of major sites for a public purpose or redevelopment of major sites no longer appropriate or suitable for public purposes
- e) To rationalise and clarify the provisions making the Minister the approval authority for development and sites of State significance, and to keep those provisions under review so that the approval process is devolved to councils when State planning objectives have been achieved

According to Schedule 1 the SEPP applies to development for the purposes of mining that:

- 1)
 - a) Is coal or mineral sands mining, or
 - b) Is in an environmentally sensitive area of State significance, or
 - c) Has a capital investment value of more than \$30 million or employs 100 or more people
- 2) Extracting a bulk sample as part of resource appraisal or a trial mine comprising the extraction of more than 20,000 tonnes of coal or of any mineral ore
- 3) Development for the purpose of mining related works (including primary processing plants or facilities for storage, loading or transporting any mineral, ore or waste material) that:
 - a) Is ancillary to or an extension of another Part 3A project, or
 - b) Has a capital investment value of more than \$30 million or employs 100 or more people

As the proposal relates to a modification to an existing consent, the SEPP is not considered to apply.

3.2.3 State Environmental Planning Policy 44 – Koala Habitat Protection

This State Environmental Planning Policy 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:

- a) By requiring the preparation of plans of management before development consent can be granted in relation to areas of core koala habitat, and
- b) By encouraging the identification of areas of core koala habitat, and
- c) By encouraging the inclusion of areas of core koala habitat in environmental protection zones.

As this proposal is not within primary or core koala habitat and there is no Comprehensive Koala Plan of Management, this SEPP is not considered to apply.

3.3 Planning policies and guidelines

3.3.1 Guidelines to the mining, rehabilitation and environmental management process

The NSW Department of Primary Industries established the Guidelines to ensure the satisfactory environmental and rehabilitation performance of mines in NSW. The Guidelines provide an acceptable format for the preparation of a Mining Operations Plan (MOP) and Annual Environmental Management Report (AEMR) for mines. The mine site has a current MOP and AEMR.

3.3.2 Planning for Bushfire Protection, 2006

Bushfire prone areas are subject to development and planning controls designed to improve the bushfire safety of constructions that face greater risk of bushfire threat. In rezoning land for urban development the ability to provide an adequate Asset Protection Zone (APZ), fire fighting facilities and access is an important consideration.

The PfBP was revised in 2006 to incorporate clearer legislative provisions and performance criteria, together with more options for achieving compliance when building in a bush fire prone area. PfBP expands the considerations for infill developments, a dwelling within an existing allotment, and for the

first time establishes the bushfire planning objectives for industrial, commercial and warehousing types of development (NSW Rural Fire Service, 2006).

The site is heavily disturbed and does not pose significant bushfire risk. The proposed activity accords with the aims of the PfBP.

3.4 Local planning framework

3.4.1 Singleton local environmental plan

The relevant local planning instrument applying to the site is the *Singleton Local Environmental Plan 1996* (LEP). According to the LEP the site is zoned 1(a) Rural and the establishment of two ventilation shafts, associated equipment and power is permissible in the zone. The objectives of the 1(a) Rural zone are:

- a) To protect and conserve agricultural land and to encourage continuing viable and sustainable agricultural land use
- b) To promote the protection and preservation of natural ecological systems and processes
- c) To allow mining where environmental impacts do not exceed acceptable limits and the land is satisfactorily rehabilitated after mining
- d) To maintain the scenic amenity and landscape of the area
- e) To provide for the proper and co-ordinated use of rivers and water catchment areas
- f) To promote provision of roads that are compatible with the nature and intensity of development and the character of the area

Land use in the locality consists of mining activities, with power generation, rail and road transport infrastructure and some agriculture. The proposed activity is compatible with existing land use in the zone and will provide additional resources to appropriately manage the mine operation for the life of the mine.

Requirements of Singleton LEP 1996

Clause	Assessment	Consistent
16 – Zone objectives	Permissible with consent	Yes
22 – Heritage items	Heritage assessment conducted (current s90 application)	Yes
31 – Flood liable land	Site not considered flood liable	Yes
32 – Development on major roads	Accessed via existing point	Yes

The proposed development is permissible in the zone with consent from Council.

3.4.2 Development Control Plan – erosion and sediment control

The objectives of the Development Control Plan (DCP) are:

- To prevent land from being degraded by soil erosion or unsatisfactory land and water management practices
- To protect streams and waterways from being degraded by erosion and sediment caused by unsatisfactory land and water management practices
- To promote and protect biodiversity

Details of erosion and sediment control are presented in Section 4.5.5. The proposed activity complies with the requirements of the DCP and provides for appropriate controls to minimise any adverse impact of erosion and sedimentation.

3.4.3 European Heritage

Ravensworth Homestead at Hepden Road in Ravensworth is listed as an Indicative Place on the Register of the National Estate. Schedule 6 of the Singleton LEP 1996 identifies the homestead as being regionally significant. The following heritage items exist in the wider study area:

- Ravensworth School, New England Highway (Local Significance)
- Foybrook Crossbeds (Register of National Estate)
- Chain of Ponds Hotel and Outbuildings (Register of National Estate)

Further discussion on heritage issues is presented in Section 4.4.

3.5 Commonwealth legislative requirements

The proposal is not considered a controlled action and as such no further consideration of the *Environment Protection and Biodiversity Conservation Act 1999* is required.

4. Assessment of environmental impact

4.1 Context and setting

The proposed ventilation shaft, two main control rooms, two transformer and circuit breaker yards and associated trench for power are in keeping with the existing land use in the area. The construction of the underground workings will occur as part of ongoing operation of the longwall activities. All proposed infrastructure is in keeping with the other mining activities in the locality.

The development is appropriate to the context and setting.

4.1.1 Existing improvements to site

The site is currently vacant with no existing improvements related to the mine. There is an existing zincalume shed on the site that will be removed. An application for an hydraulic oil access borehole, two 40 kL storage tanks for the hydraulic oil and a concrete borehole used for the delivery of concrete underground and a separate application for a substation have recently been approved by the DoP.

4.1.2 Streetscape and local character

The proposed ventilation shaft is in keeping with the streetscape and local character. Extractive industries are a common land use in the region and infrastructure associated with extractive industries are represented throughout the area.

The development will not significantly negatively affect the streetscape and local character.

4.1.3 Bulk, scale and density

A Visual Impact Assessment was conducted by Verge Landscape Architects (Appendix B). According to the visual assessment in recent times, specifically over the past two decades, mining operations have had a strong, albeit localised, impact. It is possible to see the evidence of mining from the site as either the upper portions or spoil stockpiles of open cut mines in the middle to long distance or rehabilitated landscapes such as the mounding occurring immediately opposite the site, west of the New England Highway.

Generally, past and active mining operations pose a negative impact on the local visual environment; although, the impact has been contained such that the traditional rural character still predominates within the local area. Overall, the scenic quality of the study locality is **moderate** which is either equal to or better than adjoining areas especially where mining and power generation activities become more noticeable.

On average, approximately 11,500 vehicles/day pass the site giving it high visual accessibility and the potential for a large number of people to be affected by the proposal. In addition, the Main Northern Railway passes to the east of the site further adding to the site's exposure and consequent prominence. Travellers passing the site do not see it in isolation but view it as part of a continuous journey. The impact of any proposed development; therefore, needs to be assessed as part of this travel experience because a development or land use that differs greatly from other forms will stand out and therefore pose a greater impact on the visual environment.

The relative frequency with which mining and other industries now occur within the New England Highway view corridor has lessened the visual sensitivity of the area making it able to withstand further changes providing such changes are consistent with previous development and are managed having regard to visual impact. To ensure that the proposed development has the least impact on the visual environment screen planting will be provided as shown on the landscape plan in Appendix B.

The Visual Impact Assessment concluded that the proposed development, including the provision of screen planting, does not pose a significant visual impact on either the local visual environment or the view corridor that exists between Singleton and Muswellbrook.

4.1.4 Adjoining development

As previously discussed, the locality generally involves development associated with extractive and rural activities. Land immediately to the north is utilised by Macquarie Generation while land to the south is utilised by Daracon. To the east and west of the site are the rail line and New England Highway, respectively.

The proposed development will not significantly adversely impact on adjoining development.

4.2 Privacy and overshadowing

There will not be any overshadowing of neighbouring properties as a result of the development. In terms of privacy, the site will be visited intermittently for maintenance purposes. There are no sensitive land uses in the area that would be affected by people intermittently attending the site.

The development will not cause any adverse impact on privacy or overshadowing.

4.3 Access, transport and traffic

A Traffic Assessment Report was completed by Gary Stapleton of Stapes Pty Ltd (Appendix C). The report found that due to the very minor volumes presently generated by the existing depot usage together with those of the proposed development the proposal would have minimal effect on the adjoining road network.

The proposed development site will have access via the existing Daracon Depot. Agreement has been reached with Daracon to use this existing access arrangement for the duration of construction works and for ongoing operation of the site. The depot is accessed by a separate ingress driveway 6m wide and egress driveway 12.7m wide. Both driveways are located on a straight level section of the New England Highway with satisfactory stopping sight distance in both directions. Large sealed shoulders are provided at these locations affording safe turning movements for vehicles entering or leaving the New England Highway. Traffic volumes noted at the time of the survey were only light to moderate. Vehicle speeds were recorded to have an 85th percentile reading of 91kph within the posted speed limit of 90kph. At the time of the inspection (1230hrs) 22 depot staff motor vehicles and 6 semi trailers were parked within the depot premises. Minimal activity occurs at other times.

The existing road network is capable of accommodating the minor increase in traffic from the development during and post construction.

4.4 Heritage

4.4.1 European Heritage

There are no known items of European Heritage contained within the subject property. Ravensworth Homestead at Hepden Road in Ravensworth is listed as an Indicative Place on the Register of the National Estate. The original part of Ravensworth Homestead is thought to have been built for Dr. James Bowman, colonial surgeon, by about 1835. Later owners included Captain William Russell. The Nominator's Statement of Significance states that although altered, Ravensworth Homestead is a remarkably intact Colonial Georgian bungalow. Ravensworth Homestead is a house that is associated with one of the colony's important early settlers and is therefore a building of considerable importance. Ravensworth Homestead is sufficiently removed from the site and the proposal is of minimal environmental impact such that the proposal will have no adverse impact on the heritage item.

The following exist in the wider study area:

- Ravensworth School, New England Highway
- Foybrook Crossbeds
- Chain of Ponds Hotel and Outbuildings.

Ravensworth School was built in 1876 and was in operation until 1986 and the school is considered of local heritage significance. The Foybrook Crossbeds, Chain of Ponds Hotel and Outbuildings are located about 8km north of Ravensworth and are listed on the Register of National Estate.

The proposal will not have a negative impact on the heritage items listed above as the heritage items being located further than 2km from the subject site.

4.4.2 Aboriginal Heritage

Under previous ownership, the entire subject property was surveyed for Indigenous heritage (HLA, 2004). The assessment was thorough and one (1) Indigenous open artefact scatter site was recorded; MG#1, DEC # 37-3-0588 (Appendix D). Subsequent to this survey and in the face of proposed direct impacts, management recommendations for the subject property were devised, based on zoning of the land according to its archaeological potential. The subject property was divided into two landform units – lower hillslope and alluvial flats, both assessed as being of high archaeological sensitivity where it was considered likely that surface and/or subsurface archaeological materials would be present and that an archaeological subsurface testing programme would be required to investigate the presence or absence of archaeological materials prior to any disturbance as a result of development impacts.

In response to these recommendations, the previous owner commissioned HLA to undertake a sub-surface testing programme over an extensive area, reported by HLA in 2005. During excavations, three transects of test pits were excavated over the subject property, refer Appendix D. Test pits of transect 5 tested the assessed highly sensitive alluvial flats landform, while transects 4 and 6 tested site MG#1 and the highly sensitive lower hillslope landform.

The results of testing along transect 5 (alluvial flats) revealed that of the 5 test pits excavated to a depth of c. 80 cm, no archaeological materials were recovered (HLA, 2005). As a result it was concluded that this area warrants no further archaeological investigation. This corresponds with the area delineated in pale orange on Figure 3 in Appendix D. Hence it can be concluded that this area is now free of all heritage constraints.

The results of testing along transects 4 and 6 (lower hillslope) revealed that of the 18 square metres tested, a total of 168 artefacts were recovered, all from the upper 20 cm comprising the 'A' horizon (HLA 2005: 45). Artefacts were primarily of silcrete and fine-grained siliceous materials and were unevenly distributed. A potential knapping floor was excavated in this area (HLA 2005) although a significant amount of the material excavated was also interpreted as being possibly the result of colluvial erosion from higher up the hillslope. In summarising, HLA indicate that site MG#1 and the lower hillslope landform in this area underwent not only transect testing (5 pits), but also further investigation from the excavation of three additional test pits and two trenches (HLA 2005). This degree of investigation allowed HLA to make the following determination:

Geomorphological modeling of this area implies that this site [MG#1] is actually an amalgamation of a number of sites, both chronologically and stratigraphically, from upslope that have eroded down slope through soil creep and other colluvial activity. For this reason, no further excavations are required, since the site is not scientifically significant (HLA, 2005).

The possibility of a potential massacre site being located within the study area was also investigated by HLA in 2005 (HLA, 2005). The result of this determined that no direct evidence for the location of the massacre site remains. It is further assessed that the study area “seems highly unlikely as the location for the massacre considering the distances involved and the lack of reference to nearby landmarks” (HLA, 2005).

In devising management strategies, HLA indicates that site MG#2 (located just north of the subject property) is of higher significance than site MG#1 and should be considered for conservation (HLA 2005). Recommendations of the report advise the Proponent to seek a Section 90 permit (Consent to Destroy) for site MG#1, in addition to a consent permit to cover the whole study area. Further, that a care and control permit should be applied for by the Aboriginal community to allow for the collection of artefacts that remain on site MG#1. Provision is also made for the potential that the Aboriginal community may wish to monitor site destruction; although, it is noted that the DEC do not usually support or require Proponents to undertake monitoring except under very exceptional circumstances (e.g. the possibility of burials), however, such a gesture may promote better relations with the Indigenous community (HLA, 2005).

Since the completion of this test excavation programme, the subject property was sold to Resource Pacific Ltd, who planned to use the area for the establishment of surface infrastructure to service long wall mining operations below. To that end, a solcenic borehole and associated storage tanks were proposed over the lower hillslope landform unit. This infrastructure is the subject of an earlier Development Modification application, and once it became clear that the proposal would impact site MG#1 and its associated landform, a s90 application for this area was prepared, Indigenous community consultation undertaken and the permit application lodged with the NSW DEC (Coffs Harbour Branch, 15 February, 2007).

As noted above, the s90 application prepared covers the entire lower hillslope landform unit upon which site MG#1 is located (Appendix D), which covers the proposed location of the ventilation fan that is the subject of this SEE. Contained within the s90 application is provision for the collection of the surface artefacts that comprise site MG#1 by the Indigenous community and it is expected that this collection process will form part of the Conditions of the permit. There is also the possibility that DEC may instigate a requirement for the monitoring of topsoil disturbance by the Indigenous community as a further condition of the s90 permit, although it was not proposed within the application and should (according to the DEC guidelines) only be a requirement in exceptional circumstances, i.e. where burials are considered likely. In any event, whatever conditions are placed on the s90 permit will be honoured by Resource Pacific.

In summary, once the s90 permit over the lower hillslope landform unit has been granted and any special conditions carried out, all infrastructure required within the area covered by the permit will be legally permissible from an Indigenous heritage perspective.

4.4.3 Consultation

Extensive consultation has occurred in relation to Aboriginal heritage. The following groups have been consulted in relation to activity at the subject site:

- Aboriginal Native Title Consultants(ANTEC)
- Adam McSweeney
- Combined Council of Hunter Valley Traditional Owners
- Giwiirr
- Hunter Valley Cultural Consultants
- Lower Wonnarua Tribal Consultancy Pty Ltd
- Minga
- Muswellbrook Cultural Consultants
- St Clair Aboriginal Corporation
- The Upper Hunter Heritage Consultants
- Ungooroo Aboriginal Corporation
- Upper Hunter Wananuah Council
- Valley Culture , Heritage and Cultural Consultants
- Wananuah Local Aboriginal Land Council
- Yarrawalk Enterprises
- Wananuah Custodians

- Wattaka Wonnarua C.C. Services
- Wonnarua National Aboriginal Corporation

What consultation/involvement has occurred:

At the initial field survey three Indigenous sites were identified, MG#1, MG#2 and MG#3. MG#1 is the subject of the current Section 90 Application. A community consultation meeting was held on 23 September 2004 prior to the test excavation. At this meeting, negotiations and agreements were reached in regard to each groups level of participation in the test excavation phase of the assessment. Each of these groups provided one representative each day for one week, followed by one overall representative agreed by all the groups for the following week if required. Test excavation was undertaken between 27 September and 1 October 2004, with community representatives employed in sieving and excavation of test pits. Management strategies for the test excavated sites were developed and extensive documentation supplied to all groups for comment.

4.4.4 Natural Heritage items

The proposal will not have a negative impact on listed Natural Heritage items as there are none contained within the subject property.

4.5 Natural hazards

4.5.1 Mine subsidence

The proposed infrastructure is associated with an existing mine site and is required to enable longwall extraction to continue due to venting requirements. No secondary extraction is proposed in the area and consequently, there will be no subsidence or associated environmental impacts on the surface from these workings.

The site is within a mine subsidence area and advice will be sought from the Mine Subsidence Board prior to construction commencing.

4.5.2 Contaminated land

The land is currently a vacant cleared paddock that is grazed occasionally. The site was previously owned by Macquarie Generation and formed part of a coal unloading facility. There is the potential for contamination due to previous coal activities. Any previous contamination will not have a negative impact due to the similar nature of previous and proposed coal mining activities.

Contamination of the land is not a constraint with regard to the proposed development.

4.5.3 Flooding

The subject site is located above the 1 in 100 year flood event and as such is not subject to the impact of flooding.

4.5.4 Bushfire protection

The proposed development complies with the requirements of s79BA of the EP&A Act and PfBP. The development is not considered a special fire protection purpose under s100B of the *Rural Fires Act, 1997*. The proposed infrastructure presents no additional bushfire risk and no further action in relation to bushfire management is required.

4.5.5 Erosion and sediment control

Earthworks at the site will be carried out in accordance with the Blue Book – Managing Urban Stormwater: Soils and Construction prepared by Landcom. A number of erosion and sediment control initiatives will be instigated at the site to ameliorate the potential for erosion and off-site emission of soil. Erosion and sediment control during construction may include the following:

The area of exposed ground at any one time will be minimised

- All excavated material will be placed on the upslope side of the works with water diversions in place to avoid concentration of water on exposed surfaces
- Erosion and sediment controls (such as silt fences) will be placed on the down slope side of all excavations and maintained until such time as the site is stabilised
- Dust management in the form of water carts will occur if required

Erosion and sediment controls will be sufficient to control off-site emission of soil.

4.6 Water management

4.6.1 Stormwater

Stormwater from the proposed development will be directed to a suitable surface discharge point. The location of the proposed switch rooms is such that there is sufficient land to dispose of surface water without impacting on adjoining land owners. Where any stormwater accumulates, it will accumulate within existing dams on the property.

The proposal will not create adverse stormwater issues as all stormwater will be managed on site.

4.6.2 Effluent

There will be no effluent produced by the proposed development.

4.6.3 Water bodies

There will not be any significant off-site emissions as a result of the development. Accordingly the development will comply with the requirements of the Australian and New Zealand Guidelines for Fresh and Marine Water Quality. The primary objective of the guidelines is:

"To provide an authoritative guide for setting water quality objectives required to sustain current, or likely future, environmental values [uses] for natural and semi-natural water resources in Australia and New Zealand".

The proposal will not significantly adversely impact on any natural waterways or bodies of water.

4.7 Flora and fauna

The study area (i.e. within 500 m of the proposed infrastructure) was inspected on 9 January 2007 and 16 January 2007 and a habitat evaluation was undertaken to assess the ecological value of the study area. Previous ecological investigations and database searches, including Department of Environment and Conservation (DEC) Atlas for Wildlife, Bionet and Department of Environment and Heritage (DEH) protected matters search, were used to gather background information on the study area.

HLA-Envirosciences (2003) provided an Ecological Considerations report, as part of the SEE for the proposed coal unloader sidings at Ravensworth that contained the results of flora and fauna surveys and assessment of significance of threatened species and ecological communities according to the EP&A Act and the *Threatened Species Conservation Act, 1995*. The findings of HLA-Envirosciences (2003) have been used as a basis for much of the ecological assessment of the current study area, as the HLA-Envirosciences (2003) study area included the area subject to the proposed ventilation shaft and electricity supply.

The study area is characterised by introduced pastoral grasses, annual weeds, no shrub layer and very occasional emergent canopy species. Two emergent trees occur in the study area, including one Narrow-leaved Ironbark (*Eucalyptus crebra*) and one Bull Oak (*Allocasuarina luemannii*). Introduced ground covers dominate the study area, with Galenia (*Galenia pubescens*), Red Caustic Weed (*Chamaesyce prostrate*), Flaxleaf Plantain (*Plantago lanceolata*), Fireweed (*Senecio madagascariensis*), Paddy's Lucerne (*Sida rhombifolia*) and Saffron Thistle (*Carthamus lanatus*) present on site. The New England Highway road side verge is dominated by Rhodes Grass (*Chloris* ~~arvensis~~). The study area has previously been used for grazing and is dominated by pasture species,

including Paspalum (*Paspalum dilatatum*), Perennial Rygrass (*Lolium perenne*), Soft Brome (*Bromus catharticus*), Barrel Medic (*Medicago truncatula*) and Clover (*Trifolium* spp). The native grasses that persist in the study area and broader locality include Couch (*Cyododon dactylon*), Slender Rats Tails (*Sporobolus creber*) and *Austraostipa nodosa*. The study area appears to have been subject to very limited recent rainfall, as most of the ground covers were dry and brittle. No threatened flora species were identified during the site visit. There is no vegetation of national, state or regional significance within or adjacent to the study area, no native grasses will be cleared and the vegetation is not regarded as 'native vegetation' under the *Native Vegetation Act 2003* (HLA-Envirosciences, 2003).

The potential for fauna use of the study area is limited due to the degraded nature of the site and immediate locality and therefore, there are limited opportunities for fauna to use habitat in the study area. The emergent Narrow-leaved Ironbark on the site contains a moderately large hollow and offers some limited nesting/roosting/denning resource for hollow dependant fauna capable of accessing the isolated tree (i.e. hollow dependant birds and bats). No threatened species were observed during the site inspections or in the HLA-Envirosciences (2003) survey.

Given the disturbed nature of the site the proposed infrastructure will have no significant negative impact on the existing native flora and fauna.

4.7.1 Threatened Species Conservation Act, 1995

A search of DEC Atlas for Wildlife and Bionet databases identified two threatened flora species and 24 threatened fauna species that have been recorded or are considered likely to occur, based on suitable habitats, within 10 km of the study area. Each of the 26 threatened flora and fauna species were assessed for the likelihood to occur in the study area, based on available suitable habitat and proximate records. The following threatened species are considered likely to occur in the study area:

- Eastern Bent-wing Bat (*Miniopterus schreibersii oceanensis*)
- East Coast Freetail Bat (*Mormopterus norfolkensis*)
- Grey-headed Flying-Fox (*Pteropus poliocephalus*)

All of the above species have been adequately assessed in HLA-Envirosciences (2003) and no further assessment of significance under the TSC Act is required.

Given the disturbed nature of the site the proposed infrastructure will not have a significant negative impact on existing native flora and fauna

4.7.2 Environmental Protection and Biodiversity Conservation Act, 1999

A database search using the DEH Protected Matters search tool identified several Matters of National Environmental Significance (NES) that may occur within 10 km of the study area, as below:

- Twelve threatened species – including endangered and vulnerable species listed under the EPBC Act. There are three bird species, two frog species, four mammal species and three plant species that may occur or have habitat within the area
- Twenty migratory species – including six terrestrial migratory species and fourteen migratory wetland species; all of the birds that may occur within, have habitat within, or breed within the area
- One threatened ecological community - White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland
- Twelve listed marine species – including all listed bird species that may overfly the area, or may occur within, have habitat within, or breed within the area
- One internationally important wetland (Ramsar) – The Hunter Estuary Wetlands occur within the same catchment as the study area
- One regional forest agreement – The Lower North East NSW Regional Forest Agreement is listed as being applicable to the study area; however, the RFA is unlikely to be relevant in this case.

- Two places of Regional and National Environmental significance

Conclusion to Environmental Protection and Biodiversity Conservation Act consideration

An assessment of likelihood of occurrence identified one vulnerable species (ie Grey-headed Flying-fox) and one migratory species (ie White-throated Needletail) as likely to occur at the site.

The study area is not considered to offer significant ecological value for the Grey-headed Flying-fox or White-throated Needletail, as no breeding, nesting or roost habitat occurs and only limited forage is available (i.e. seasonal inflorescence of one emergent Narrow-leaved Ironbark). Given the degraded nature of the habitat in the study area, the proposal will not have a significant impact on any Matter of NES species considered likely to occur in the study area (refer to Appendix E for assessment per the EPBC guidelines).

4.7.3 SEPP 44 - Koala Habitat Protection

Database searches revealed the nearest recent record (that is, within the last 25 years) occurs near Goorangoola, approximately six kilometres to the southeast of the study area. No Koala feed tree species listed on Schedule 2 of SEPP 44 – Koala Habitat Protection were recorded in the study area. The mostly cleared landscape of the study area and immediate locality suggest that the area is unlikely to support Koala. Hence, an assessment of potential Koala habitat using plots to record species within the upper and lower strata of the tree component was not required. No scats or scratches indicating koala activity were recorded during the site inspections undertaken in the study area.

The study area does not constitute either Potential or Core Koala Habitat and as such the proposal will not have any negative impact on Koala habitat.

4.8 Waste management

There will be no significant volume of waste produced as people are not required to be at the site except for maintenance of the infrastructure. All waste will be managed in accordance with the requirements of the local authority. All material extracted as a result of surface construction works will be removed off-site and disposed of at an approved emplacement area currently utilised by the mine. As discussed previously, all debris from the shaft construction will be deposited to the seam below, for final stowage underground or conveying to the surface at the main mine entry for deposition with the normal reject of the coal. A Waste Management Plan will be prepared by the contractor for the construction of the infrastructure as part of the Construction Environmental Management Plan to ensure that all waste is considered and managed appropriately.

The proposal will not have a significant negative impact due to waste as any waste that is produced will be removed to an approved waste disposal location.

4.9 Noise and vibration

An Environmental Noise Impact Assessment was prepared by Bridges Acoustics to assess noise levels from the site (Appendix F). Appendix A1 of the noise assessment indicates the location of the nearest private residence in Hebden Road, where the noise logger was positioned to gain background noise readings. The noise assessment found that appropriate noise criteria can be achieved at the closest residences to the site with minimal noise control measures being adopted.

Background readings are taken from a data logger attached to a tree in front of 246 Hebden Road from Friday 2 to Monday 12 February as shown in Table 4.1.

Table 4.1: Background readings

Weekly Median	Background LA90, 15min			Ambient LAeq, 15min		
	Day	Evening	Night	Day	Evening	Night
	33.9	39.2	32.2	62.0	61.8	57.0

No industrial noise was audible at nearby residences and no potentially audible industrial developments exist in the area apart from Daracon's truck depot. While it is possible that truck movements within Daracon's depot could be audible at nearby residences at times, it is clear that such noise would be below the background noise level when considering an average level of 15 minute periods.

Criteria for operational noise have been developed using procedures in the Industrial Noise Policy (INP). The INP recommends two sets of noise criteria, being intrusive criteria to limit the relative audibility of the noise and amenity criteria to limit industrial noise to a level consistent with the receiver zone and land use. Existing industrial noise produced in the area would be at least 6dB(A) below the INP amenity limits in each time period so would not affect amenity criteria applying to this assessment.

Intrusive criteria are set 5dB(A) above the background noise level in each 15 minute period. The amenity criteria adopted in the noise assessment are based on the conservative 'rural' receiver category; although, a higher category such as 'suburban' or 'urban' may be appropriate considering the dominant nature of traffic noise in the area. Table 4.2 shows intrusive and amenity criteria, with the most stringent criterion highlighted for each time period.

Table 4.2: Adopted Intrusive and Amenity Noise Criteria, LAeq, 15min

Criteria	Background LA90, 15min			Criterion LAeq, 15min		
	Day	Evening	Night	Day	Evening	Night
Intrusive criteria	34	39	32	39	44	37
Amenity criteria	-	-	-	50	45	40

Table 4.2 shows the intrusive criteria are lower in all time periods and are therefore the limiting criteria for the noise assessment. Noise criteria developed to INP guidelines indicate the 'target' noise levels from the proposed industrial development and represent the levels at which noise impacts may, but will not necessarily, occur. Compliance with INP not targets is not mandatory.

Table 4.3 shows predicted noise levels compared to relevant criteria with vertical discharge vent fans and insulated discharge ducts on the compressors.

Table 4.3: Predicted Received Noise Levels, with noise control, LAeq, 15min

Noise Source	Neutral weather conditions		Noise enhancing conditions	
	Day/evening	Night	Day/evening	Night
Two vent fans	27	28	32	30
Four compressors	31	32	36	34
Vehicle movements	24	25	29	27
Total received level	33	34	38	36
Noise criteria	39	37	39	37

A construction period of approximately six months is expected to be required to complete the ventilation shaft and install the first fan and associated electrical equipment proposed for Stage 1. A later Stage 2 construction period of less than 6 months would be required to install the second fan, compressors, and associated equipment. Noise criteria for the construction period are sourced from Section 171 of the EPA's Environmental Noise Control Manual (ENCM), partly reproduced below:

Level Restrictions

(i) Construction period of 4 weeks and under:

The L10 level measured over a period of not less than 15 minutes when the construction site is in operation must not exceed the background level by more than 20 dB(A).

(ii) Construction period greater than 4 weeks and not exceeding 26 weeks:

The L10 level measured over a period of not less than 15 minutes when the construction site is in operation must not exceed the background level by more than 10 dB(A).

Time Restrictions

Monday to Friday, 7am to 6pm

Saturday, 7am to 1pm if inaudible on residential premises, otherwise 8am to 1pm.

No construction work to take place on Sundays or Public Holidays.

Relatively minor exceedances of the conservative construction noise criterion may occur during busy periods that coincide with noise enhancing weather conditions such as a light south westerly breeze. Such a breeze typically occurs less than 10% of the time, based on previous analysis of Hunter Valley weather conditions, so construction noise exceedances would occur rarely. Noise mitigation measures have been recommended to minimise the chance of construction noise levels over the criterion (Appendix F).

No sleep disturbance or road traffic noise issues are expected to occur due to the nature of the site and its location adjacent to the New England Highway. Residents currently receive relatively high traffic noise levels during the day and night and such noise would effectively mask most construction and operational noise sources on the site. Based on the results of the noise assessment, the proposed borehole infrastructure site should produce a satisfactory level of environmental noise and is recommended for acceptance. The main ventilation fans should be fitted with vertical discharge ducts and the compressors should be fitted with insulated discharge ducts as offered by the currently preferred supplier.

The proposed infrastructure will have no significant negative impact on the surrounding area due to noise.

4.10 Air quality and odour

The activity will be in keeping with the land use and zoning of the area as the locality is dominated by industrial activities such as mining and power production. The purpose of the ventilation shaft is to provide external air to the underground mining operations. Any air that is exhausted will be generally clear of dust and other matter due to the wet nature of the coal that is being extracted. Any dust emissions during construction will be mitigated by erosion and sediment control measures and water tanks, where required. As such dust will be appropriately controlled and will have no significant negative impact.

There will be no offensive odours discharged off-site as a result of the operation of the fans. The evasee will be directed upwards and air exchanged will be a mixture of subterranean air and air vented from outside. As the air is expelled through the fan operation it will be adequately mixed with atmospheric air such that there is minimal potential for any offensive odour. Any potential odour discharge will be adequately controlled by the operation of the fans and mixing with the atmosphere.

4.11 Socio-economic impact

The development will result in a positive socio-economic impact through ongoing operation of the mine and subsequent ongoing employment for mining staff. Economic benefits will accrue in the form of benefits to employees, goods and services purchased in local towns and the expenditure in the wider community. In 2005 the colliery employed 95 people, 45 contractors and 20 additional staff. The maximum number of people on site on any day is approximately 130 people.

4.12 Greenhouse emissions

Approval for the mine and longwall was given in 1996. An energy statement in Section 4.16 of the 1996 EIS states that in producing product coal, energy will be consumed, mainly in the form of electricity to power conveyors, washery and other fixed equipment and petroleum product to power vehicles and other mobile equipment. Furthermore, the EIS states that the mine will be a net producer of energy. In 1996 the total annual electricity use was estimated at 27,000MWh, equivalent to 8.12×10^{10} MJ.

The proposed infrastructure will not significantly impact on greenhouse gases. The fans and compressors will be powered by an electricity supply that is a small component of the overall energy usage of the mine. One of the fans at the subject site will merely be the relocated No.2 Shaft fan that is currently ventilating the mine and as such will require no additional power usage. As stated previously, the additional ventilation shaft was mentioned in the 1996 EIS and is implicit in the ongoing operation of the mine.

4.13 Rehabilitation

Site rehabilitation will involve filling in the shaft, compacting the material and subsequent growth of vegetation to facilitate grazing or similar land uses. The site will be sculpted to reflect natural landscape in the locality and the final morphology of the site will allow for adequate flow of surface water, appropriate access for future land uses and adequate levels of stability and soil cohesiveness to minimise the potential for erosion. The final slope of the site will be a maximum of 10°.

4.14 Ongoing environmental management

The construction and operation of the proposed shaft and ventilation fans will be incorporated into the mine's environmental management and rehabilitation plans. An erosion and sediment control plan will determine controls to minimise the potential for erosion and subsequent sedimentation during construction. The design and construction contractor would be required to submit a Construction Environmental Management Plan that adequately considers environmental impacts of the construction activities. Furthermore, noise for the construction period will comply with the EPA's Environmental Noise Control Manual criteria.

Operation of the shaft and ventilation fans will be managed through inclusion of the site in the mines Annual Environmental Management Report (AEMR). The AEMR covers current operations at the Colliery, waste management, water management, hazard materials management, environmental management and performance based on key issues, community relations and rehabilitation. Each of the relevant issues addressed in the AEMR will be considered at the subject site.

Newpac No.1 Colliery is also subject to annual environmental audits by the Department of Mineral Resources that would be expanded to cover the subject site.

4.15 Cumulative impact

The issues of noise, dust and visual impact are those that are most likely to have a cumulative impact. In terms of noise the INP considers issues such as existing noise levels and background creep. The noise assessment has concluded that the noise levels from the proposed infrastructure can be managed in terms of the location and existing noise levels in the area. Dust emissions will be managed through active measures such as water carts and also through minimising disturbance of soil where possible. The proposed infrastructure will be located in an area where the visual character has already been modified from agricultural to agricultural and industrial. The development, in tandem with the proposed landscaping, is in keeping with the existing visual character.

Due to appropriate mitigation measures, the proposed infrastructure will not result in an adverse cumulative impact on the locality.

5. Summary and conclusion

It is recommended that the proposal be approved as it fully complies with the *Environmental Planning and Assessment Act, 1979* and Singleton LEP 1996.

Where any potential adverse impact has been identified appropriate mitigation measures will be put in place. The visual impact assessment has confirmed that the proposed development, including the provision of screen planting, does not pose a significant visual impact on either the local visual environment or the view corridor that exists between Singleton and Muswellbrook.

The traffic assessment found that the existing road network is capable of coping with the small level of additional traffic generated during construction and operation of the infrastructure. There will be no negative impact on items of European heritage and the application is currently being assessed for a Section 90 application under the *National Parks and Wildlife Act, 1974*, to destroy one Indigenous open artefact scatter site and provide a permit for the entire site.

Noise emission from the proposed infrastructure was predicted not to be offensive noise provided the evasee is pointed up and as such the evasee will be re-positioned to point up. In terms of flora and fauna the site is heavily disturbed and the proposal was found to have no significant negative impact. Furthermore, during construction appropriate erosion and sediment control measures will be in place.

In Section 4.4.4 of the original EIS it was highlighted that as the mine develops underground towards the south an additional ventilation shaft may be required. Following an assessment of the proposed works it is recommended that the modification be approved.

6. References

Australian and New Zealand Environment and Conservation Council and Agriculture and Resource Management Council of Australia and New Zealand, 2000, *Australian and New Zealand Guidelines for Fresh and Marine Water Quality*, ANZECC and ARMCANZ.

www.deh.gov.au

Department of Environment and Conservation, accessed 2007, Atlas for Wildlife and Bionet databases
www.deh.gov.au

Eby, P., 1998, 'An analysis of the diet specialisation in *frugivorous Pteropus poliocephalus* in Australian subtropical rainforest', *Austral Ecology*, 23:443-456

HLA- Envirosciences, 2003, *Statement of Environmental Effects – Ravensworth Rail Unloader Modification, New England Highway, Ravensworth, NSW*, HLA- Envirosciences, NSW.

HLA-Envirosciences, 1996, *Environmental Impact Statement for Nardell Underground Coal Mine*, HLA-Envirosciences, NSW.

Umwelt, 2000, *Statement of Environmental Effects: Proposed Modification to Rejects Emplacement and Water Management Systems*, Umwelt, NSW.

Appendix A

Legislation

Appendix A

Protection of the Environment Operations Act, 1997

Management of environmental impacts in relation to air, noise and water quality falls under the provisions of the *Protection of the Environment Operations Act 1997*. According to Schedule 1 of the Act a licence is required to mine, process or handle coal in:

- 1) Underground mines, or
- 2) Open cut mines that:
 - a) Have an intended production or processing capacity of more than 500 tonnes per day of coal or carbonaceous material, or
 - b) Have disturbed, are disturbing or will disturb a total surface area of more than 4 hectares of land by:
 - i) Clearing or excavating, or
 - ii) Constructing dams, ponds, drains, roads, railways or conveyors, or
 - iii) Storing or depositing overburden, coal or carbonaceous material or tailings

The proposed works would be associated with a scheduled activity under the Act. However, the proposed works would be covered under an existing environment protection licence.

Threatened Species Conservation Act, 1995

Protection of listed threatened species and ecological communities in New South Wales falls under the provisions of the *Threatened Species Conservation Act 1995* (TSC Act). Consideration of potential impacts on listed threatened species and/or ecological communities is addressed in the first instance through the seven matters listed under s5A of the Environmental Planning and Assessment Act 1979 (EP&A Act) (the '7-Part Test'). Where a significant impact is likely, the relevant provisions of the TSC Act must be addressed. Given the disturbed nature of the site, it is unlikely that further work would be required in relation to the TSC Act.

Water Management Act, 2000

The *Water Management Act 2000* was gazetted in December 2000 and repealed the *Water Act 1912* and certain provisions of the *Rivers and Foreshores Improvement Act 1948*. Part 3A of *The Rivers and Foreshores Improvement Act 1948* remains in effect and requires that a permit from the Department of Planning be obtained for development within 40m of a river or stream bank. Due to the location of the development site no further consideration of the Act is required.

Rivers and Foreshores Improvement Act, 1948

The *Rivers and Foreshores Improvement Act 1948* provides guidelines for the carrying out of works in and the improvement of rivers and foreshores, and the prevention of erosion of lands by tidal and non-tidal waters. Part 3A of the Act requires a permit to be obtained from the Department of Planning for any development within 40m of a river or stream bank. However, according to s22H of the Act there is no requirement for a Part 3A permit under the Act in respect of the exercise of any rights lawfully exercisable under any lease, licence, permit or other right in force under any Act relating to mining. Furthermore, there will be no earthworks within 40m of any watercourse. Notwithstanding the foregoing, the DoP must consider the potential impact of any proposed creek crossing. There will not be any work within 40m of a watercourse associated with the proposed development.

Native Vegetation Act, 2003

Clearing of native vegetation in New South Wales is controlled via the provisions of the *Native Vegetation Act 2003*. Under Section 12 of the Act, native vegetation must not be cleared without development consent or a property vegetation plan. However, Section 25 of the Act provides for

legislative exclusions which includes any clearing authorised under the *Mining Act 1992*. Given the disturbed nature of the site, it is unlikely that further work would be required in relation to the Act.

National Parks and Wildlife Act, 1974

Part 6 of the National Parks and Wildlife Act 1974 relates to Relics and Aboriginal Places. Part 8A of the Act relates to Threatened Species, Populations and Ecological Communities and Their Habitats and Critical Habitat. A current application under Section 90 is being assessed to destroy one Indigenous open artefact scatter site and provide a permit for the entire site.

Heritage Act, 1977

In NSW, items defined as a *place, building, work, relic, movable object, or precinct* of heritage significance are protected under the *Heritage Act 1977*. Under s139 of the Act, a person must not disturb or excavate any area if there is a known or suspected likelihood of the excavation resulting in a relic being discovered, exposed, moved, damaged or destroyed. In cases where a relic is discovered, an excavation permit issued by the Heritage Council is required to carry out the excavation.

Contaminated Land Management Act 1997

The general object of the Act is to establish a process for investigating and (where appropriate) remediating land where contamination presents a significant risk of harm to human health or some other aspect of the environment. Given the disturbed nature of the site and its proposed land use, it is unlikely that further work would be required in relation to the Act. There is no requirement for storage of material that has the potential to contaminate the site; furthermore, ongoing maintenance of the fans will occur to minimise the potential for any discharge of material.

Rural Fires Act, 1997

The *Rural Fires Act 1997* requires activities defined as a “special fire protection purpose” to be referred to the Commissioner. According to s100B of the Act “...(1) The Commissioner may issue a bush fire safety authority for:

- A subdivision of bush fire prone land that could lawfully be used for residential or rural residential purposes, or
- Development of bush fire prone land for a special fire protection purpose...”

The proposal is not for subdivision or a special fire protection purpose and as such does not require referral under s100B of the Act.

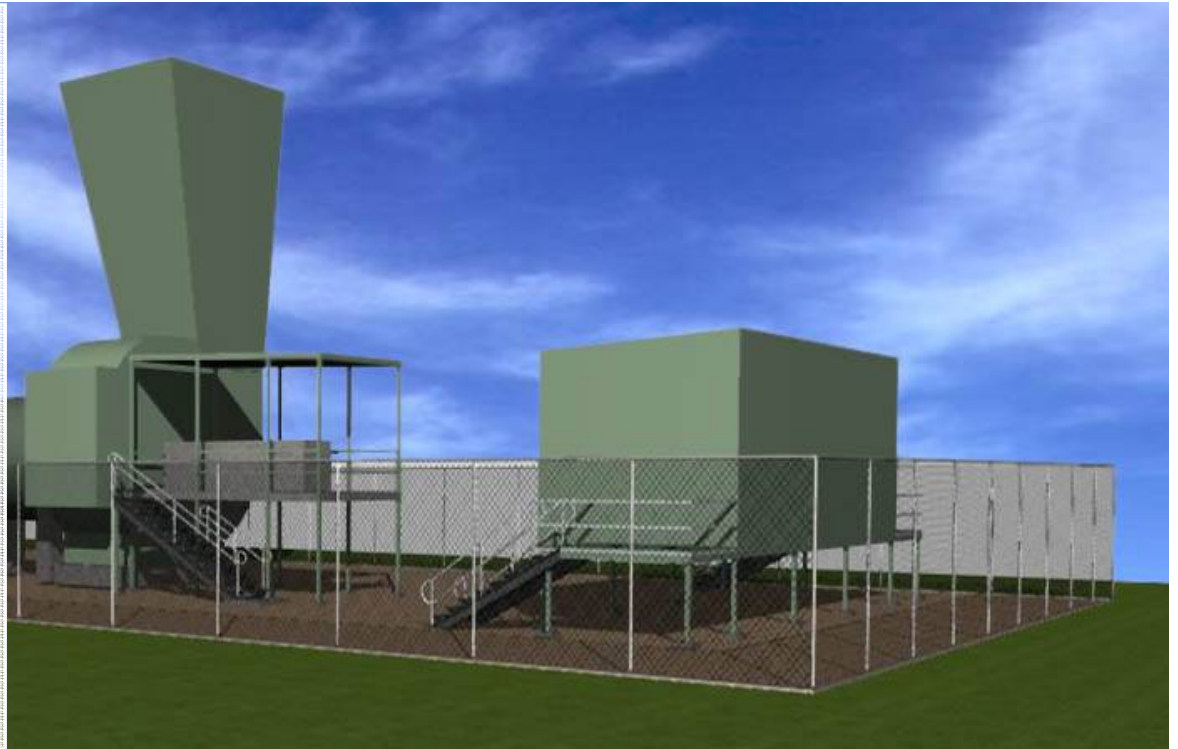
Appendix B

Visual Impact

VISUAL IMPACT ASSESSEMENT

VERGE LANDSCAPE ARCHITECTS

2007



A VISUAL IMPACT ASSESSMENT TO DETERMINE THE LIKELY IMPACTS FOR VENTILATOR SHAFTS, LOCATED AT RAVENSWORTH, NEW SOUTH WALES, PROPOSED BY RESOURCE PACIFIC LIMITED.



Prepared by:
VERGE LANDSCAPE ARCHITECTS
+61 2 4929 4926
www.vergela.com.au

VISUAL IMPACT ASSESSMENT

PROPOSED VENTILATOR SHAFTS NEWPAC MINE, RAVENSWORTH

1.0 INTRODUCTION

Resource Pacific Limited has engaged Verge Landscape Architects to provide a visual impact assessment (VIA) for proposed above ground ventilator shafts and associated structures linked with the expansion of its Newpac Mine located at Ravensworth, New South Wales. Field work for the assessment was conducted in April 2007.

1.1 Objectives

The objectives of this report are as follows:

- to identify and describe the existing visual environment and to evaluate its current qualities;
- to portray the proposal in its contextual setting from selected viewpoints; and,
- to determine the likely impacts this development will have on the scenic quality of the area; and,
- to make recommendations on how best to minimise any such impacts

1.2 Terminology

The following terminology shall be used for this report:

- The **subject site** (also referred to as “the site”) is defined as the land directly affected by the proposal within defined boundaries.
- The **study area** consists of the subject site plus the immediate surrounding land potentially affected by the proposal during its construction and operation phase;
- The **study locality** is the area of land within the regional visual catchments whereby the proposal can be readily recognised. Generally this is confined to a four-kilometre radius beyond which individual structures of a certain size, such as the proposed ventilation shafts, are difficult to discern especially amongst other development where contrast is low. The study locality is restricted by topography and vegetation. Further, visual sensitivity generally declines significantly beyond this distance due to the broad viewing range obtained from distant vantage points.

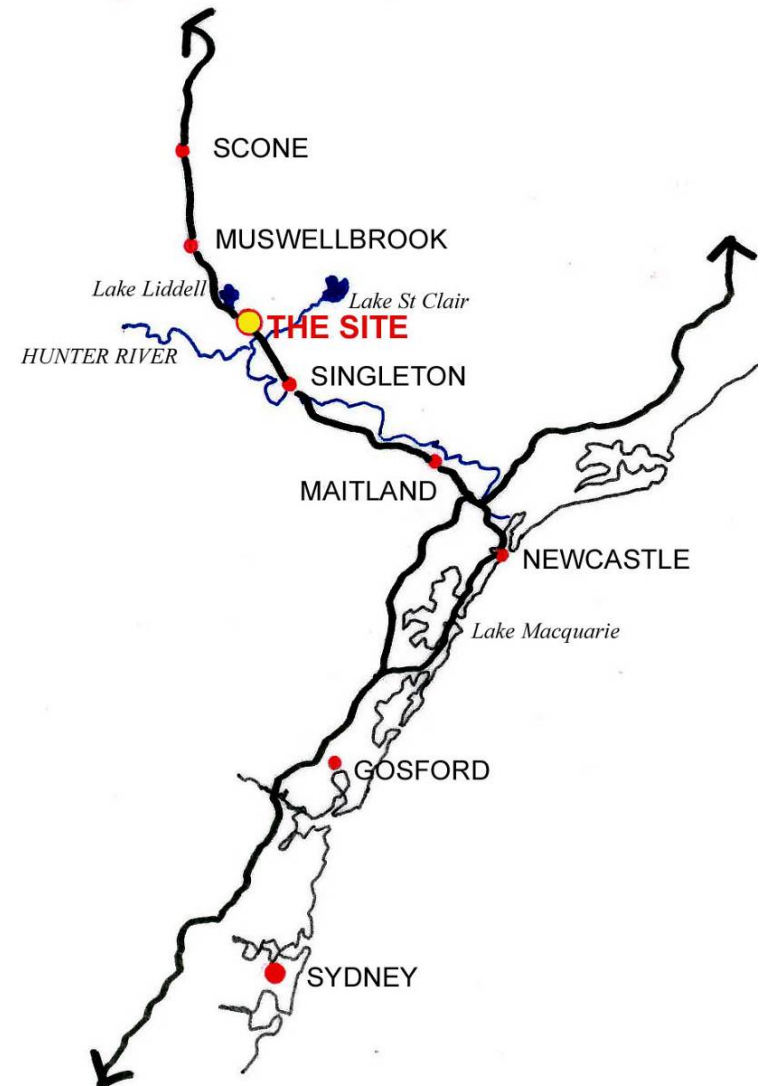


FIGURE 1.1: LOCATION PLAN

For this particular assessment, consideration has been given to reviewing the landscape character between Singleton and Muswellbrook. This has been done as the majority of viewers likely to be affected by the works will be those travelling along the New England Highway. A second group, albeit smaller, will be those people using the Main North Railway: a route that closely follows the New England Highway.

1.3 Visual Assessment Principles

An assessment of the visual impact of a proposed development involves consideration of the proposal in relation to three issues:

- Visual or scenic quality,
- Visual sensitivity,
- Visual effect.

Visual or Scenic Quality

Visual quality of an area is determined by assessing how viewers may respond to designated scenery. Scenes of high visual quality are those that are valued by a community for the enjoyment and improved amenity that they can create. Conversely, scenes of low visual quality are of little scenic value to the community with a preference that they be changed and improved, often through the introduction of landscape treatments (e.g. screen planting).

As visual quality relates to aesthetics, its assessment is largely subjective. There is evidence to suggest that certain landscapes are continually preferred over others, with preferences related to the presence or absence of certain elements. In this case, analysis will be made on the basis of building density and building heights due to a rezoning application.

The rating of visual quality of this study has been based on the following generally accepted conclusions arising from scientific research (DOP, 1988).

- Visual quality increases as relative relief and topographic ruggedness increases.
- Visual quality increases as vegetation pattern variations increase.
- Visual quality increases due to the presence of natural and/or agricultural landscapes.
- Visual quality increases owing to the presence of water forms (without becoming common) and related to water quality and associated activity.
- Visual quality increases with increases in land use compatibility.

This last point is particularly relevant to the study as mining and power generation has become a significant land use often being imposed on former, visually appealing rural landscapes. Generally, these activities happen on such a dramatic scale, especially when consideration is also given to the associated infrastructure that accompanies them, that it radically affects natural and rural landscapes often at the expense of scenic quality. These impacts are relatively



short-lived (20-30 years) until mitigation measures can take effect, however, the early stages can still cause a major impact.

Appendix A contains a visual quality preference table that has a more detailed breakdown of the above elements and their impact on visual quality.

Visual Sensitivity

Another aspect affecting visual assessments is visual sensitivity. This is the estimate of the significance that a change will have on a landscape and to those viewing it. For example, a significant change that is not frequently seen may result in a low visual sensitivity although its impact on a landscape may be high.

Visual sensitivity is assessed using a number of variables such as the number of people affected, viewer location including distance from the source, viewer position (i.e. inferior, neutral, superior), the surrounding land use and degree of change. Generally the following principles apply:

- Visual sensitivity decreases as the viewer distance increases.
- Visual sensitivity decreases as the viewing time decreases.
- Visual sensitivity is related to viewer activity (e.g. a person viewing an affected site while engaged in recreational activities will be more strongly affected by change than someone passing a scene in a car travelling to a desired destination).

As mentioned previously, the main groups to be affected by the proposal will be users of the New England Highway and Main Northern Railway, namely people coming in close proximity to the structures, however, with short viewing times and travellers heading towards a destination where scenery is an aspect of the journey but not often its purpose.

Visual Effect

Visual effect is the interaction between a proposal and the existing visual environment. It is often expressed as the level of visual contrast of a proposal against its setting or background in which it is viewed. This is a particularly important consideration when a development, is taller or of a strong contrast to the surrounding structures. Visual effect is rated as follows:

- **Low Visual** effect occurs when a proposal blends in with its existing viewed landscape due to a high level of integration of one or several of the following: form, shape, pattern, line, texture or colour. It can also result from the use of effective screening often using a combination of landform and landscaping.
- **Moderate Visual** effect results where a proposal noticeably contrasts with its viewed landscape, however, there exists some degree of integration (e.g. good siting principles employed, retention of significant existing vegetation, provision of screen landscaping, careful colour selection and/or appropriately scaled development.)



- **High Visual** effect results when a proposal presents itself with high visual contrast to its viewed landscape with little or no integration and/or screening.

It is anticipated that that the proposal has the potential for a high visual effect based on the above criteria without any attempts to mitigate adverse impacts.

Visual Impact

Visual Impact is the combination of the above elements and refers how readily new development may be seen within a landscape setting.

It should be noted that a high visual impact does not necessarily equate with a reduction in scenic quality, and the degree of visual impact has to be understood and assessed in relation to both the existing scenic quality of an area and the design merits of the proposal itself. For example, a well-designed proposal with a high visual impact may help to improve the visual environment of an area with low scenic quality. This being said, it is generally the rule that industrial/infrastructure development within a rural landscape is commonly perceived as being intrusive and therefore detrimental to scenic quality and requiring amelioration.

1.4 Assessment Methodology

The methodology used in this report for assessing visual impact involves systematically evaluating the existing visual environment pertaining to the site and assessing the proposed development according to the principles of visual assessment outlined above.

The assessment was undertaken in four stages as noted below:

- I. A written description (with accompanying images) of the existing visual environment to provide an appreciation of the development's local context, including vegetation, topography and surrounding development.
- II. A description of the proposal in relation to its height, scale, materials, roofline and landscape treatment.
- III. A visual appraisal
- IV. An assessment of visual impacts including recommendations for amelioration and improvement.

The purpose of the above methodology is to reduce the amount of subjectivity entering into the impact assessment and to provide sufficient data to allow for third party verification of results.

1.5 Authorship

This report has been prepared by Phillip Williams who is a landscape architect and director with Verge Landscape Architects [VLA] with assistance from Grit Kaeding [Landscape Architect, VLA].



2.0 EXISTING VISUAL ENVIRONMENT

The following sections describe the appearance of the site, the study locality and the view corridor associated with the New England Highway between the urban centres of Singleton and Muswellbrook as a means of defining the existing visual environment into which the proposed development will be placed. The New England Highway view corridor running for a length of approximately 45kms and taking about 35 minutes to travel has been included as most people viewing the site would be travelling along this route and so they represent the major viewer group. The impact of the proposal would therefore not only relate to the site locality but also the travel route between the two towns.

2.1 SITE LOCATION & DESCRIPTION

The site is located between the New England Highway and the Main Northern Railway situated 1200m north of the village of Ravensworth within the Singleton Local Government Area. The nearest major towns are Singleton 17kms south and Muswellbrook 28kms north along the New England Highway.

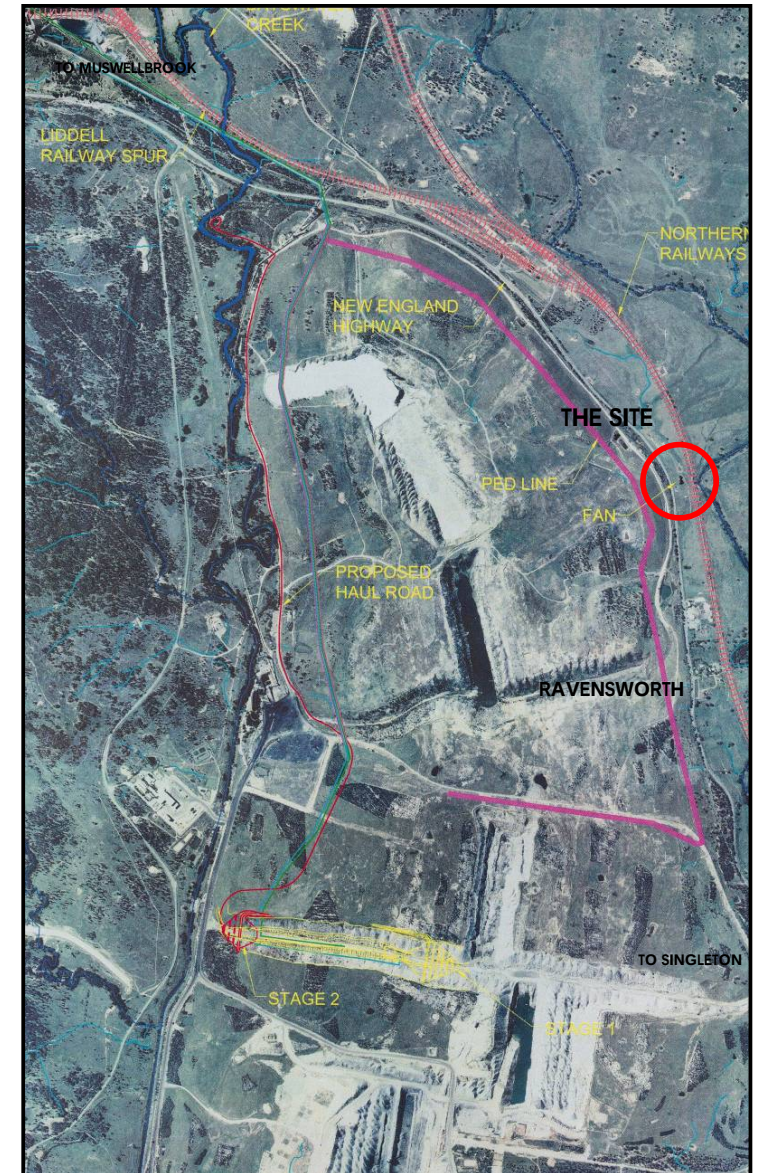
The site has been extensively cleared and now consists of unimproved pastures. A handful of mature but stunted trees occur randomly about the site. An abandoned galvanised steel shed is located just south of the proposed location of the ventilator shafts. Other elements occurring on site include: an earth dam, fencing and power poles.

2.2 DESCRIPTION OF STUDY LOCALITY (Regional Context)

The study locality is characterised by a range of landscapes from steep sloping peaks in the distance and which are common to the Hunter River and its tributaries, to slightly undulating low hills and hills through to the flats of the floodplain. Some of the steeper peaks are densely vegetated; however, many of the undulating hills have been partially or fully cleared for grazing. Some of the floodplain and lower flat areas have been used for irrigated croplands and fodder production although generally these areas have also been for grazing.

In recent times, specifically over the past two decades, mining operations have had a strong, albeit localised, impact. It is possible to see the evidence of mining from the site as either the upper portions or spoil stockpiles of open cut mines in the middle to long distance or rehabilitated landscapes such as the mounding occurring immediately opposite the site, west of the New England Highway.

Generally, past and active mining operations pose a negative impact on the local visual environment although the impact has been contained such that the traditional rural character still predominates within the local area.



Rural landscapes with a diversity of vegetation types and topographic variation usually fair well in terms of scenic quality as they are perceived as naturalistic landscapes. As human intervention becomes more obvious, such as housing/residential development, infrastructure (roads, powerlines, railways) and mining/industry, the scenic quality decreases.

Overall, the scenic quality of the study locality is **moderate** which is either equal to or better than adjoining areas especially where mining and power generation activities become more noticeable. It is anticipated that the scenic quality of the study locality may decline further as more development occurs unless appropriate amelioration is provided with each proposal to ensure offset the threat of gradual visual degradation form occurring.

(It should be noted that parts of the Upper Hunter Valley are especially picturesque, especially north of Muswellbrook and have been classified by the National Trust of Australia (NSW) for their rural scenery. The closest classified landscape to the site is the Muswellbrook-Jerry's Plain Conservation Area which is located approximately 16kms west and as such is not affected by the proposed development of the site.)



THE TWO IMAGES ARE TYPICAL VIEWS OF THE RURAL LANDSCAPE OCCURRING WITHIN THE STUDY LOCALITY WHERE MINING ACTIVITY DOES NOT DOMINATE VIEWS.



2.3 NEW ENGLAND HIGHWAY VIEW CORRIDOR

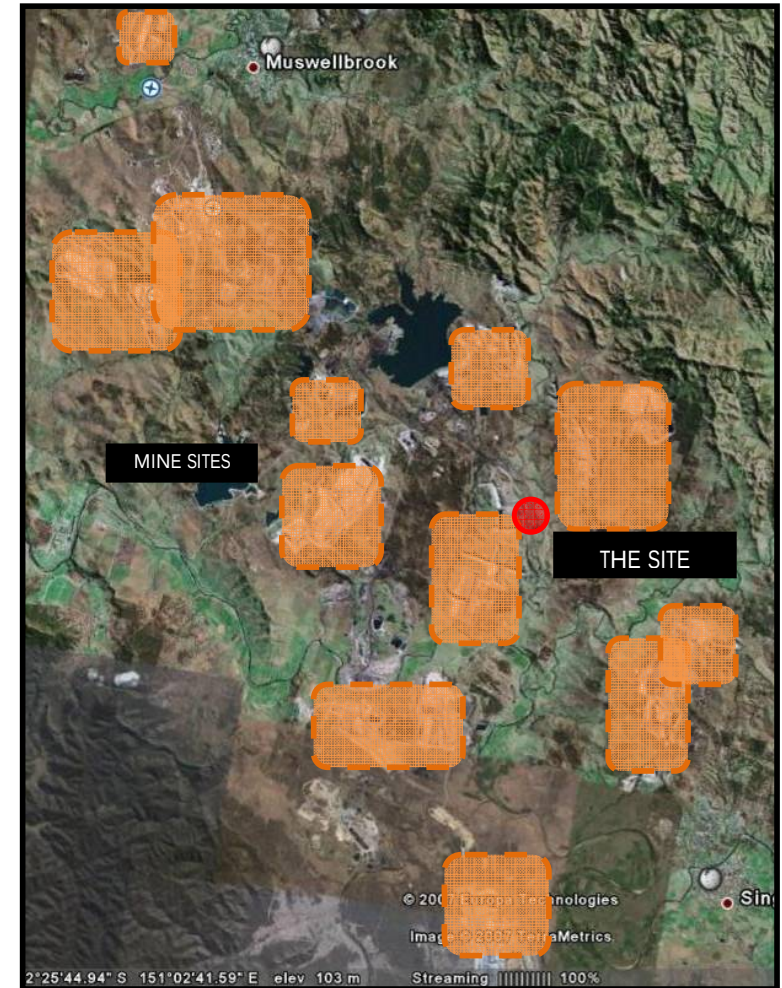
Description

On average, approximately 11,500 vehicles/day¹ pass the site giving it high visual accessibility and the potential for a large number of people to be affected by the proposal. In addition, the Main Northern Railway passes to the east of the site further adding to the site's exposure and consequent prominence. Travellers passing the site do not see it in isolation but view it as part of a continuous journey. The impact of any proposed development, therefore, needs to be assessed as part of this travel experience because a development or land use that differs greatly from other forms will stand out and therefore pose a greater impact on the visual environment.

The image on the right shows the extent of mining that occurs within the area between Singleton and Muswellbrook. The New England Highway tends to run through the centre of the mine sites such that they occur on different sides of the road at various times within a trip and so making their impacts seem more widespread.

The following three pages contain representative images of scenes visible on the trip from Singleton to Muswellbrook. Their purpose is to describe the experience and to place the site in a context that has meaning to the majority of people likely to be affected by the proposed development. The below are descriptions that relate to the images:

01. View of rural countryside located slightly north of Singleton characterised by pastures and scattered clumps of native trees with mining operations visible on the horizon.
02. View location is similar to Image 01, however, looking east with mining operations occurring in middle distance. The scale of the mine and its impact are lessened by the presence of trees occurring within the foreground.
03. View looking north-east near to McInerny Road turn-off. This view would be typical of views prior to mining operations occurring within the area. This scene has moderately high scenic quality mainly due to its strong rural character, varying land uses and contrasting vegetation patterns.
04. View looking west towards open cut mine located on the road between Singleton and Ravensworth. Although creating a large scar in the landscape and the loss of vegetation along the intermediate ridgeline, the distance of the mine away from the road and the presence of trees and pastures in the foreground helps to mitigate its potential negative impact.



¹ "Traffic Volume Data for Hunter and Northern Regions 2004", Roads and Traffic Authority, NSW, 2005







05. View looking south of new mine facility being developed south of Ravensworth. This mine is readily visible from the road and has a strong negative impact. Mounding and buffer planting have been located between the highway and the mine which in time will assist in reducing the mine's existing impact.
06. View located south of Ravensworth looking west at rural lands and distant hills with little evidence of mining activity.
07. Image taken immediately north of the site and looking east showing abandoned pastures, the railway and low hills in the middle distance. Although not visible in the photograph, views of mining activity can be seen in the visual catchment along with areas of former activity that has now been rehabilitated (refer Image 8 also).
08. This image has been taken north of the site and shows a rehabilitated mine area that is typical of other sites along the highway where rehabilitation has occurred. Although green with some screen planting of trees at the road edge, the landform looks unnatural rising up quickly from the road and having uniform contouring.
09. View looking north east at Pikes Gully with a mine occurring in the middle distance partially screen by intervening vegetation and grasslands.
10. View located near to Bayswater Power Station looking south at part of conveyor system used to move coal to the station.
11. View looking from Saltwater Creek towards Bayswater Power Station with large, out-of-scale, industrial structures appearing within the landscape.
12. View looking east toward Liddell Power Station and showing associated infrastructure.

Appraisal

Prior to mining occurring within the area, the view corridor associated with the New England Highway (and the Main Northern Railway) was comprised mainly of rural scenes of cleared pastures with scattered clumps of native vegetation over floodplains and rolling hills in the foreground to middle distance and tree covered ridges in the background. Development was mainly restricted to: farmhouses and associated out buildings and sheds; small villages (e.g. Ravensworth;) and, light infrastructure (e.g. roads, powerlines, railway). The level of the development was minor and was complementary with the largely rural scenes. Overall the scenic quality would have been moderately high with the travel experience between Singleton and Muswellbrook pleasant albeit similar to other drives within the Upper Hunter.

Where mining operations, which includes associated infrastructure (e.g. roads, overbridges, conveyor systems, processing plants etc) and other industries (including power generation) have added to the level of development, the scenic quality has been significantly reduced



proportional to the degree of exposure, the extent of disturbance including vegetation removal, and the lack of screening. Although such activities may add interest to a journey, mainly through an increase of diversity and activity, it has a detrimental affect on scenic quality and therefore, a viewer's appreciation and enjoyment of an area.

The relative frequency with which mining and other industries now occur within the New England Highway view corridor has lessened the visual sensitivity of the area making it able to withstand further changes providing such changes are consistent with previous development and are managed having regard to visual impact.



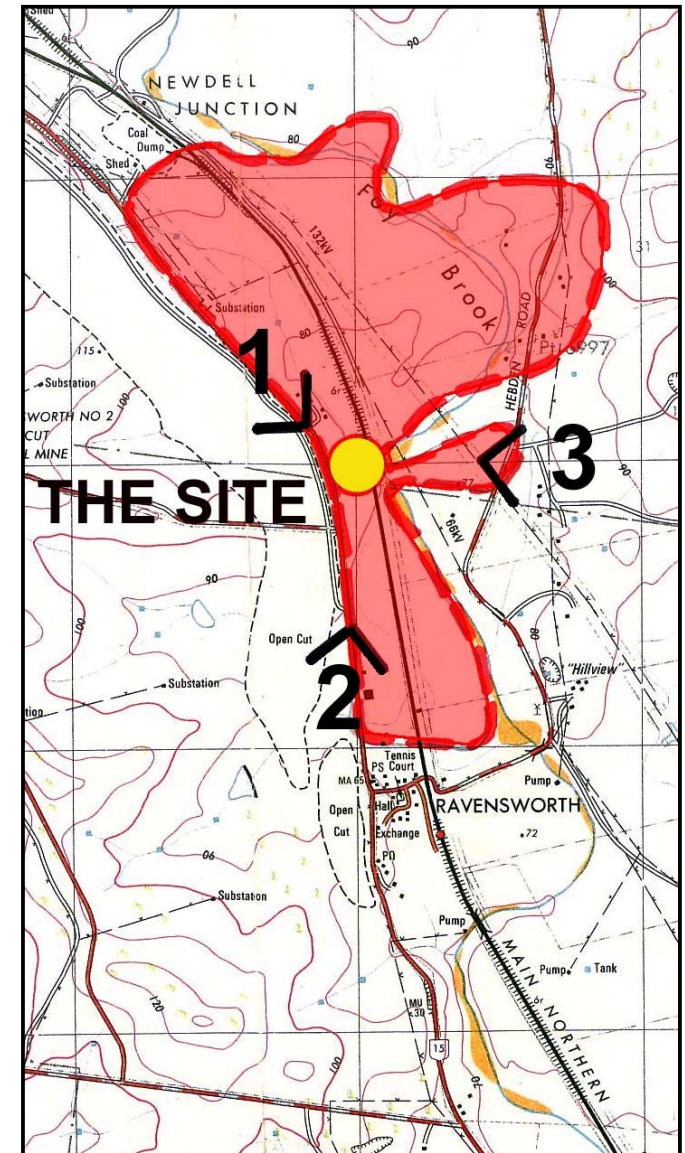
3.0 THE PROPOSAL

As part of the expansion of the Newpac No1 Colliery into longwall mining, there is a need to provide improved ventilation to assist in underground mining operations. It is proposed to construct a ventilation shaft, two fans and associated underground workings. Associated with the each ventilator fan will be: a main control switch room and a transformer and circuit breaker yard located at either end. The above ground development will occupy an area of approximately 55m by 15m with a maximum height of 13m (being the top of the ventilator shafts). It is considered that the proposed modifications are generally in keeping with the original Environmental Impact Statement (EIS) prepared by HLA Envirosiences Pty Ltd and Development Consent (N95/00395/001) from the Department of Planning (DoP).

The actual siting of the aboveground structures needs to correspond to the belowground workings. This requires that the above elements be located between the New England Highway and the Main North Railway creating the potential for the new infrastructure to be visible from the well-used, transportation paths.

The following three pages contain before and after views of the proposed development at the completion of construction.

The viewing locations, as indicated in the figure (right) have been chosen to give a fair representation of how people may view the structures as they travel past the site. Generally passing traffic will be using the New England Highway with local traffic using Hebden Road. As can be seen in the figure, visual access to the site is restricted to a small area due to the topography and current patterns of vegetation.







BEFORE



PHOTOMONTAGE 3A

HEBDEN ROAD LOOKING WEST WITHOUT LANDSCAPING

4.0 VISUAL IMPACT ASSESSMENT

From the previous sections, it has been demonstrated that the proposed development will be readily visible within the defined viewshed. Fortunately the viewshed is only small, however, when seen, from the New England Highway, the structures will be noticeable due to their close proximity to the road and their overall size. Views from Hebden Road, which are intermittent, will be less obvious due to the greater viewing distance and the presence of the mounding on the western side of the highway that reduces the visual effect as the colour chosen for the structures will not contrast greatly from the mound's colours.

With respect to the study locality, it is considered that the visual impact of the proposal will not reduce its scenic quality in any significant way. This assessment is based on the restricted views of the proposed development and the amount of disturbance that has already occurred to the locality's rural character.

These above comments can also be applied to the New England Highway view corridor where the experience of travelling through a rural environment has already been largely compromised by mining and other industries. The main concern here is not use this as an excuse to allow any form of development as there must be regard for the cumulative affect of adding more development. In this regard, methods to minimise impact need to be properly considered and incorporated into proposals including this one.

Based on the above assessment, the main concern arising from the proposed development is its impact on users of the New England Highway. It is estimated that the time of exposure for vehicles travelling south would not exceed 30 seconds and 45 seconds for cars travelling north. Having regard to the impact that mining and industry has had on the visual quality of the New England Highway view corridor between Singleton and Muswellbrook, it is felt that the proposed development would not pose an unacceptable impact providing the proposed amelioration works as detailed in the following section were implemented and maintained.

5.0 PROPOSED AMELIORATION WORKS

To ensure that the proposed development has the least impact on the visual environment it is recommended that screen planting be provided as shown on the landscape plan included on the following page.

Two types of landscaping are proposed:

1. Thick screen planting

This landscaping is to be carried out closest to the proposed development and is to consist of five lines of randomly placed trees and shrubs comprised of commonly occurring, local native species. Preferred species would include:

Trees

› <i>Eucalyptus crebra</i>	Narrow-leaved Ironbark
› <i>Eucalyptus moluccana</i>	Grey Box
› <i>Eucalyptus tereticornis</i>	Forest Red Gum
› <i>Angophora floribunda</i>	Rough-barked Apple
› <i>Brachychiton populneum</i>	Kurrajong
› <i>Allocasuarina leuhmanii</i>	Bull Oak
› <i>Allocasuarina torulosa</i>	Forest Oak
› <i>Allocasuarina leuhmanii</i>	Bull Oak

Shrubs

› <i>Acacia salicina</i>	Cooba Wattle
› <i>Acacia falcata</i>	Sickle-leaved Wattle
› <i>Acacia decora</i>	Graceful Wattle
› <i>Cassinia quinquefaria</i>	Cassinia

2. Row Planting

This landscaping is to be undertaken along the New England Highway between the electrical easement and the site boundary and is to consist of a single row of *Eucalyptus tereticornis* planted at random centres and groupings. The purpose of this landscaping is to partially screen and soften the proposed development whilst still allowing views across to neighbouring lands.

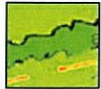
To demonstrate the effect the planting is intended to have, photomontages have been included in the report, following the landscape plan, indicating how the site will appear after five years and then after ten years when the planting is reaching its first adult form.



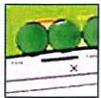


PROPOSED LANDSCAPE TREATMENT TO SCREEN DEVELOPMENT

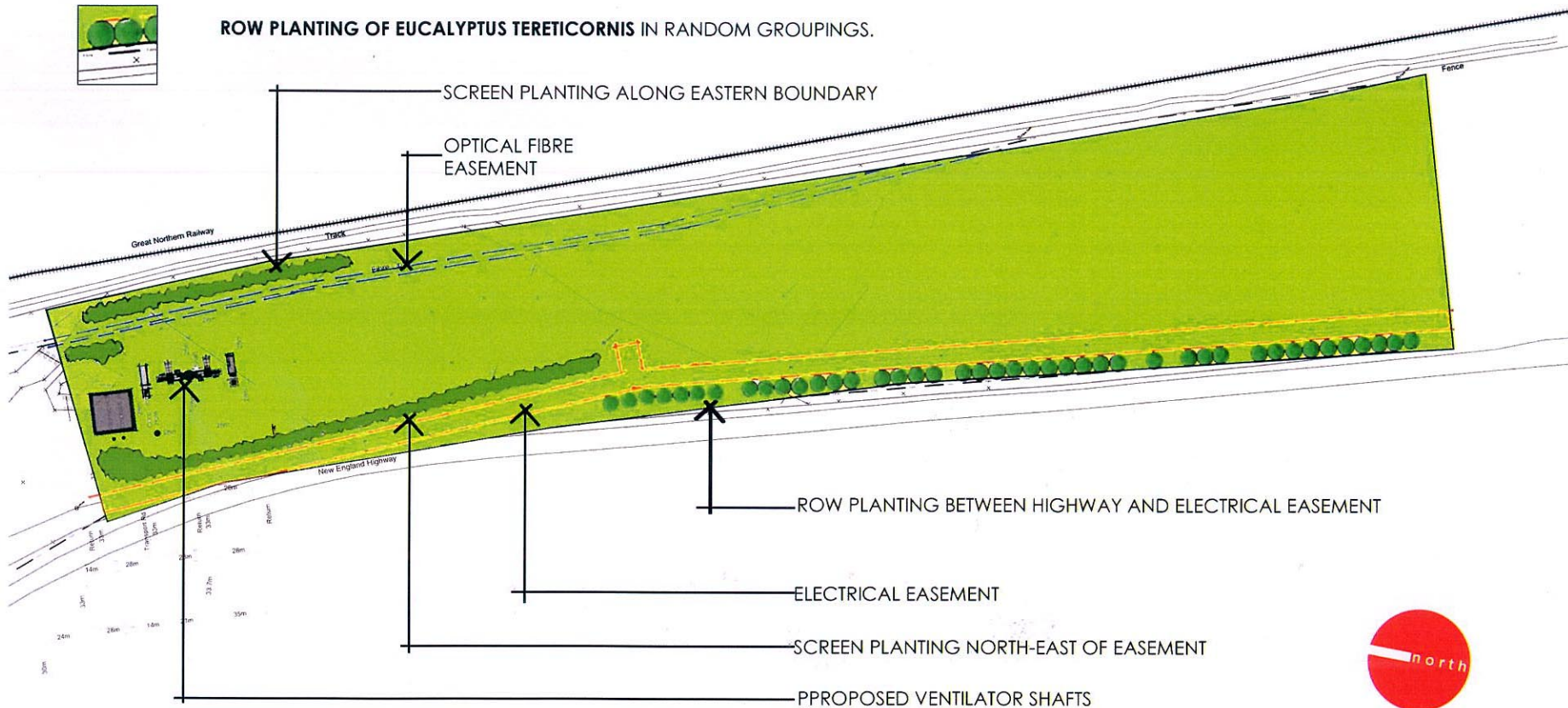
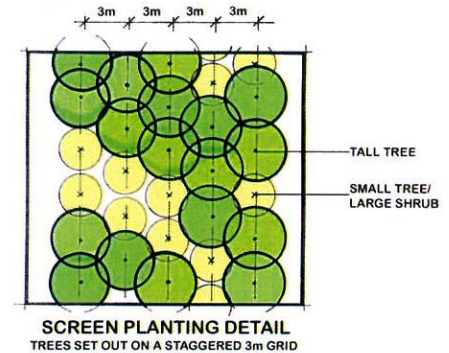
LEGEND



SCREEN PLANTING AS PER DETAIL USING: *Eucalyptus tereticornis*, *Angophora floribunda*, *Brachychiton populneum*, *Allocasuarina leuhmanii*, *Allocasuarina. torulosa*, *Acacia salicina*, *Acacia decora* and *Cassia quinquefaria*.



ROW PLANTING OF EUCALYPTUS TERETICORNIS IN RANDOM GROUPINGS.



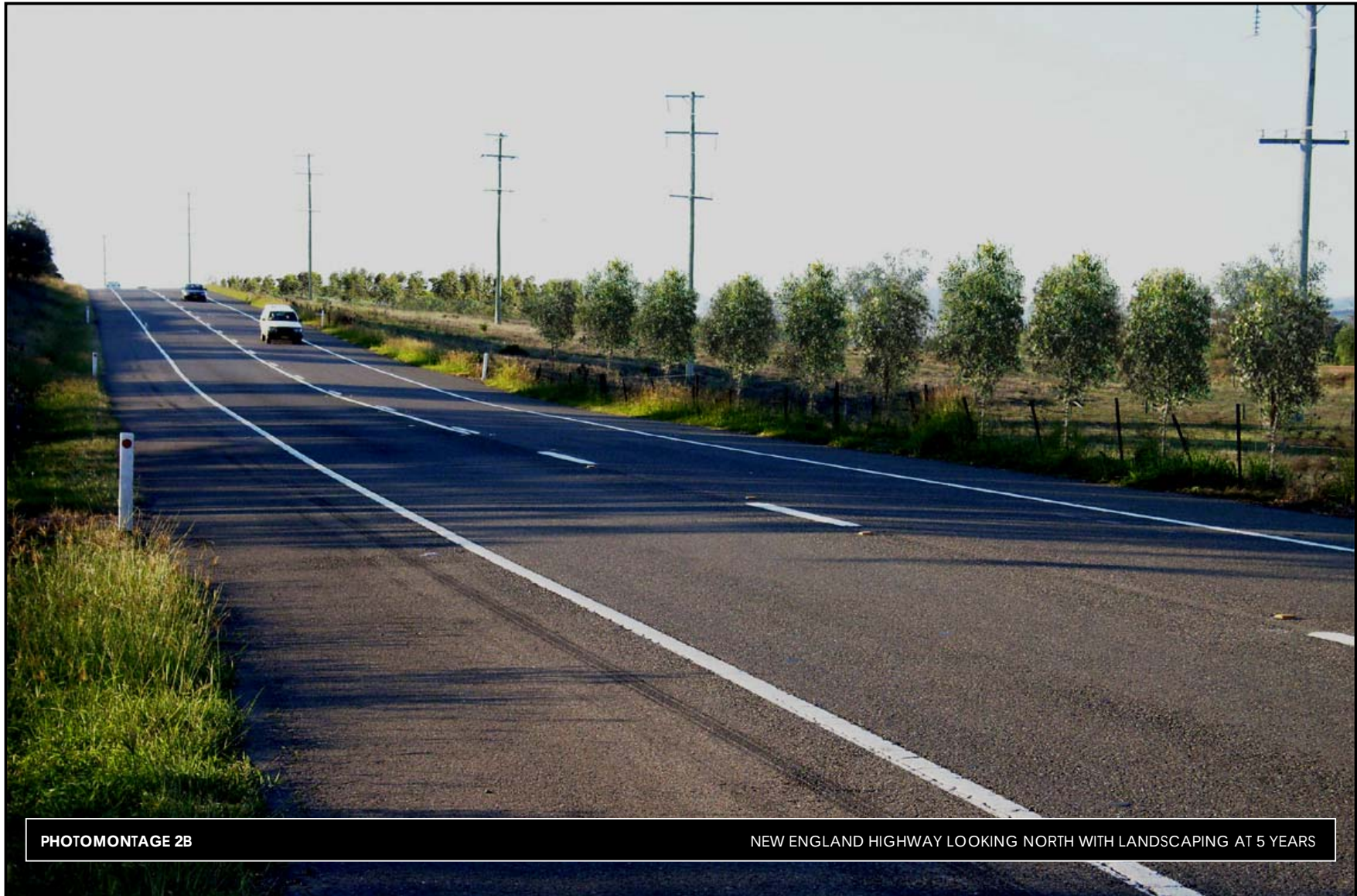


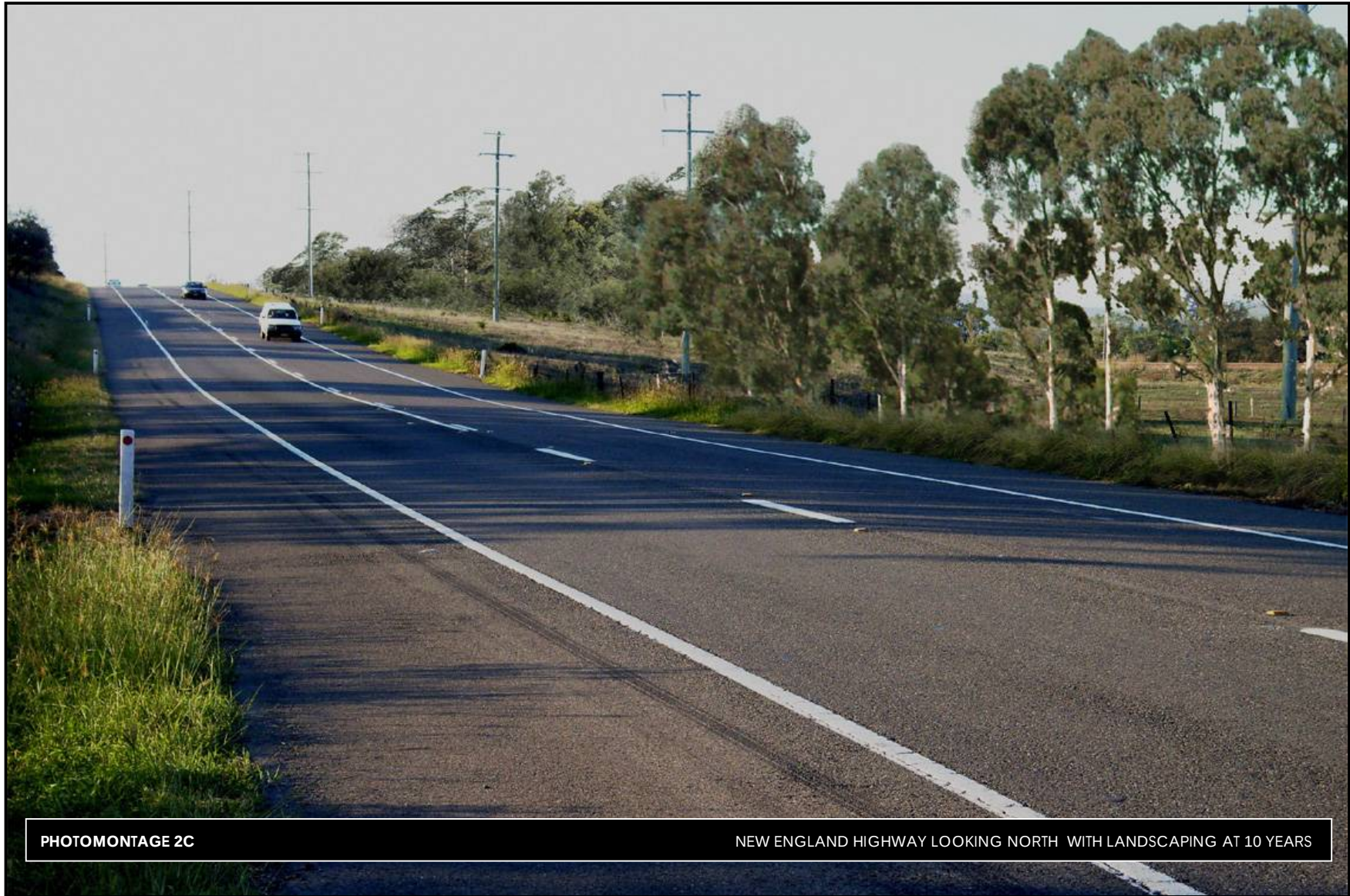
PHOTOMONTAGE 1B

NEW ENGLAND HIGHWAY LOOKING SOUTH WITH LANDSCAPING AT 5 YEARS



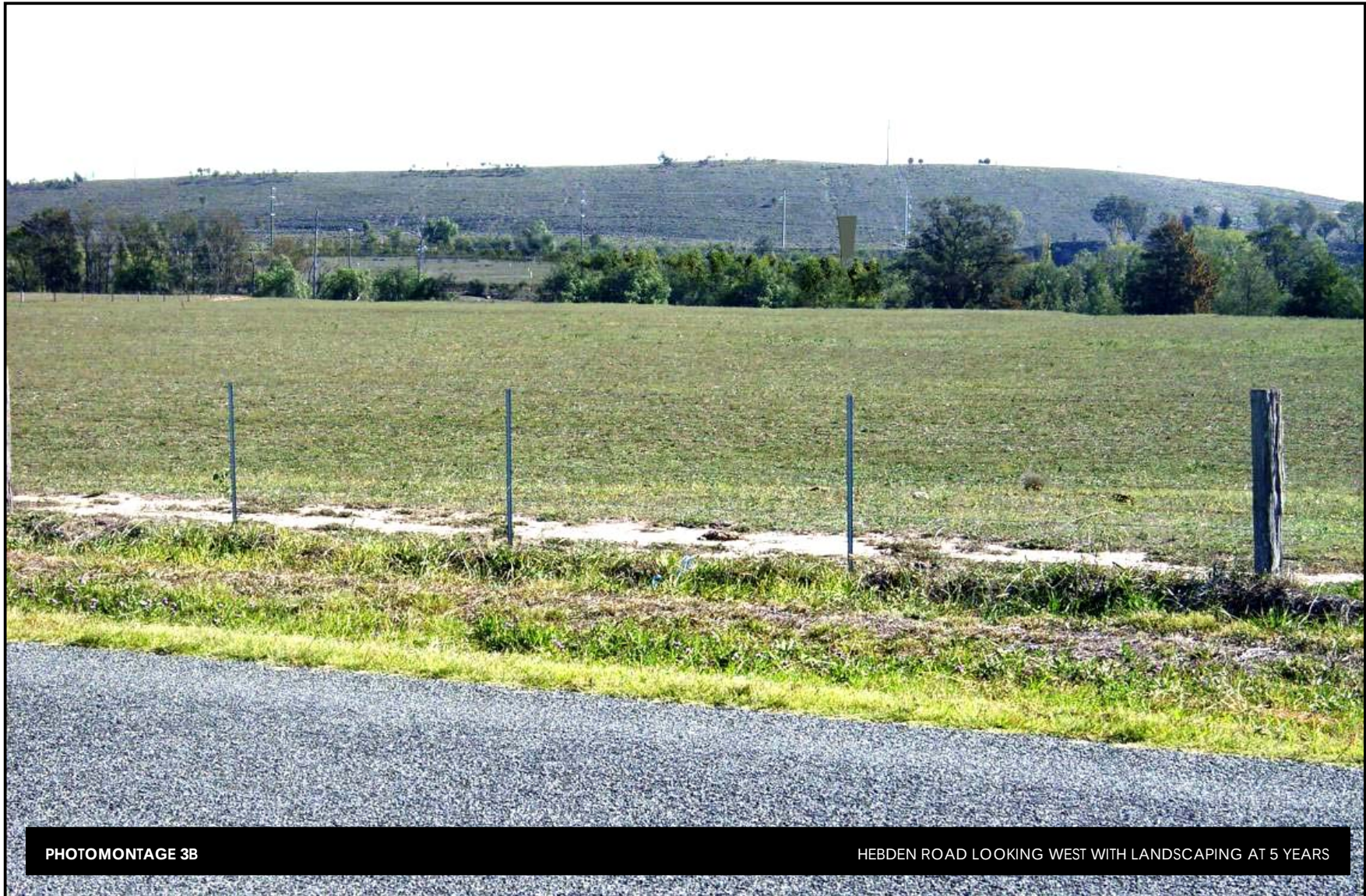


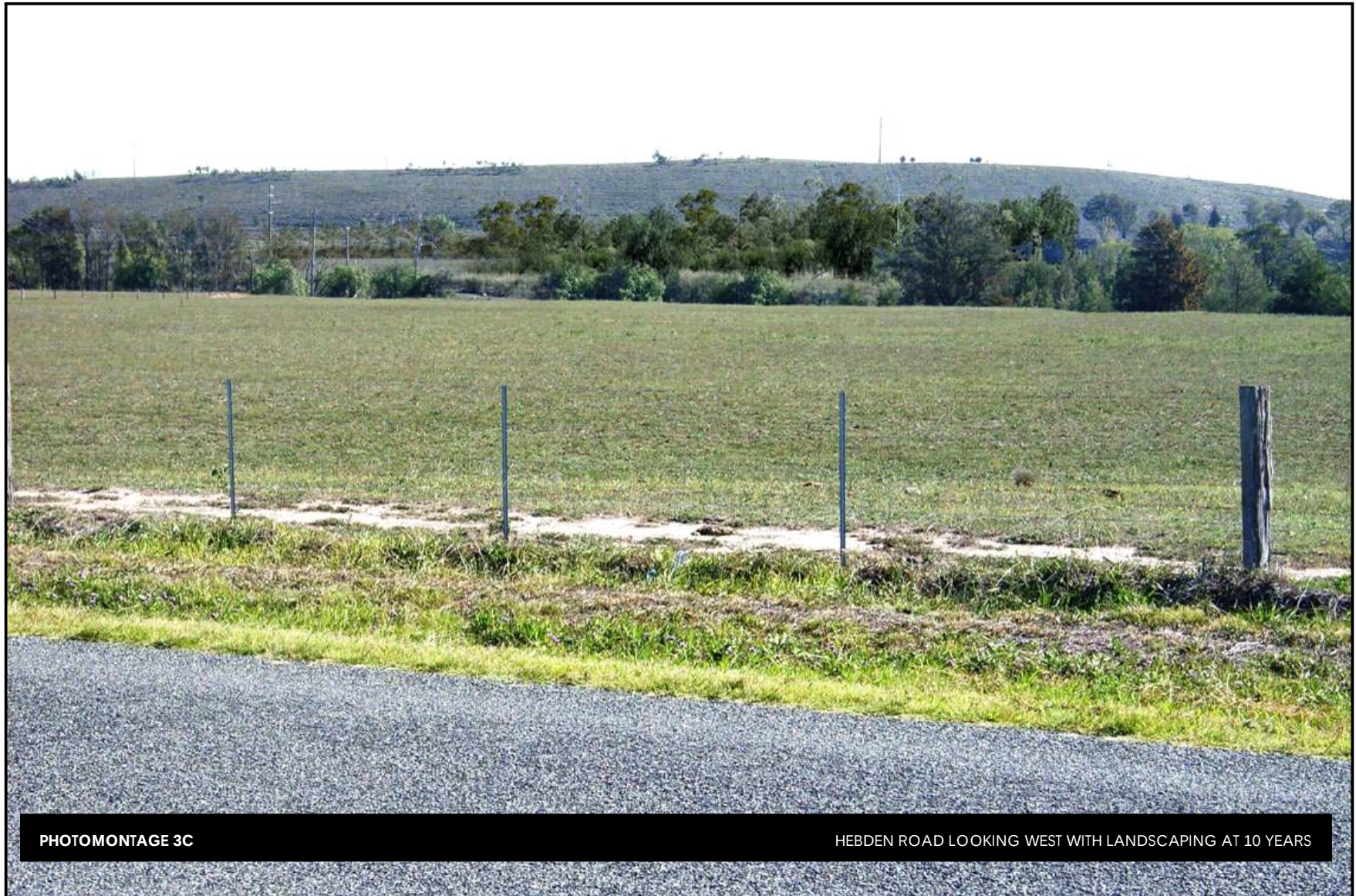




PHOTOMONTAGE 2C

NEW ENGLAND HIGHWAY LOOKING NORTH WITH LANDSCAPING AT 10 YEARS





PHOTOMONTAGE 3C

HEBDEN ROAD LOOKING WEST WITH LANDSCAPING AT 10 YEARS

6.0 CONCLUSION

It is considered that the proposed development including the provision of screen planting as outlined in Section 5 does not pose a significant visual impact on either the local visual environment or the view corridor that exists between Singleton and Muswellbrook.



Appendix C

Traffic assessment report

TRAFFIC MANAGEMENT & SAFETY CONSULTANTS
53 Marangani Ave, North Gosford. NSW 2250

ACN 072 806 805
ABN 41 072 806 805 (GST REGISTERED)

Telephone No:
Office – 0243231369
Mobile – 0405219634

Fax No: 0243231369

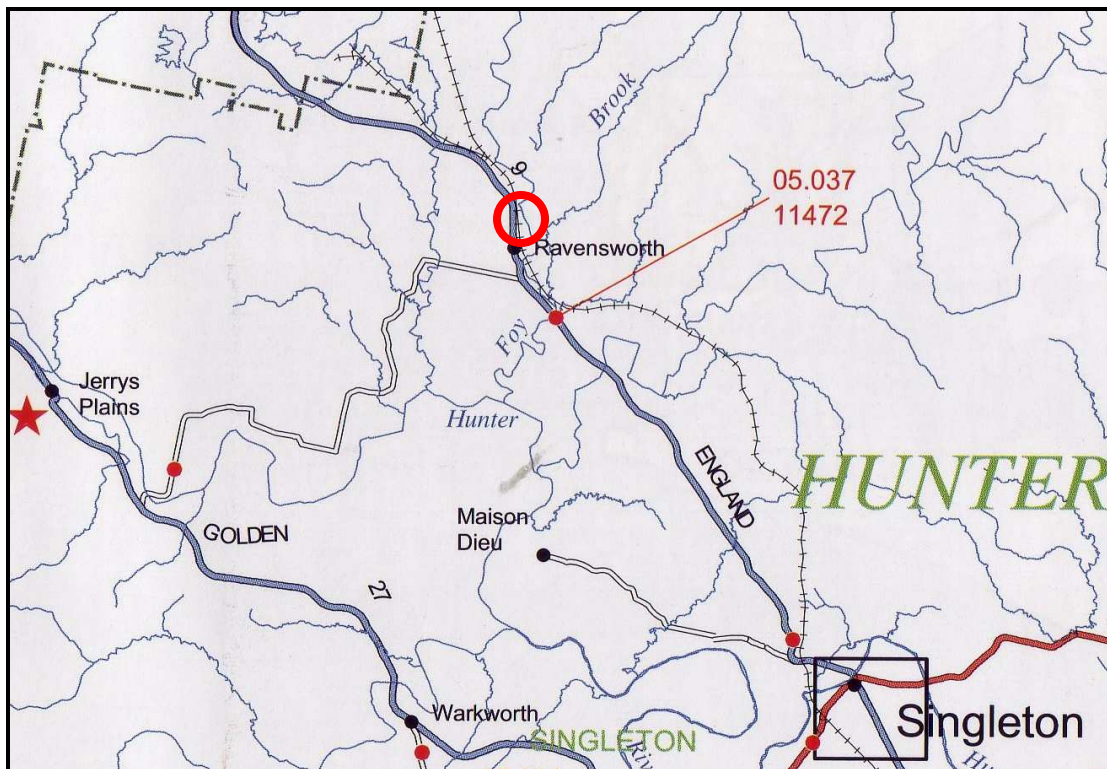
e-mail: stapo@aapt.net.au

TRAFFIC ASSESSMENT REPORT

STAGE 1

CONSTRUCTION OF VENTILATION SHAFT AND FAN FOR
NEWPAC No.1 COLLIERY NEW ENGLAND HIGHWAY, RAVENSWORTH NSW

JANUARY 2007



LOCALITY SKETCH

TABLE OF CONTENTS

INTRODUCTION

The Project

Task Description

Project Representative

References

EXISTING CONDITIONS

Locality

Road Network

PROPOSED TRAFFIC MANAGEMENT

Project Overview and Traffic Conditions

Traffic Generation

CONCLUSIONS

INTRODUCTION

The Project

Stapes Pty Ltd was invited by Connell Wagner Pty Ltd to undertake a Traffic Assessment Report for the proposal to construct a Ventilation Shaft and Fan on land on the eastern side of the New England Highway north of the intersection of the New England Highway and Hebden Road, Ravensworth.

The general site location is circled on the locality sketch above.

Task Description

The Statement will focus on the following issues.

- A determination of both the composition and the estimated traffic flow to be generated by this proposal during the construction phase of the operation.
- Examine the proposed ingress / egress arrangements to be utilised during the construction phase. Determine the suitability of this arrangement and the ability to adequately cater for both the increase and the type of traffic generated by this proposal.
- Establish that appropriate road safety and traffic management guidelines and standards have been addressed by the proposal.

Project Representative

Mr. Gary Stapleton, Director, Stapes Pty Ltd undertook the evaluation and preparation of the report. He has extensive experience in the road safety and traffic management profession, including the assessment of traffic generating developments.

References

- Roads and Traffic Authority – Guide to Traffic Generating Developments.
- Austroads Part 5 - Intersections at Grade.
- Australian Standards 2890.1:2004 – Off street car parking
- Project Plan provided

EXISTING CONDITIONS

Locality

The proposed development site has access to it via the existing Daracon Depot on the east side of the New England Highway approximately 400m north of the intersection of the New England Highway and Hebden Road, Ravensworth.

Agreement has been reached with Daracon to use this existing access for the duration of construction works.

See Figure 1 for ingress / egress locations.



Looking south to ingress / egress driveways shown with yellow arrows

Figure 1

Road Network

New England Highway

The New England Highway (State Highway No. 9) is a classified state road and part of the national highway network

The New England Highway at this location has an Average Annual Daily Traffic (AADT) flow of 11472 vpd based on data contained in the RTA Traffic Volume Data for the Hunter Region – 2004. The relevant counting station 05.037 located at the Foy Brook Bridge approximately 4km south of Ravensworth. Only a slight increase in traffic has occurred since 2001 when 10611 vpd was recorded.

Traffic volumes noted at the time of the survey (1230hrs) were only light to moderate.

The speed limit on the highway at access point location was 90kph.

The New England Highway at the access point location is level in grade and some 7.0m wide marked with edge lines and two traffic lanes separated by a marked centreline.

A sealed shoulder of approximately 4.5m is provided on both sides allowing safe overtaking and deceleration manoeuvres to the access locations to occur on the west and east sides respectively. (see Figure 2)

Stopping Sight distance from the egress driveway location both north and south into the highway is satisfactory - Australian Standards 2890.1:2004 – Off street car parking



The New England Highway looking south in vicinity of existing access locations (Note wide sealed road shoulders)

Figure 2

PROPOSED TRAFFIC MANAGEMENT

Project Overview and Traffic Conditions

It is proposed to construct a Ventilation Shaft and Fan on land on the eastern side of the New England Highway north of the intersection of the New England Highway and Hebden Road, Ravensworth.

The road based construction operation will be completed in approximately 8 - 10 weeks. The proposed development site will have access to it via the existing Daracon Depot. The Daracon depot is located on the east side of the New England Highway approximately 400m north of the intersection of the New England Highway and Hebden Road, Ravensworth.

Agreement has been reached with Daracon to use this existing access arrangement for the duration of construction works and operation of the site.

At the time of the inspection (1230hrs) 22 staff motor vehicles and 6 semi trailers were parked within the depot premises. Minimal activity occurs at other times.

The depot is accessed by a separate ingress driveway 6m wide and egress driveway 12.7m wide.(see Figures 3 & 4)

Both driveways are located on a straight level section of the New England Highway with satisfactory stopping sight distance (SSD) in both directions.

Large sealed shoulders are provided at these locations affording safe turning movements for vehicles entering or leaving the New England Highway.

Traffic volumes noted at the time of the survey (1230hrs) were only light to moderate. Vehicle speeds were recorded to have an 85th percentile reading of 91kph within the posted speed limit of 90kph.

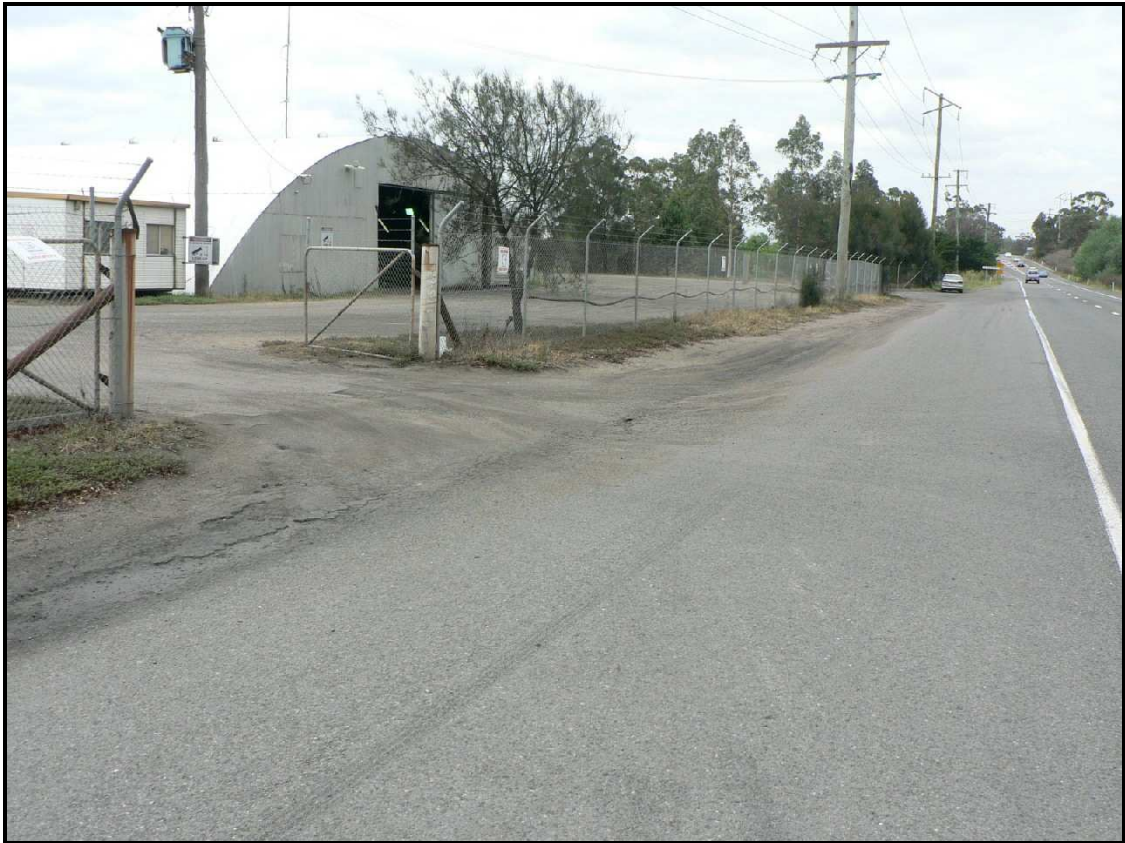


Figure 3 Ingress driveway – looking south



Figure 4 Egress driveway – looking south

Traffic Generation

For the construction phases Table 1 & 2 show the composition of vehicles, volumes and duration of tasks expected to be operating at that time.

The total construction time is anticipated to be 4 – 5 weeks for the construction of the ventilation shaft and 4 – 5 weeks for the construction of the fan. Total construction time would be anticipated to be 8 – 10 weeks.

Accurate definitive daily traffic generation figures are unable to be provided due to the methods of construction where some tasks are performed concurrently with others.

An indication however of a major activity period is during the Borehole Installation which occurs for a period of 3 weeks and the daily generation rate is only 3 light vehicles / 1 truck plus a total of 6 semi trailers for that full 3 week period. It can be seen that the level of major activity is quite low.

The minor volumes presently generated by the existing depot useage together with the volumes detailed in Table 1 & 2 are very minor and will have only minimal effect on the adjoining road network.

It is expected that all traffic associated with the construction phase of the proposed development will originate from the south. The movements associated with the operation will be right turn into the ingress driveway and left turn from the egress driveway.

These movements can be safely accommodated by the existing road construction and satisfactory sight distance.

CONSTRUCTION OF VENTILATION SHAFT

Task	L/Vehicle	Truck	SemiTrailer	Duration
Borehole Installation	3/day	1/day	Total of 6	3 weeks
Reaming of Shaft	2/day	1/day	Nil	4 weeks
Sealing of Shaft	2/day	3/day	Nil	3 days
Demobilisation	2/day	1/day	Total of 4	2 days

Traffic flow from south

For the borehole and reaming operations a mobile generator will be used – this will be silenced

Table 1

CONSTRUCTION OF FAN

Task	L/Vehicle	Truck	SemiTrailer	Duration
Mobilisation	6/day	Total of 1		2 days
Concrete	4/day	Total of 40		3 weeks
Switchroom	2/day		Total of 1	5 weeks
Motor House	2/day		Total of 1	1 day
Fan	6/day		Total of 8	4 weeks
No.2 Switchroom	2/day		Total of 1	5 weeks
No.2 Motor House	2/day		Total of 1	1 day
No.2 Fan	6/day		Total of 8	4 weeks
Fencing	4/day		Total of 2	1 week
Demobilisation	4/day	Total of 1		2 days

Traffic flow from south

Table 2

Subsequent to the construction phases shown in Tables 1 & 2 the composition of vehicles, volumes and duration of tasks expected to be operating for the operation / maintenance of the fan is shown in Table 3.

These volumes are very minor and whilst of an ongoing nature will have little effect on the adjoining road network.

OPERATION / MAINTENANCE OF FAN

Task	L/Vehicle	Truck	SemiTrailer	Duration
Inspection	1/day	Nil	Nil	Ongoing
Maintenance	2/week	1/week	1/annum	Ongoing

Table 3

CONCLUSIONS

The assessment by Stapes Pty Ltd has concluded that:

The proposed development site will have access to it via the existing Daracon Depot. Agreement has been reached with Daracon to use this existing access arrangement for the duration of construction works and for ongoing operation of the site.

The depot is accessed by a separate ingress driveway 6m wide and egress driveway 12.7m wide.

Both driveways are located on a straight level section of the New England Highway with satisfactory stopping sight distance in both directions.

Large sealed shoulders are provided at these locations affording safe turning movements for vehicles entering or leaving the New England Highway.

Traffic volumes noted at the time of the survey were only light to moderate. Vehicle speeds were recorded to have an 85th percentile reading of 91kph within the posted speed limit of 90kph.

At the time of the inspection (1230hrs) 22 depot staff motor vehicles and 6 semi trailers were parked within the depot premises. Minimal activity occurs at other times.

The minor volumes presently generated by the existing depot useage together with those of the proposed development would be expected to be very minor and would have only minimal effect on the adjoining road network.

Prepared by

G.L.Stapleton

Mr. G.L.Stapleton
Director – Stapes Pty Ltd

Appendix D

Indigenous heritage plans

Figure 2: **Location of recorded sites and survey transects.** (Source HLA 2004: Figure 4)



Figure 1: Zones of archaeological sensitivity over the surveyed land. (Source HLA 2004: Figure 6).

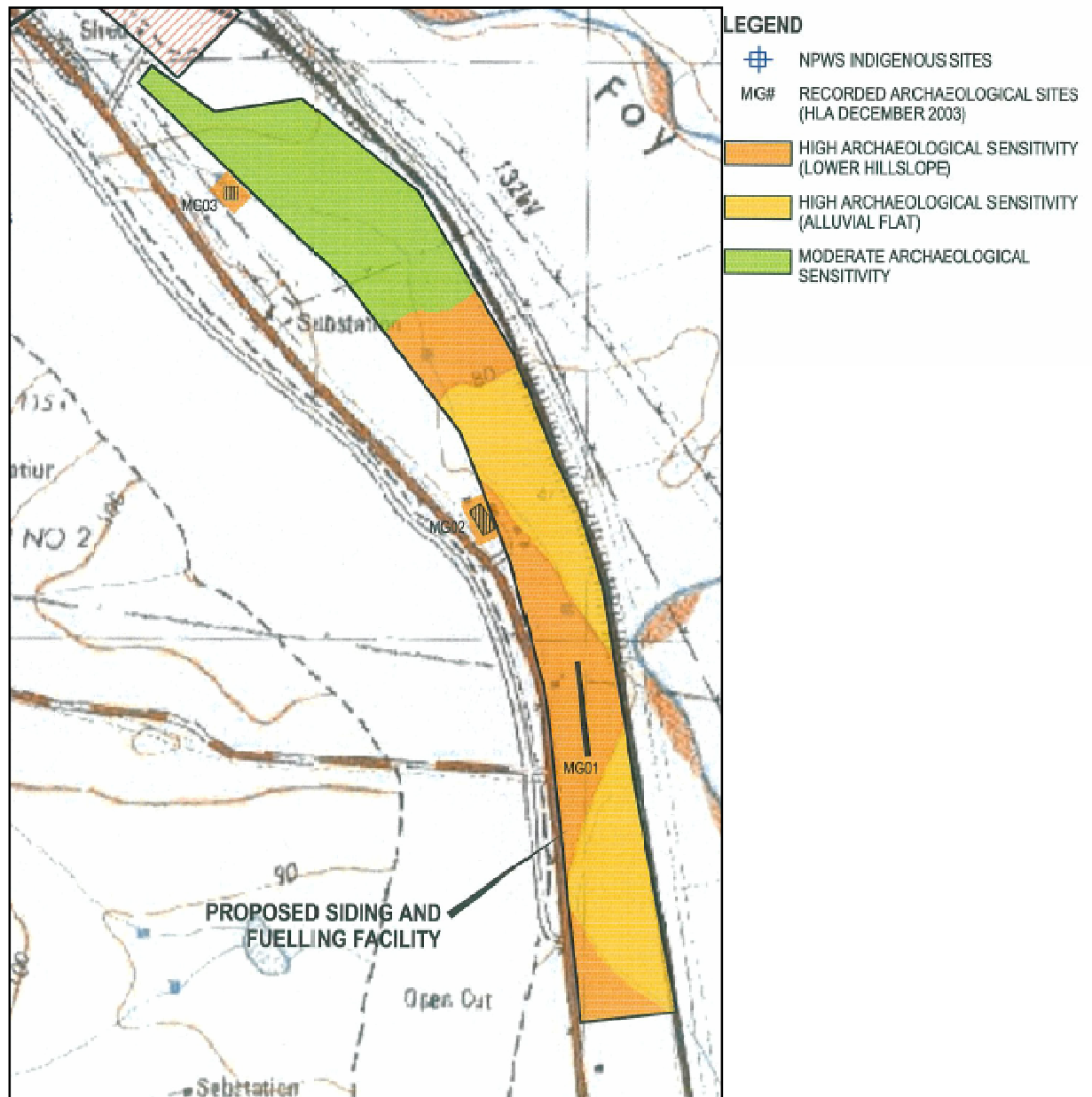
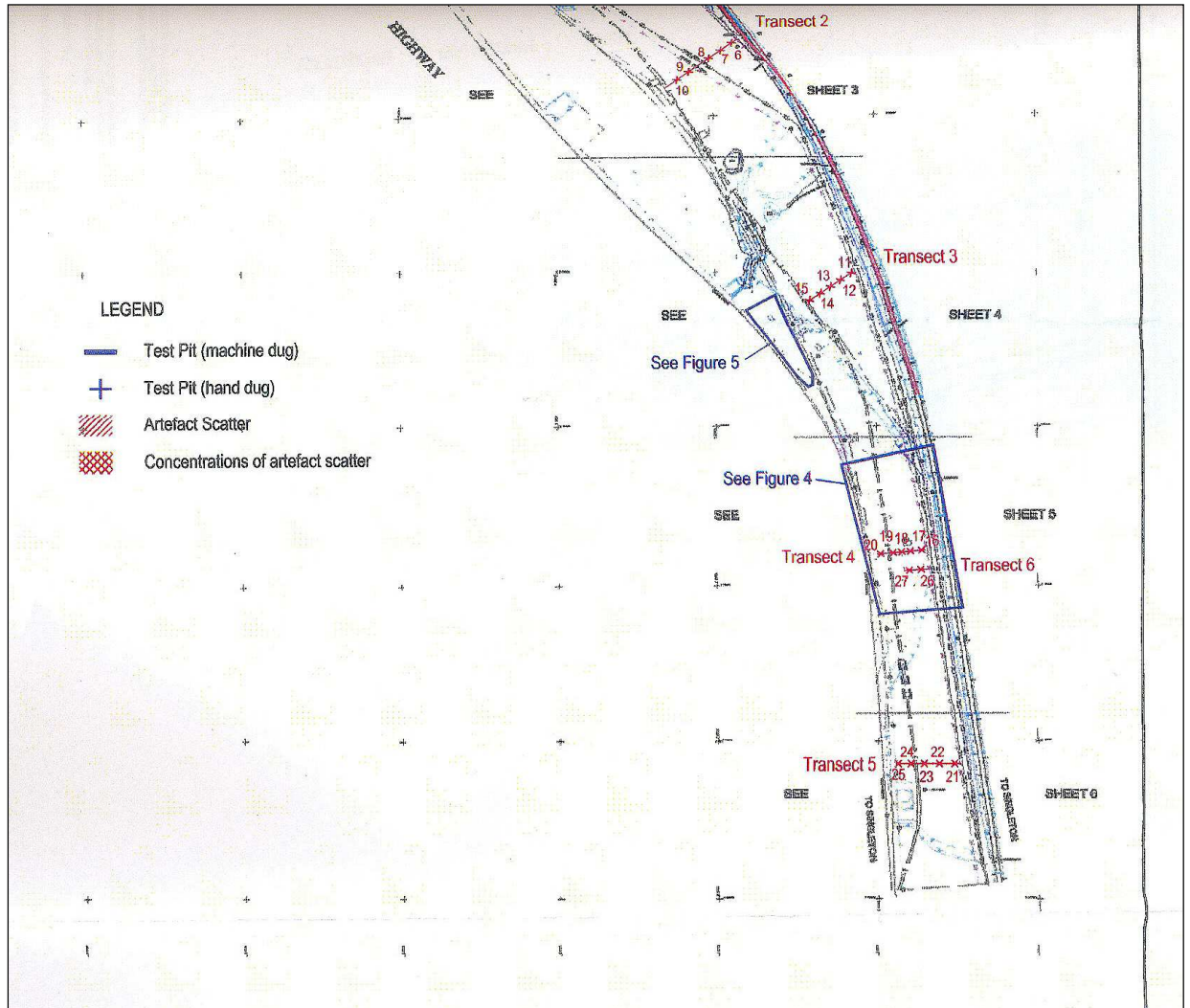
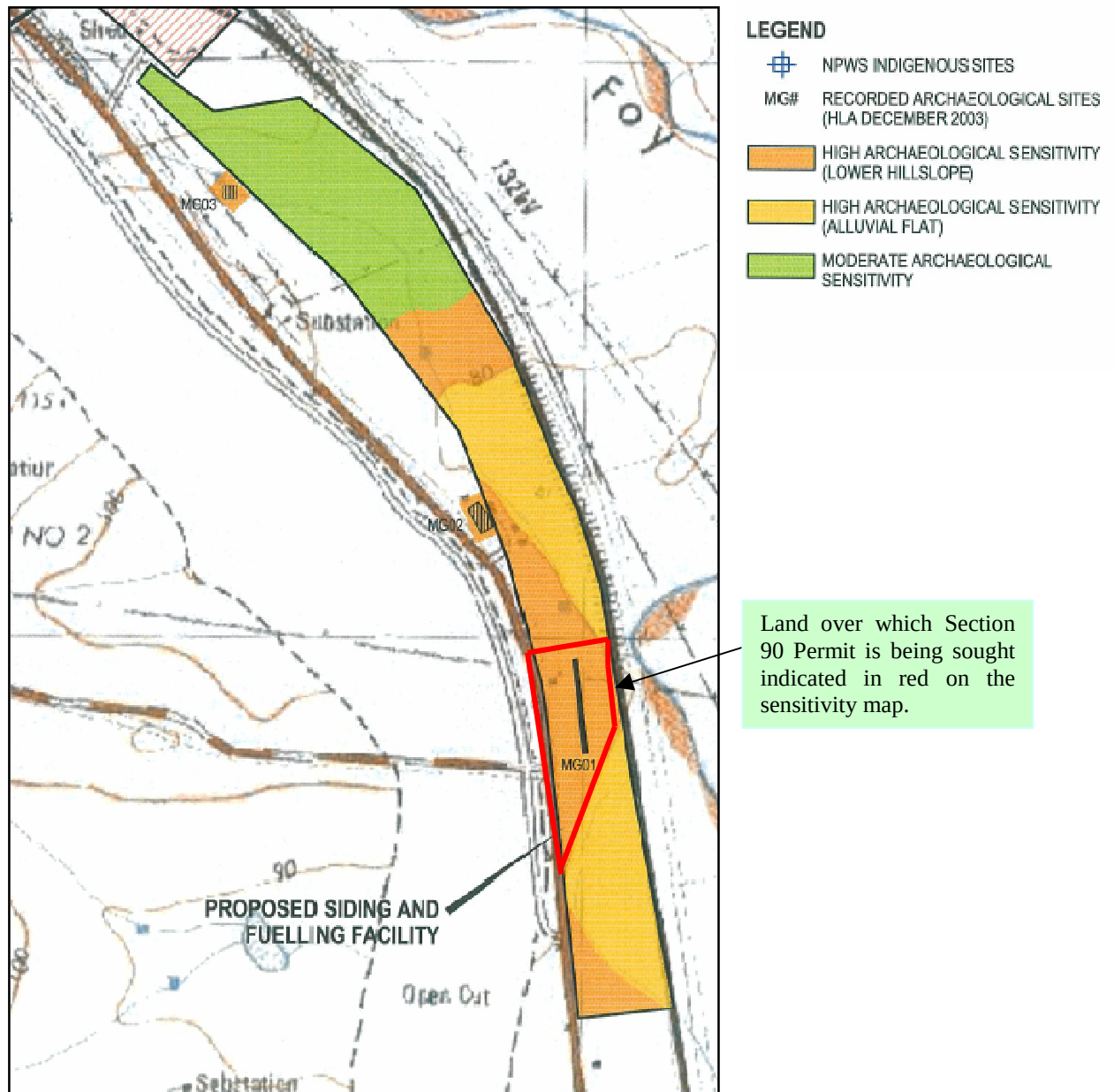


Figure 2: Location of test pit transects excavated by HLA in 2005 over the subject land. Source HLA 2005: Figure 3.



**Figure 5: Area of land subject to Section 90 Permit Application delineated in red
(Base plan source, HLA 2004: Figure 6).**



Appendix E

EPBC assessment of significance

Table : Assessment of Likelihood of Occurrence of Threatened Fauna Species						
E = Endangered, E2 = Endangered population, V = Vulnerable, M = Migratory, O/F = overfly marine area						
Scientific Name	Common Name	Conservation Significance		Habitat Associations	Likelihood of Occurrence	Current Level of Assessment and Requirement for Seven Part Test
		TSC Act	EPBC Act			
FROGS						
<i>Litoria aurea</i>	Green and Golden Bell Frog	E	V	This species has been observed utilising a variety of natural and man-made waterbodies (Pyke & White 1996) such as coastal swamps, marshes, dune swales, lagoons, lakes, other estuary wetlands, riverine floodplain wetlands and billabongs, stormwater detention basins, farm dams, bunded areas, drains, ditches and any other structure capable of storing water (DEC 2005a). Fast flowing streams are not utilised for breeding purposes by this species (Mahony 1999). Preferable habitat for this species includes attributes such as shallow, still or slow flowing, permanent and/or widely fluctuating water bodies that are unpolluted and without heavy shading (DEC 2005a). Large permanent swamps and ponds exhibiting well-established fringing vegetation (especially bulrushes–Typha sp. and spikerushes–Eleocharis sp.) adjacent to open grassland areas for foraging are preferable (Ehmann 1997; Robinson 1993). Ponds that are typically inhabited tend to be free from predatory fish such as Mosquito Fish (Gambusia holbrooki) (NPWS 1999m).	Unlikely. No suitable habitat. Some farms dams nearby, though limited fringing vegetation and open water.	Adequately assessed in HLA (2003). Species unlikely to occur and no further assessment required. Assessment under EPBC not required, as unlikely to occur.
DIURNAL BIRDS						

Table : Assessment of Likelihood of Occurrence of Threatened Fauna Species						
E = Endangered, E2 = Endangered population, V = Vulnerable, M = Migratory, O/F = overfly marine area						
Scientific Name	Common Name	Conservation Significance		Habitat Associations	Likelihood of Occurrence	Current Level of Assessment and Requirement for Seven Part Test
		TSC Act	EPBC Act			
<i>Climacteris picumnus</i> <i>Climacteris picumnus victoriae</i>	Brown Treecreeper Brown Treecreeper (eastern subspecies)	V V	— —	Distributed through central NSW on the western side of the Great Dividing Range and sparsely scattered to the east of the Divide in drier areas such as the Cumberland Plain of Western Sydney, and in parts of the Hunter, Clarence, Richmond and Snowy River valleys. The Brown Treecreeper occupies eucalypt woodlands, particularly open woodland lacking a dense understorey. It is sedentary and nests in tree hollows within permanent territories (NSW Scientific Committee 2001a).	Unlikely. Recorded locally in areas of suitable woodland habitat. The study area is typically cleared pastoral land and suitable habitat is absent from the study area.	Adequately assessed in HLA (2003). Species unlikely to occur and no further assessment required.
<i>Lathamus discolor</i>	Swift Parrot	E	E	Breeds in Tasmania between September and January. Migrates to mainland in autumn, where it forages on profuse flowering Eucalypts (Blakers <i>et al.</i> 1984; Schodde and Tidemann 1986). Hence, in this region, autumn and winter flowering eucalypts are important for this species. Favoured feed trees include winter flowering species such as Swamp Mahogany (<i>Eucalyptus robusta</i>), Spotted Gum (<i>Corymbia maculata</i>), Red Bloodwood (<i>C. gummifera</i>), Mugga Ironbark (<i>E. sideroxylon</i>), and White Box (<i>E. albens</i>) (DEC 2005b).	Unlikely. The study area is typically cleared pastoral land and suitable habitat is absent from the study area.	Adequately assessed in HLA (2003). Species unlikely to occur and no further assessment required. Assessment under EPBC not required, as unlikely to occur.

Table : Assessment of Likelihood of Occurrence of Threatened Fauna Species						
E = Endangered, E2 = Endangered population, V = Vulnerable, M = Migratory, O/F = overfly marine area						
Scientific Name	Common Name	Conservation Significance		Habitat Associations	Likelihood of Occurrence	Current Level of Assessment and Requirement for Seven Part Test
		TSC Act	EPBC Act			
<i>Melanodryas cucullata</i> <i>Melanodryas cucullata cucullata</i>	Hooded Robin Hooded Robin (southeastern subspecies)	V	—	Associated with a wide range of Eucalypt woodlands, Acacia shrubland and open forests (Blakers et al. 1984). In temperate woodlands, the species favours open areas adjoining large woodland blocks, with areas of dead timber and sparse shrub cover (NSW Scientific Committee 2001b). Hooded Robin home ranges are relatively large, averaging 18ha for birds from the New England Tableland (NSW Scientific Committee 2001b).	Unlikely. The study area is typically cleared pastoral land and suitable habitat is absent from the study area.	Adequately assessed in HLA (2003). Species unlikely to occur and no further assessment required.
<i>Melithreptus gularis gularis</i>	Black-chinned Honeyeater (eastern subspecies)	V	—	Predominantly associated with box-ironbark association woodlands and River Red Gum (NSW Scientific Committee, 2001c). Also associated with drier coastal woodlands of the Cumberland Plain and the Hunter, Richmond and Clarence Valleys (NSW Scientific Committee, 2001c).	Unlikely. The study area is typically cleared pastoral land and suitable habitat is absent from the study area.	Adequately assessed in HLA (2003). Species unlikely to occur and no further assessment required.
<i>Pomatostomus temporalis temporalis</i>	Grey-crowned Babbler (eastern subspecies)	V	—	Open woodlands dominated by mature eucalypts with regenerating trees, tall shrubs, and an intact ground cover of grass and forbs (NSW Scientific Committee 2001d). This species avoids very wet areas (Blakers et al. 1984).	Unlikely. Recorded locally in areas of suitable woodland habitat. The study area is typically cleared pastoral land and suitable habitat is absent from the study area.	Adequately assessed in HLA (2003). Species unlikely to occur and no further assessment required.

Table : Assessment of Likelihood of Occurrence of Threatened Fauna Species						
E = Endangered, E2 = Endangered population, V = Vulnerable, M = Migratory, O/F = overfly marine area						
Scientific Name	Common Name	Conservation Significance		Habitat Associations	Likelihood of Occurrence	Current Level of Assessment and Requirement for Seven Part Test
		TSC Act	EPBC Act			
<i>Pyrrholaemus sagittatus</i>	Speckled Warbler	V	—	Occupies a wide range of eucalypt dominated communities with a grassy understorey, often on rocky ridges or in gullies (DEC 2005d). Typical habitat would include scattered native tussock grasses, a sparse shrub layer, some eucalypt regrowth and an open canopy (DEC 2005d). Large, relatively undisturbed remnants are required for the species to persist in an area (DEC 2005d). Pairs are sedentary and occupy a breeding territory of about ten hectares, with a slightly larger home-range when not breeding (DEC 2005d).	Unlikely. The study area is typically cleared pastoral land and suitable habitat is absent from the study area.	Adequately assessed in HLA (2003). Species unlikely to occur and no further assessment required.
<i>Stagonopleura guttata</i>	Diamond Firetail	V	—	Typically found in grassy eucalypt woodlands, but also occurs in open forest, mallee, Natural Temperate Grassland, and in secondary grassland derived from other communities (DEC 2005e). It is often found in riparian areas and sometimes in lightly wooded farmland (DEC 2005e). Appears to be sedentary, though some populations move locally, especially those in the south (DEC 2005e).	Unlikely. The study area is typically cleared pastoral land and suitable habitat is absent from the study area.	Adequately assessed in HLA (2003). Species unlikely to occur and no further assessment required.
<i>Stictonetta naevosa</i>	Freckled Duck	V	—	Associated with a variety of plankton-rich wetlands, such as heavily vegetated, large open lakes and their shores, creeks, farm dams, sewerage ponds and floodwaters (NPWS 1999v).	Unlikely. No wetland habitats occur in the study area.	Adequately assessed in HLA (2003). Species unlikely to occur and no further assessment required.

Table : Assessment of Likelihood of Occurrence of Threatened Fauna Species						
E = Endangered, E2 = Endangered population, V = Vulnerable, M = Migratory, O/F = overfly marine area						
Scientific Name	Common Name	Conservation Significance		Habitat Associations	Likelihood of Occurrence	Current Level of Assessment and Requirement for Seven Part Test
		TSC Act	EPBC Act			
<i>Xanthomyza phrygia</i>	Regent Honeyeater	E	E, M	Associated with temperate eucalypt woodland and open forest including forest edges, wooded farmland and urban areas with mature eucalypts, and riparian forests of River Oak (<i>Casuarina cunninghamiana</i>) (Garnett 1993). Areas containing Swamp Mahogany (<i>Eucalyptus robusta</i>) in coastal areas have been observed to be utilised (NPWS 1997). The Regent Honeyeater primarily feeds on nectar from box and ironbark eucalypts and occasionally from banksias and mistletoes (NPWS 1995). As such it is reliant on locally abundant nectar sources with different flowering times to provide reliable supply of nectar (Environment Australia 2000).	Unlikely. The study area is typically cleared pastoral land and suitable habitat is absent from the study area.	Adequately assessed in HLA (2003). Species unlikely to occur and no further assessment required. Assessment under EPBC not required, as unlikely to occur.
NOCTURNAL BIRDS						

Table : Assessment of Likelihood of Occurrence of Threatened Fauna Species						
E = Endangered, E2 = Endangered population, V = Vulnerable, M = Migratory, O/F = overfly marine area						
Scientific Name	Common Name	Conservation Significance		Habitat Associations	Likelihood of Occurrence	Current Level of Assessment and Requirement for Seven Part Test
		TSC Act	EPBC Act			
<i>Ninox connivens</i>	Barking Owl	V	—	Associated with a variety of habitats such as savanna woodland, open eucalypt forests, wetland and riverine forest. The habitat is typically dominated by Eucalypts (often Redgum species), however often dominated by Melaleuca species in the tropics (NPWS 2003). It usually roosts in dense foliage in large trees such as River She-oak (<i>Allocasuarina cunninghamiana</i>), other Casuarina and Allocasuarina, eucalypts, Angophora, Acacia and rainforest species from streamside gallery forests (NPWS 2003). It usually nests near watercourses or wetlands (NPWS 2003) in large tree hollows with entrances averaging 2-29 metres above ground, depending on the forest or woodland structure and the canopy height (Debus 1997).	Unlikely. Suitable shelter and nest hollows will not be affected. No suitable prey habitat and thus foraging habitat.	Adequately assessed in HLA (2003). Species unlikely to occur and no further assessment required.
<i>Ninox strenua</i>	Powerful Owl	V	—	Associated with a wide range of wet and dry forest types with a high density of prey, such as arboreal mammals, large birds and flying foxes (Environment Australia 2000, Debus & Chafer 1994). Large trees with hollows at least 0.5m deep are required for shelter and breeding (Environment Australia 2000).	Unlikely. Suitable shelter and nest hollows will not be affected. No suitable foraging habitat.	Adequately assessed in HLA (2003). Species unlikely to occur and no further assessment required.

Table : Assessment of Likelihood of Occurrence of Threatened Fauna Species						
E = Endangered, E2 = Endangered population, V = Vulnerable, M = Migratory, O/F = overfly marine area						
Scientific Name	Common Name	Conservation Significance		Habitat Associations	Likelihood of Occurrence	Current Level of Assessment and Requirement for Seven Part Test
		TSC Act	EPBC Act			
<i>Tyto novaehollandiae</i>	Masked Owl	V	—	Associated with forest with sparse, open, understorey, typically dry sclerophyll forest and woodland (NPWS 2005m) and especially the ecotone between wet and dry forest, and non forest habitat (Environment Australia 2000). Known to utilise forest margins and isolated stands of trees within agricultural land (Hyem 1979) and heavily disturbed forest where its prey of small and medium sized mammals can be readily obtained (Kavanagh & Peake 1993).	Unlikely. Suitable shelter and nest hollows will not be affected. No suitable foraging habitat.	Adequately assessed in HLA (2003). Species unlikely to occur and no further assessment required.
MAMMALS (EXCLUDING BATS)						
<i>Dasyurus maculatus</i> <i>Dasyurus maculatus maculatus</i>	Spotted-tailed Quoll Spotted-tailed Quoll (SE Mainland Population)	V —	— E	The Spotted-tailed Quoll inhabits a range of forest communities including wet and dry sclerophyll forests, coastal heathlands and rainforests (Mansergh 1984; NPWS 1999j), more frequently recorded near the ecotones of closed and open forest. This species requires habitat features such as maternal den sites, an abundance of food (birds and small mammals) and large areas of relatively intact vegetation to forage in (NPWS 1999j). Maternal den sites are logs with cryptic entrances; rock outcrops; windrows; burrows (Environment Australia 2000).	Unlikely. Potential den sites absent from study area. No suitable foraging habitat.	Adequately assessed in HLA (2003). Species unlikely to occur and no further assessment required. Assessment under EPBC not required, as unlikely to occur.
<i>Petaurus norfolcensis</i>	Squirrel Glider	V	—	Associated with dry hardwood forest and woodlands (Menkhorst et al. 1988; Quin 1995). Habitats typically include gum barked and high nectar producing species, including winter flower species (Menkhorst et al. 1988). The presence of hollow bearing eucalypts is a critical habitat value (Quin 1995).	Unlikely. The study area is typically cleared pastoral land and suitable habitat is absent from the study area.	Adequately assessed in HLA (2003). Species unlikely to occur and no further assessment required.

Table : Assessment of Likelihood of Occurrence of Threatened Fauna Species E = Endangered, E2 = Endangered population, V = Vulnerable, M = Migratory, O/F = overfly marine area						
Scientific Name	Common Name	Conservation Significance		Habitat Associations	Likelihood of Occurrence	Current Level of Assessment and Requirement for Seven Part Test
		TSC Act	EPBC Act			
<i>Petrogale penicillata</i>	Brush-tailed Rock-wallaby	E	V	Rocky areas in a variety of habitats, typically north facing sites with numerous ledges, caves and crevices (Strahan 1995).	Unlikely. Suitable habitat absent from the study area.	Adequately assessed in HLA (2003). Species unlikely to occur and no further assessment required.
<i>Phascolarctos cinereus</i>	Koala	V	—	Associated with both wet and dry Eucalypt forest and woodland that contains a canopy cover of approximately 10 to 70% (Reed et al. 1990), with acceptable Eucalypt food trees. Some preferred Eucalyptus species are: <i>Eucalyptus tereticornis</i> , <i>E. punctata</i> , <i>E. cypellocarpa</i> , <i>E. viminalis</i>	Unlikely. No primary browse species occur in the study area. Suitable habitat absent from the study area.	Adequately assessed in HLA (2003). Species unlikely to occur and no further assessment required.
<i>Pseudomys oralis</i>	Hastings River Mouse	E	E	An open canopy and shrub layer appear to be the major predictive habitat features of this species (Read & Tweedie 1996). Open forest or woodland with a grassy sedge rush or heath understorey that is about 10-75cm above the ground (NPWS 1999w). Ground cover may vary from almost no cover to a dense, rank cover of grasses, herbs and sedges (DEH 2006a). Sedges, particularly <i>Carex</i> , <i>Juncus</i> and <i>Cyperus</i> spp. are common to most sites (DEH 2006a). This habitat occurs beside creeks (permanent and ephemeral) and soakages, but is also found on ridges and grassy Plains (DEH 2006a). Shelter areas such as rock piles, hollow logs, yabby burrows or cavities in the butts of large old trees are also required to be present (NPWS, 1999w).	Unlikely. No suitable dense ground habitat.	Adequately assessed in HLA (2003). Species unlikely to occur and no further assessment required. Assessment under EPBC not required, as unlikely to occur.
MAMMALS (BATS)						

Table : Assessment of Likelihood of Occurrence of Threatened Fauna Species						
E = Endangered, E2 = Endangered population, V = Vulnerable, M = Migratory, O/F = overfly marine area						
Scientific Name	Common Name	Conservation Significance		Habitat Associations	Likelihood of Occurrence	Current Level of Assessment and Requirement for Seven Part Test
		TSC Act	EPBC Act			
<i>Chalinolobus dwyeri</i>	Large-eared Pied Bat	V	V	Recorded in a variety of habitats, including dry sclerophyll forests, woodland, sub-alpine woodland, edges of rainforests and wet sclerophyll forests (Churchill 1998; NPWS 2005p). This species roosts in caves, rock overhangs and disused mine shafts and as such is usually associated with rock outcrops and cliff faces (Churchill 1998; NPWS 2005p).	Unlikely. No suitable roost or forage habitat on site.	Adequately assessed in HLA (2003). Species unlikely to occur and no further assessment required. Assessment under EPBC not required, as unlikely to occur.
<i>Miniopterus schreibersii oceanensis</i>	Eastern Bent-wing Bat	V	CD	Associated with a range of habitats such as rainforest, wet and dry sclerophyll forest, monsoon forest, open woodland, paperbark forests and open grassland (Churchill 1998). It forages above and below the tree canopy on small insects (AMBS 1995, Dwyer 1995, Dwyer 1981). Will utilise caves, old mines, and stormwater channels, under bridges and occasionally buildings for shelter (Environment Australia 2000, Dwyer 1995).	Likely. Potential foraging habitat within the broader locality and possibly in the study area. No suitable roost habitat.	Adequately assessed in HLA (2003). Species unlikely to occur and no further assessment required.
<i>Mormopterus norfolkensis</i>	East Coast Freetail Bat	V	—	Most records of this species are from dry eucalypt forest and woodland east of the Great Dividing Range (Churchill 1998). Individuals have, however, been recorded flying low over a rocky river in rainforest and wet sclerophyll forest and foraging in clearings at forest edges (Environment Australia 2000; Allison & Hoyer 1998). Primarily roosts in hollows or behind loose bark in mature eucalypts, but have been observed roosting in the roof of a hut (Environment Australia 2000; Allison & Hoyer 1998).	Likely. Potential foraging habitat within the broader locality and possibly in the study area. No roost habitat will be affected. The emergent Ironbark will be retained.	Adequately assessed in HLA (2003). Species unlikely to occur and no further assessment required.

Table : Assessment of Likelihood of Occurrence of Threatened Fauna Species						
E = Endangered, E2 = Endangered population, V = Vulnerable, M = Migratory, O/F = overfly marine area						
Scientific Name	Common Name	Conservation Significance		Habitat Associations	Likelihood of Occurrence	Current Level of Assessment and Requirement for Seven Part Test
		TSC Act	EPBC Act			
<i>Myotis adversus</i>	Large-footed Myotis	V	—	Will occupy most habitat types such as mangroves, paperbark swamps, riverine monsoon forest, rainforest, wet and dry sclerophyll forest, open woodland and River Red Gum woodland, as long as they are close to water (Churchill 1998). While roosting is most commonly associated with caves, this species has been observed to roost in tree hollows, amongst vegetation, in clumps of Pandanus, under bridges, in mines, tunnels and stormwater drains (Churchill 1998). However the species apparently has specific roost requirements, and only a small percentage of available caves, mines, tunnels and culverts are used (Richards 1998).	Unlikely. No suitable roost habitat on site. No suitable forage habitat	Adequately assessed in HLA (2003). Species unlikely to occur and no further assessment required.
<i>Nyctophilus timoriensis</i>	Eastern Long-eared Bat	V	V	Preference for semi-arid areas, however, have been recorded in the high rainfall areas of south-western Australia (Churchill 1998). In South Australia this species has been associated with a range of mallee species, and found to the fringes of the treeless Nullarbor Plain (Duncan et al. 1999). In northern NSW, this species is thought to prefer structurally complex forest as foraging habitat, and breeding and sheltering is in tree hollows (Environment Australia 2000).	Unlikely. Suitable habitat (structurally complex forest) absent from study area. No local records: nearest record is in Wollemi National Park, approximately 35 km from the study area.	Adequately assessed in HLA (2003). Species unlikely to occur and no further assessment required. Assessment under EPBC not required, as unlikely to occur.
<i>Pteropus poliocephalus</i>	Grey-headed Flying-Fox	V	V	Inhabits a wide range of habitats including rainforest, mangroves, paperbark forests, wet and dry sclerophyll forests and cultivated areas (Churchill 1998, Eby 1998). Camps are often located in gullies, typically close to water, in vegetation with a dense canopy (Churchill 1998).	Likely. Potential foraging habitat within the broader locality and possibly in the study area. The emergent Ironbark will be retained.	Adequately assessed in HLA (2003). Species unlikely to occur and no further assessment required. Assessment under EPBC required as likely to occur and not previously assessed.

Table : Assessment of Likelihood of Occurrence of Threatened Fauna Species						
E = Endangered, E2 = Endangered population, V = Vulnerable, M = Migratory, O/F = overfly marine area						
Scientific Name	Common Name	Conservation Significance		Habitat Associations	Likelihood of Occurrence	Current Level of Assessment and Requirement for Seven Part Test
		TSC Act	EPBC Act			
<i>Scoteanax rueppellii</i>	Greater Broad-nosed Bat	V	—	Associated with moist gullies in mature coastal forest, or rainforest, east of the Great Dividing Range (Churchill, 1998), tending to be more frequently located in more productive forests (Hoye & Richards 1998). Within denser vegetation types use is made of natural and man made openings such as roads, creeks and small rivers, where it hawks backwards and forwards for prey (Hoye & Richards 1998).	Unlikely. No suitable dense forest habitats in the study area.	Adequately assessed in HLA (2003). Species unlikely to occur and no further assessment required.
MIGRATORY TERRESTRIAL SPECIES LISTED UNDER EPBC ACT						
<i>Haliaeetus leucogaster</i>	White-bellied Sea-Eagle	—	M	Forages over large open fresh or saline waterbodies, coastal seas and open terrestrial areas (Marchant & Higgins 1993, Simpson & Day 1999). Breeding habitat consists of tall trees, mangroves, cliffs, rocky outcrops, silts, caves and crevices and is located along the coast or major rivers. Breeding habitat is usually in or close to water, but may occur up to a kilometre away (Marchant & Higgins 1993).	Unlikely. No suitable open water available for foraging.	Species unlikely to occur and no further assessment under EPBC required.
<i>Hirundapus caudacutus</i>	White-throated Needletail	—	M	Forages aerially over a variety of habitats usually over coastal and mountain areas, most likely with a preference for wooded areas (Marchant & Higgins 1993; Simpson & Day 1999). Has been observed roosting in dense foliage of canopy trees, and may seek refuge in tree hollows in inclement weather (Marchant & Higgins 1993).	Likely. May overfly study area.	Not assessed according to the EPBC by HLA (2003). Assessment under EPBC Act required.
<i>Monarcha melanopsis</i>	Black-faced Monarch	—	M	Rainforest and eucalypt forests, feeding in tangled understorey (Blakers et al. 1984).	Unlikely. Suitable habitat absent from study area.	Species unlikely to occur and no further assessment under EPBC required.

Table : Assessment of Likelihood of Occurrence of Threatened Fauna Species						
E = Endangered, E2 = Endangered population, V = Vulnerable, M = Migratory, O/F = overfly marine area						
Scientific Name	Common Name	Conservation Significance		Habitat Associations	Likelihood of Occurrence	Current Level of Assessment and Requirement for Seven Part Test
		TSC Act	EPBC Act			
<i>Myiagra cyanoleuca</i>	Satin Flycatcher	—	M	Associated with drier eucalypt forests, absent from rainforests (Blakers et al. 1984), open forests, often at height (Simpson & Day 1999).	Unlikely. No local records.	Species unlikely to occur and no further assessment under EPBC required.
MIGRATORY WETLAND SPECIES LISTED UNDER EPBC ACT						
<i>Gallinago hardwickii</i>	Latham's Snipe	—	M	A variety of permanent and ephemeral wetlands, preferring open fresh water wetlands with nearby cover (Marchant and Higgins 1999). Occupies a variety of vegetation around wetlands (Marchant and Higgins 1999) including wetland grasses and open wooded swamps (Simpson and Day 1999).	Unlikely. Suitable habitat absent from study area.	Species unlikely to occur and no further assessment under EPBC required.
<i>Rostratula benghalensis s. lat.</i>	Painted Snipe	—	M	Shallow fresh water for breeding (Blakers et al. 1984) forages in marshes with moderate cover (Simpson and Day 1999).	Unlikely. Suitable habitat absent from study area.	Species unlikely to occur and no further assessment under EPBC required.
OTHER MATTERS PROTECTED BY EPBC ACT – LISTED MARINE SPECIES						
<i>Apus pacificus</i>	Fork-tailed Swift	—	O/F	Aerial species usually occurring in flocks, sometimes immense. Movements often precede or accompany thunderstorms. Feeds with erratic flutters and turns. Roosting has not been observed in Australia, but may spend nights on wing under circumstances. Breeds in Siberia and Himalayas east to Japan, south to China, Taiwan and south-east Asia; regular migrant, arriving in northern Australia early October (Pizzey and Doyle 1988).	Likely. May overfly study area.	No assessment required under EPBC Act

Table : Assessment of Likelihood of Occurrence of Threatened Fauna Species						
E = Endangered, E2 = Endangered population, V = Vulnerable, M = Migratory, O/F = overfly marine area						
Scientific Name	Common Name	Conservation Significance		Habitat Associations	Likelihood of Occurrence	Current Level of Assessment and Requirement for Seven Part Test
		TSC Act	EPBC Act			
<i>Ardea alba</i>	Great Egret	—	O/F	Cosmopolitan species widespread in the Americas, Africa, the Indian subcontinent, South-east Asia and Papua New Guinea (McKilligan 2005). Nests in mixed-species colonies where it claims a nest site in a commanding position in the tree (<i>ibid</i>). Feeds in a wide range of wet and dry habitats, including permanent and ephemeral freshwaters, wet pasture and estuarine mangroves and mudflats (<i>ibid</i>). Usually feeds along in open shallows to a depth of about 30 cm (<i>ibid</i>).	Unlikely. Suitable habitat absent from study area.	No assessment required under EPBC Act
<i>Ardea ibis</i>	Cattle Egret	—	O/F	Resident in Australia (McKilligan 2005). Forages on pasture, marsh, grassy road verges, rain puddles and croplands, but not usually in the open water of streams or lakes, and they avoid marine environments (<i>ibid</i>). Not restricted to wetlands (<i>ibid</i>).	Likely. May forage in study area, particularly at river end of pipeline route.	No assessment required under EPBC Act
<i>Merops ornatus</i>	Rainbow Bee-eater	—	O/F	Resident in coastal and subcoastal northern Australia; regular breeding migrant in southern Australia, arriving September to October, departing February to March, some occasionally present April to May (Pizzey and Doyle 1988). Occurs in open country, chiefly at suitable breeding places in areas of sandy or loamy soil: sand-ridges, riverbanks, road-cuttings, sand-pits, occasionally coastal cliffs (<i>ibid</i>). Nest is a chamber at the end of a burrow, up to 1.6 m long, tunnelled in flat or sloping ground, sandy back or cutting (<i>ibid</i>).	Likely. Suitable habitat within study area. Recorded at Freshwater Dam near Bayswater Power Station (A.Finegan, Connell Wagner, pers. obs.).	No assessment required under EPBC Act

Disclaimer: Data extracted from the Atlas of NSW Wildlife are only indicative and cannot be considered a comprehensive inventory. In recognising this, a literature review complemented by appropriate field survey has been undertaken that targets a larger number of species than is listed in Table 4.

- Allison, F.R. and Hoye, G.A. (1998) 'Eastern Freetail-bat', In: Strahan, R. (Ed.) *The Mammals of Australia*, pp. 484-485, Australian Museum/ Reed Publications, Sydney.
- Australian Museum Business Services (1995) *Fauna impact statement for proposed forestry activities in the Urbenville Management Area.*, Report prepared for State Forests of New South Wales. Australian Museum Business Services, Sydney.
- Blakers, M., Davies, S., and Reilly, P.N (1984) *The Atlas of Australian Birds*. RAOU Melbourne University Press.
- Churchill, S. (1998) *Australian Bats*, Reed New Holland, Sydney.
- Debus, S.J.S. and Chafer, C.J. (1994) 'The Powerful Owl *Ninox strenua* in New South Wales', *Australian Birds*. 28:s21-s38.
- Debus, S.J.S. (1997) 'The Barking Owl in New South Wales', *Australian Birds*, 30(3).
- Department of Environment and Conservation NSW (2005a) *Green and Golden Bell Frog (Litoria aurea) Draft Recovery Plan*, Department of Conservation and Environment NSW, Hurstville.
- Department of Environment and Conservation NSW (2005d) *Speckled Warbler – profile*, <http://threatenedspecies.environment.nsw.gov.au/tsprofile/profile.aspx?id=10722>
- Department of Environment and Conservation NSW (2005e) *Diamond Firetail – profile*, <http://threatenedspecies.environment.nsw.gov.au/tsprofile/profile.aspx?id=10768>
- Department of the Environment and Heritage (2006a). *Pseudomys oralis* in Species Profile and Threats Database, Department of the Environment and Heritage, Canberra. Available from: <http://www.deh.gov.au/sprat>, Accessed 18/7/2006.
- Duncan, A, Baker, GB and Montgomery, N (eds) (1999) *The Action Plan for Australian Bats*, Environment Australia, Canberra.
- Dwyer, P.D. (1981) 'Common Bent-wing Bat, *Miniopterus schreibersii*', *ANH*, 20(6):187-190.
- Dwyer, P.D. (1995) 'Common Bent-wing Bat (*Miniopterus schreibersii*)', In: R. Strahan (Ed.) *The Australian Museum Complete Book of Australian Mammals*, pp494-495, Angus and Robertson Publishers, Sydney.
- Eby, P. (1998) 'An analysis of the diet specialisation in frugivorous *Pteropus poliocephalus* in Australian subtropical rainforest', *Austral Ecology*, 23:443-456
- Ehmann, E. (1997) *Threatened Frogs of New South Wales: Habitats, status and conservation*, Frog and Tadpole Study Group, Sydney.
- Environment Australia (2000) *Comprehensive and Regional Assessments for North-East NSW*. Report to National Parks and Wildlife Service.
- Garnett, S. (Ed) (1993). *Threatened and extinct birds of Australia*. Royal Australian Ornithologists Union and Australian NPWS, Royal Australian Ornithologists Union Report, No. 82.
- Hoye, G. and Richards, G. (1998) 'Greater Broad-nosed Bat', In: Strahan, R. (ed.) *The Australian Museum Complete Book of Australian Mammals*, Angus and Robertson Publishers, Sydney.
- Hyem, E.L. (1979) 'Observation on Owls in the Upper Manning River District, New South Wales', *Corella*, 3(2):17-25.
- Kavanagh, R.P. and Peake, P. (1993) 'Distribution and habitats of nocturnal forest birds in south-eastern New South Wales', In: Olsen, P. (Ed.). *Proceedings of the 10th Anniversary Conference*, Canberra, pp 86-100, Australian Raptor Association, Royal Ornithologists Union, Sydney.
- Mahony, M. (1999) 'Review of the declines and disappearances in the Bell frog species group (*Litoria aurea* species group) in Australia', In: Campbell, A. (Ed.) *Declines and Disappearances of Australian Frogs*, pp 81-93, Biodiversity Group Environment Australia, Canberra.

-
- Mansergh, I. M. (1984) 'The status, distribution and abundance of *Dasyurus maculatus* (Tiger Quoll) in Australia with particular reference to Victoria', *Australian Zoology*, 21(2):109-22.
- Marchant and Higgins (1993) *Handbook of Australian, New Zealand and Antarctic Birds*. Oxford University Press, Melbourne.
- Menkhorst, P., Weavers, B. and Alexander, J. (1988) 'Distribution, habitat and conservation status of the Squirrel Glider *Petaurus norfolcensis* in Victoria', *Aust. Wildl. Res.* 15: 59 -71
- NSW National Parks and Wildlife Service (1995) *Endangered Fauna of Western New South Wales*, NSW National Parks and Wildlife Service, Hurstville.
- NSW National Parks and Wildlife Service (1997) *Urban Bushland Biodiversity Study - Western Sydney*, National Parks and Wildlife Service.
- NSW National Parks and Wildlife Service (1999j) *Threatened Species Information: Spotted-tailed Quoll*, National Parks and Wildlife Service, Hurstville
- NSW National Parks and Wildlife Service (1999m) *Threatened Species Information: Green and Golden Bell Frog*, National Parks and Wildlife Service, Hurstville
- NSW National Parks and Wildlife Service (1999u) *Threatened Species Information: Broad-headed Snake*, National Parks and Wildlife Service, Hurstville
- NSW National Parks and Wildlife Service (1999v) *Threatened Species Information: Freckled Duck*, National Parks and Wildlife Service, Hurstville
- NSW National Parks and Wildlife Service (1999w) *Threatened Species Information: Hastings River Mouse*, National Parks and Wildlife Service, Hurstville
- NSW National Parks and Wildlife Service (2003) *Recovery Plan for the Barking Owl (Ninox connivens) Draft*, National Parks and Wildlife Service, Hurstville.
- NSW National Parks and Wildlife Service (2005d) *Northern Directorate Giant Barred Frog Mixophyes iteratus*, <http://maps.nationalparks.nsw.gov.au/keyhabs/pdf/GiantBarredFrog.pdf>
- NSW National Parks and Wildlife Service (2005m) *Northern Directorate – Masked Owl Tyto novaehollandiae*, <http://maps.nationalparks.nsw.gov.au/keyhabs/pdf/MaskedOwl.pdf>
- NSW National Parks and Wildlife Service (2005p) *Northern Directorate – Large-eared Pied Bat Chalinolobus dwyeri*, <http://maps.nationalparks.nsw.gov.au/keyhabs/pdf/Large-earedPiedBat.pdf>
- NSW Scientific Committee (1999a) *Final Determination: Giant Barred Frog – Endangered Species Listing*, National Parks and Wildlife Service, Hurstville.
- NSW Scientific Committee (2000a) *Final Determination: Little John's Tree Frog – Vulnerable Species Listing*, National Parks and Wildlife Service, Hurstville.
- NSW Scientific Committee (2001a) *Final Determination: Brown Treecreeper (Eastern Subspecies) – Vulnerable Species Listing*, National Parks and Wildlife Service, Hurstville.
- NSW Scientific Committee (2001b) *Final Determination: Hooded Robin (Southeastern Form) – Vulnerable Species Listing*, National Parks and Wildlife Service, Hurstville.
- NSW Scientific Committee (2001c) *Final Determination: Black-chinned Honeyeater (Eastern Subspecies) – Vulnerable Species Listing*, National Parks and Wildlife Service, Hurstville.
- NSW Scientific Committee (2001d) *Final Determination: Grey-crowned Babbler (Eastern Subspecies)*, National Parks and Wildlife Service, Hurstville.
- Pizzey, G. and Doyle, R.B. (1988). *A field guide to the birds of Australia*. Collins Publishers, Sydney.
- Pyke, G.H and White, A.W. (1996) 'Habitat requirements for the Green and Golden Bell Frog *Litoria aurea* (Anura:Hylidae)', *Australian Zoologist*, 30(2):177-189.

-
- Quinn, D.G. (1995) 'Population ecology of the Squirrel Glider and the Sugar Glider at Limeburners Creek, on the Central North Coast of NSW', *Wildlife Research*. 22: 471-505.
- Read, D. and Tweedie, T. (1996) "Floristics of habitats of *Pseudomys oralis* (Rodentia: Muridae)", *Wildlife Research*, 23:485-493.
- Reed, P.C., Lunney, D. and Walker, P. (1990) 'A 1986-7 survey of the Koala *Phascolarctos cinereus* in NSW and an ecological interpretation of its distribution', In: *Biology of the Koala*, pp: 55-74.
- Richards, G.C. (1988) 'Large-footed Mouse-eared Bat (*Myotis adversus*)', In: Strahan, R (Ed.) *The Australian Museum Complete Book of Australian Mammals*, Angus and Robertson Publishers, Sydney.
- Robinson, M. (1993) *A Field Guide to Frogs of Australia: from Port Augusta to Fraser Island including Tasmania*, Australian Museum/Reed New Holland, Chatswood.
- Schodde, R. and Tidemann, S. (Eds) (1986). *Readers Digest complete book of Australian Birds*, 2nd Edn., Reader's Digest Services Pty Ltd, Sydney.
- Simpson, K. and Day, N. (1999). *Field guide to the birds of Australia 6th edn.*, Penguin Books Australia Ltd, Ringwood Victoria.
- Strahan, R. (Ed.) (1998) *The Australian Museum Complete Book of Australian Mammals*, Angus and Robertson Publishers, Sydney.
- Webb J.K. and Shine R. (1998) 'Ecological characteristics of a threatened snake species *Hoplocephalus bungaroides* (Serpentes: Elapidae)', *Animal Conservation*, 1: 185-193.

Table : Assessment of Likelihood of Occurrence of Threatened Flora Species						
Scientific Name	Common Name	Conservation Significance		Habitat Associations	Likelihood of Occurrence	Current Level of Assessment and Requirement for Seven Part Test
		TSC Act	EPBC Act			
WETLANDS OF INTERNATIONAL SIGNIFICANCE						
	Hunter Estuary Wetlands		Ramsar site	Hunter Estuary Wetlands comprises Kooragang Nature Reserve and Shortland Wetlands. The Wetlands encompass an area of 2,971 ha and supports up to 250 species of birds, including listed threatened and migratory species under both the EPBC Act and TSC Act (DEH, 2002).	Likely. The study area does not contain wetland habitats, but is within the same catchment of the Hunter Estuary Wetlands.	The study area is within the same catchment of the Hunter Estuary Wetlands. Given the site is greater than 80 km from the Hunter Estuary Wetlands, the proposed action is unlikely to impact upon this wetland of international importance. No further assessment required.
THREATENED ECOLOGICAL COMMUNITIES						
	White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland	EEC	Critically Endangered	Found on relatively fertile soils on the tablelands and western slopes of NSW. White Box Yellow Box Blakely's Red Gum Woodland is characterised by one or more of the following species in varying proportions and combinations - <i>Eucalyptus albens</i> (White Box), <i>Eucalyptus melliodora</i> (Yellow Box) or <i>Eucalyptus blakelyi</i> (Blakely's Red Gum). Grass and herbaceous species generally characterise the ground layer. In some locations, the tree overstorey may be absent as a result of past clearing or thinning and at these locations only an understorey may be present. Shrubs are generally sparse or absent, though they may be locally common (NPWS, 2002).	Unlikely. The study area has been subject to long term disturbance (ie pastoral use, infrastructure). No Box species occur in the study area. Invasive grasses and annuals dominated the ground cover.	Unlikely to occur, further assessment not required
PLANTS						

Table : Assessment of Likelihood of Occurrence of Threatened Flora Species						
Scientific Name	Common Name	Conservation Significance		Habitat Associations	Likelihood of Occurrence	Current Level of Assessment and Requirement for Seven Part Test
		TSC Act	EPBC Act			
<i>Bothriochloa biloba</i>	Lobed Bluegrass	V	V	Found on red earth soils and associated with Bimble Box (<i>Eucalyptus populnea</i>) woodland communities (Cunningham <i>et. al.</i> 1992). Flowers in summer (Plantnet 2007). Few sub-coastal records, with most records on the northern tablelands and extending north to the southern Queensland (Plantnet 2007).	Unlikely. The study area has been subject to long term disturbance (ie pastoral use, infrastructure). Invasive grasses and annuals dominated the ground cover.	Adequately assessed in HLA (2003). Species unlikely to occur and no further assessment required. Assessment under EPBC not required, as unlikely to occur.
<i>Digitaria porrecta</i>	Finger Panic Grass	E	E	Native grassland, woodlands or open forest with a grassy understorey, on richer soils (DEC 2005a). Often found along roadsides and travelling stock routes where there is light grazing and occasional fire (DEC 2005a).	Unlikely. Not known from the Hunter region	Assessment under TSC and EPBC not required, as unlikely to occur.
<i>Diuris tricolor</i> <i>Diuris sheaffiana</i>	Pine Donkey Orchid Tricolor Diuris	V	V	Grows in sclerophyll forest among grass, often with <i>Callitris</i> spp (Harden 1994). It is found in sandy soils, either on flats or small rises (DEC 2005b). Also recorded from a red earth soil in a Bimble Box community in western NSW (DEC 2005b). Soils include gritty orange-brown loam on granite, shallow red loamy sand on stony porphyry, skeletal lateritic soil and alluvial grey silty loam (DEC 2005b). Flowers from September to November or generally spring (DEC 2005b).	Unlikely. The study area has been subject to long term disturbance (ie pastoral use, infrastructure).	Assessment under TSC and EPBC not required, as unlikely to occur.

Table : Assessment of Likelihood of Occurrence of Threatened Flora Species						
Scientific Name	Common Name	Conservation Significance		Habitat Associations	Likelihood of Occurrence	Current Level of Assessment and Requirement for Seven Part Test
		TSC Act	EPBC Act			
<i>Thesium australe</i>	Austral Toadflax	V	V	Occurs in grassland or grassy woodland (DEC 2005c). Often found in damp sites in association with Kangaroo Grass (<i>Themeda australis</i>) DEC 2005c).	Unlikely. The study area has been subject to long term disturbance (ie pastoral use, infrastructure).	Assessment under TSC and EPBC not required, as unlikely to occur.
<i>Eucalyptus glaucina</i>	Slaty Red Gum	V	V	Associated with grassy woodland on deep, moderately fertile and well-watered soil (Harden 1994).	Unlikely. Recorded within 10 km of the study area, in Ravensworth State Forest. Species does not occur in the study area.	Adequately assessed in HLA (2003). Species unlikely to occur and no further assessment required. Assessment under TSC and EPBC not required, as unlikely to occur.

1. REFERENCES

Benson, D. and McDougall, L. (1994) 'Ecology of Sydney plants 2', <i>Cunninghamia</i> , 3(4): 709-1004.
Bishop, A. (1996) <i>Field guide to the orchids of New South Wales and Victoria</i> , University of New South Wales Press, Sydney.
Department of Environment and Conservation NSW (2006) Finger Panic Grass – <i>profile</i> , http://threatenedspecies.environment.nsw.gov.au/tsprofile/profile.aspx?id=10222
Department of Environment and Conservation NSW (2005b) Pine Donkey Orchid – <i>profile</i> , http://threatenedspecies.environment.nsw.gov.au/tsprofile/profile.aspx?id=10243
Department of Environment and Conservation NSW (2005a) Narrow-leaved Black Peppermint – <i>profile</i> , http://threatenedspecies.environment.nsw.gov.au/tsprofile/profile.aspx?id=10302
Department of Environment and Conservation NSW (2005c) Austral Toadflax – <i>profile</i> , http://threatenedspecies.environment.nsw.gov.au/tsprofile/profile.aspx?id=10802
Department of Environment and Heritage (2002) Media Release – Extension to Internationally Recognised NSW Wetland, http://www.deh.gov.au/minister/env/2002/mr18nov402.html
Cunningham, G.M., Mulham, W.E., Milthorpe, P.L. and Leigh, J.H. (1992), <i>Plants of Western NSW</i> . Inkata Press.
Fairley, A. and Moore P. (2000) <i>Native Plants of the Sydney District, an identification guide</i> , Kangaroo Press/S.G.A.P., Kenthurst.
Harden GJ (ed.) (1994) <i>Flora of NSW</i> Volume 4, UNSW Press, Sydney.
Harden G. (ed) (2002) <i>Flora of New South Wales</i> , Volume 2 revised edition, UNSW Press.
Maryott-Brown, K. and Wilks, D. (1993) <i>Rare and endangered plants of Yengo National Park and adjacent areas</i> , NSW NPWS, Hurstville.
NSW National Parks and Wildlife Service (1999ab) <i>Threatened Species Information: Wollemia nobilis</i> , National Parks and Wildlife Service, Hurstville.
NSW National Parks and Wildlife Service (2000ab) <i>Threatened Species Information: Olearia cordata</i> , National Parks and Wildlife Service, Hurstville.
NSW National Parks and Wildlife Service (2002) <i>Final Determination: White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland, National Parks and Wildlife Service</i> , Hurstville.
NSW National Parks and Wildlife Service (2002ab) <i>Threatened Species Information: Cynanchum elegans</i> , National Parks and Wildlife Service, Hurstville.

NSW Scientific Committee (2005aa) <i>Acacia pendulum</i> (a tree) in the Hunter Catchment – endangered population listing, National Parks and Wildlife Service, Hurstville.
NSW Scientific Committee (2005ab) <i>Eucalyptus camaldulensis</i> (a tree) in the Hunter Catchment – endangered population listing, National Parks and Wildlife Service, Hurstville.
NSW Scientific Committee (2006aa) <i>Cymbidium canaliculatum</i> – endangered population listing, National Parks and Wildlife Service, Hurstville.
Peacock, R. (1996) ROTAP Species of the Walcha/Nundle and Styx River Management Area
Plantnet (2007) Profile - <i>Bothriochloa biloba</i> http://plantnet.rbgsyd.nsw.gov.au/cgi-bin/NSWfl.pl?page=nswfl&lvl=sp&name=Bothriochloa-biloba

Appendix F

Noise impact assessment



ABN: 73 254 053 305

78 Woodglen Close
P.O. Box 61
PATERSON NSW 2421

Phone : (02) 4938 5866

Fax: (02) 4938 5831

Mobile: (0407) 38 5866

E-mail: bridgesacoustics@bigpond.com

ENVIRONMENTAL NOISE IMPACT ASSESSMENT

PROPOSED BOREHOLE INFRASTRUCTURE

NEWPAC No.1 COLLIERY

NEW ENGLAND HIGHWAY

RAVENSWORTH

REPORT J0156-01-R1

18th MARCH 2007

Prepared for:

Connell Wagner Pty Ltd

P.O. Box 19

CALLAGHAN NSW 2308

Prepared by:

Mark Bridges BE Mech (Hons) MAAS

Principal Consultant

TABLE OF CONTENTS

1	INTRODUCTION	2
2	THE SITE	2
3	EXISTING ENVIRONMENT	2
4	CRITERIA.....	4
4.1	Operational Noise	4
4.2	Construction Noise	4
5	RESULTS	5
5.1	Site Noise Sources	5
5.2	Received Noise Levels	6
5.3	Construction Noise	7
5.4	Construction Noise Management.....	8
5.5	Other Issues	8
6	CONCLUSION.....	9
	APPENDIX A1 – AREA PLAN.....	10
	APPENDIX A2 – SITE PLAN	11

1 INTRODUCTION

This report describes an assessment of environmental noise levels produced by proposed borehole infrastructure including ventilation fans, compressors and a solcenic lubricating oil system to be installed on land above the underground Colliery adjacent to the New England Highway at Ravensworth. The main focus of this assessment is noise produced by the ventilation fans and compressors, as these sources have the greatest potential to cause noise impacts to nearest residences.

The project is expected to be staged with initial construction of the ventilation shaft and a single fan, with associated power supplies and control equipment. Stage two of the project would include a second fan, the compressors, a solcenic tank and associated pumps.

The assessment is based on recommended policies and procedures described in the Department of Environment & Conservation (DEC) NSW Industrial Noise Policy (INP). This report has been commissioned by Connell Wagner Pty Ltd on behalf of Resource Pacific Limited to accompany and support a Development Application for the proposed infrastructure to the Department of Planning.

2 THE SITE

The site is located between the New England Highway and the Great Northern Railway, approximately 1300m north of Hebden Road. The land slopes down from the Highway towards the Railway and Foy Brook and has previously been cleared for stock grazing. Land on the western side of the Highway has been rehabilitated after being used for open cut coal mining, while Boral's truck depot is located approximately 800m south of the site.

Nearest residences are located approximately 800m north east of the site, on the eastern side of Hebden Road. Occupied residences at 220 Hebden Road and 246 Hebden Road have a good view of the site across the shallow valley formed by Foy Brook. Background noise levels at 246 Hebden Road were measured to determine relevant noise criteria, as part of this assessment.

Residences located within the small village of Ravensworth are approximately 1200m south of the site adjacent to Hebden Road and near the New England Highway intersection. These residences are further from the site than the residences referred to above and would receive significantly higher background and ambient noise levels due to their proximity to the New England Highway.

Plans of the site and surrounds are attached in Appendix A.

3 EXISTING ENVIRONMENT

Existing environmental noise levels were measured using an unattended noise logger attached to a tree in front of 246 Hebden Road from Friday 2nd to Monday 12th February 2007. The noise logger consisted of a Svan 949 Type 1 sound level meter programmed to measure and store 1-second LAeq noise levels for the entire measurement period. The logger was installed in a security cage attached to a tree on the road reserve in front of the residence. As the residence is set back further from the road, ambient (LAeq) noise levels due to local traffic would be substantially lower at the residence than measured by the logger. Background noise levels are primarily influenced by New England

Highway traffic rather than local traffic and would be the same at the logger location and at the residence.

Logger calibration was checked at the beginning and end of the noise survey using an 01dB Cal-01 acoustic calibrator producing 94 dB at 1kHz, with both readings within 0.2 dB from the expected value. The logger was calibrated by the manufacturer within the last two years, as required by relevant standards.

Table 1 shows a summary of background and ambient noise levels measured by the noise logger, excluding periods of extraneous noise due to winds above 5m/s or rain.

Table 1: Measured Background and Ambient Noise Levels, 246 Hebden Road, dBA.

Date	Background LA90,15min			Ambient LAeq,15min		
	Day	Evening	Night	Day	Evening	Night
Fri 2nd to Sat 3rd	36.5	37.7	30.1	62.8	59.7	56.1
Sat 3rd to Sun 4th	32.5	40.4	31.0	58.6	59.1	53.1
Sun 4th to Mon 5th	33.0	42.1	32.1	56.6	59.3	57.2
Mon 5th to Tue 6th	32.2	37.8	32.5	62.1	60.8	58.1
Tue 6th to Wed 7th	38.1	47.9	32.3	62.0	62.6	59.0
Wed 7th to Thu 8th	35.2	42.5	35.2	64.1	67.1	58.4
Thu 8th to Fri 9th	37.8	37.7	32.5	65.1	60.5	57.4
Fri 9th to Sat 10th	36.0	38.0	29.9	63.2	60.7	54.2
Sat 10th to Sun 11th	30.7	34.1	27.8	57.1	60.4	54.9
Sun 11th to Mon 12th	32.2	42.3	34.9	56.5	59.5	57.8
Mon 12th to Tue 13th	33.9	-	-	63.5	-	-
Weekly Median	33.9	39.2	32.2	62.0	61.8	57.0

Short term attended noise measurements, over 15 minute periods, were taken during the day, evening and night on Thursday 8th and Friday 9th February to assist in determining dominant sources of background and ambient noise in this area. Daytime noise levels are dominated by local Hebden Road traffic and by more distant traffic noise from the Highway, with a minor contribution from insects and birds and periods of wind noise. Evening noise levels are similar to the day with less noise due to birds and wind, with higher background noise levels due to heavier Highway traffic. Noise levels during the night were primarily influenced by distant traffic on the significant length of Highway that is visible and audible from the logger location.

No industrial noise was audible at these residences and no potentially audible industrial developments exist in this area apart from Boral's truck depot. While it is possible that truck movements within Boral's depot could be audible at these residences at times, it is clear that such noise would be below the background noise level when considering an average level of 15 minute periods, would be at least 6 dBA below the INP amenity limits in each time period so would not affect amenity criteria applying to this assessment.

4 CRITERIA

4.1 Operational Noise

Criteria for operational noise have been developed using procedures in the INP. The INP recommends two sets of noise criteria, being intrusive criteria to limit the relative audibility of the noise and amenity criteria to limit industrial noise to a level consistent with the receiver zone and land use. Intrusive criteria are set 5 dBA above the background noise level in each 15 minute period, while the amenity criteria adopted in this assessment are based on the conservative 'rural' receiver category despite a higher category such as 'suburban' or 'urban' perhaps being appropriate considering the dominant nature of traffic noise in this area. Table 2 shows intrusive and amenity criteria, with the most stringent criterion highlighted for each time period.

Table 2: Adopted Intrusive and Amenity Noise Criteria, LAeq,15min.

Date	Background LA90,15min			Criterion, LAeq,15min		
	Day	Evening	Night	Day	Evening	Night
Intrusive Criteria	34	39	32	39	44	37
Amenity Criteria	-	-	-	50	45	40

Table 2 shows the intrusive criteria are lower in all time periods and are therefore the limiting criteria for this assessment. Note that noise criteria developed to INP guidelines indicate the 'target' noise levels from the proposed industrial development and represent the levels at which noise impacts may, but will not necessarily, occur. Compliance with these targets is not mandatory.

The assessment point for industrial noise is the residential property boundary or, where the boundary is more than 30m from the residence, the potentially most affected point within 30m of the residence. Both residences are within 30m of the boundary.

While no background noise measurements have been taken at Ravensworth Village residences, background levels in this area would be similar to or higher than the measured levels further from the Highway. The noise criteria in Table 2 are therefore conservatively adopted for all residences near the site.

4.2 Construction Noise

A construction period of over 6 months is expected to be required to complete the ventilation shaft and install the first fan and associated electrical equipment proposed for Stage 1. A later Stage 2 construction period of less than 6 months would be required to install the second fan, compressors, solcenic system and associated equipment. Noise criteria for the construction period are sourced from Section 171 of the EPA's Environmental Noise Control Manual (ENCM), partly reproduced below:

Level Restrictions

- (i) *Construction period of 4 weeks and under:*

The L10 level measured over a period of not less than 15 minutes when the construction site is in operation must not exceed the background level by more than 20 dB(A).

- (ii) *Construction period greater than 4 weeks and not exceeding 26 weeks:*

The L10 level measured over a period of not less than 15 minutes when the construction site is in operation must not exceed the background level by more than 10 dB(A).

Time Restrictions

Monday to Friday, 7am to 6pm

Saturday, 7am to 1pm if inaudible on residential premises, otherwise 8am to 1pm.

No construction work to take place on Sundays or Public Holidays.

The ENCM does not recommend a construction noise criterion for a period exceeding 6 months and a criterion equal to 5 dBA above the background noise level is typically adopted. While this construction noise criterion represents an ideal target to limit noise impacts to residential receivers, exceedances of the criterion can often occur at receivers close to construction sites and some tolerance is normally expected. The LA10,15min criterion refers to the loudest 10% of the time in each 15 minute period received at a residential or other sensitive property from construction related sources.

5 RESULTS

5.1 Site Noise Sources

Significant sources proposed to operate on the site would include the ventilation fans, compressors and intermittent car and truck movements. Minor noise sources, such as the solcenic pumps, would produce insignificant noise to the nearest residences approximately 800m from the site and are not considered further.

One of the two proposed ventilation fans is currently installed elsewhere on the Newpac Colliery site and would be relocated to this proposed site. Noise measurements at various locations around the existing fan, in order to determine the sound power level of the fan and motor, were taken on 16th January 2007 using a Svan 912AE sound level analyser which measures and stores 1/3 octave percentile noise levels to Type 1 accuracy. Instrument calibration was checked before and after the measurements using an 01dB Cal-01 Type 1 acoustic calibrator which produces 94 dB at 1kHz, with each reading within the range 93.9 to 94.1 dBA. Copies of current instrument calibration certificates from a NATA-accredited laboratory are not attached to this report but are available upon request.

The existing ventilation fan is fitted with a horizontal discharge, allowing noise levels produced by the discharge duct to be measured at a number of locations and angles. This information allows an accurate sound power level, including directivity corrections for various viewing angles, to be determined as shown in Table 3. As both proposed fans would be nominally identical, both are assumed to produce the sound power levels and directivity corrections shown in Table 3.

Table 3: Measured Newpac Fan Sound Power Level and Directivity.

Measurement Direction	Octave Band Centre Frequency, dB(Lin)								Lin Total	A Total
	63	125	250	500	1k	2k	4k	8k		
Discharge centreline	117	114	116	110	108	107	104	96	123	114
45° from centreline	113	107	108	103	100	99	96	87	117	106
90° from centreline	111	105	98	95	90	89	86	78	115	98
135° from centreline #	110	103	96	94	88	89	86	77	113	97
Behind the discharge duct *	110	100	95	92	86	89	85	75	111	95

Noise levels at 135° have been interpolated from adjacent measurements rather than measured on the fan site.

* Noise levels measured directly behind the discharge duct were primarily due to the electric motor.

A total of four nominally identical air compressors are proposed for the site, with one to be relocated from another Newpac Colliery site and three to be purchased. The compressors would be Champion VOC250 models, or equivalent, fitted within acoustic enclosures including inlet silencers. Information from the currently preferred supplier indicates each compressor would produce an average of 78 dBA at 1m from the surface of the enclosure which is equivalent to a sound power level of 99 dBA per compressor and 105 dBA for four compressors operating together. A lower sound power level of 100 dBA from four compressors would be produced if the discharge ducts are fitted with insulation. The compressors are expected to produce an impulsive noise and a 5 dBA penalty is assumed to apply as recommended by the INP.

Car and truck movements would occur intermittently on the site to deliver consumables such as solcenic oil and for regular inspection and maintenance. The site would primarily be visited during the day but occasional visits may be made during the evening and night. Sound power levels produced by cars and trucks vary depending on the vehicle and its speed. Typical sound power levels of 90 dBA for diesel powered four wheel drive cars or utilities and 108 dBA for trucks are assumed for this assessment. One car and one truck are assumed to either enter or leave the site in a typical 15 minute period and would produce an average sound power level of 98 dBA, although it is expected that no vehicle movements would occur during the majority of 15 minute periods.

5.2 Received Noise Levels

As the nearest residences are approximately 800m from the site, variations in weather conditions from time to time can have a significant effect on received noise levels. A noise model of the site and surrounds was therefore established using RTA Technology's Environmental Noise Model (ENM) software. A representative ground section from the site to residences was determined from the topographic map included in Appendix A1 combined with an inspection of the site and surrounds.

The model was initially used to determine received noise levels with the fan discharge facing east north east as shown in Appendix A2. Initial results showed exceedances of the criteria were likely to occur with horizontal discharge ducts facing generally towards residences, while vertical discharge ducts would provide acceptable noise levels from the fans to all residences.

Similarly, initial noise model results indicated potential exceedances of the noise criteria with four compressors operating in an exposed area of the site, in the absence of discharge duct insulation and considering the 5 dBA impulsive penalty. Results indicate a reduction of 4 dBA is required to provide acceptable noise levels and could be achieved by installing insulation to the discharge ducts as offered by the supplier.

Table 4 shows received noise levels under various weather conditions with vertical discharge fans and discharge duct insulation on the compressors. Noise enhancing weather conditions include a 3m/s breeze from source to receiver during the day and evening and a 3°C/100m inversion during the night. A breeze towards the receiver is not included with the inversion as the Foy Brook valley runs from the receiver to the source.

Table 4: Predicted Received Noise Levels, With Noise Control, LAeq,15min.

Noise Source	Neutral Weather Conditions		Noise Enhancing Conditions	
	Day/Evening	Night	Day/Evening	Night
Two Vent Fans	27	28	32	30
Four Compressors *	31	32	36	34
Vehicle Movements	24	25	29	27
Total Received Level	33	34	38	36
Noise Criteria	39	37	39	37

* Including a 5 dBA impulsive penalty that may apply to compressor noise.

Table 4 shows acceptable noise levels compared to relevant criteria with vertical discharge vent fans and insulated discharge ducts on the compressors. It should be noted that vehicle movements on the site would sound very similar to existing vehicle movements on the nearby Boral Transport truck depot and traffic on the Highway. Residents are therefore unlikely to notice such vehicle movements during any time period.

Other equipment proposed to be installed on the site includes electrical equipment such as power supplies, control and monitoring equipment, staff amenities and the solcenic oil tanks and pumps. Solcenic pumps are relatively small units that are expected to produce a sound power level at least 10 dBA below that produced by the fans and compressors, so no detailed assessment of these units is warranted. No other anticipated sources would be audible at any residence.

5.3 Construction Noise

Construction work on the site is assumed to require the following or equivalent construction equipment:

- Two excavators,
- Three trucks,
- One grader,
- Two rollers,
- One bobcat,
- One backhoe loader,
- One drilling/raiseboring machine,
- Two mobile cranes,
- Two air compressors,
- Various powered hand tools including concrete vibrators, grinders and welders,
- Various unpowered hand tools including hammers.

A total site sound power level of approximately 118 dBA is expected during the construction period, assuming most listed machines operate simultaneously on various areas of the site. The noise model was modified to represent worst case construction noise levels with all listed plant operating, with results indicating a received noise level in the range 38 to 47 LA10,15min depending on weather conditions during the day. Construction noise levels would therefore exceed the criterion at times, in the absence of noise control measures, but would be acceptable for much of the construction period at all residences.

Drilling and raiseboring are often continued into the night to minimise daily costs associated with the raiseboring machine. This machine operating alone, or with occasional light vehicle movements, would produce a noise level up to 30 dBA during the night under noise enhancing weather conditions based on a typical sound power level of 100 dBA for this machine. Drilling and raiseboring can therefore occur at night if required provided the site sound power level, including all significant noise sources and considering shielding or other noise control measures if such measures are adopted, does not exceed 106 LAeq,15min in the direction of any residence.

5.4 Construction Noise Management

Construction noise levels can be minimised to the lowest cost effective and practical level by adopting the following management measures:

- Minimise audible noise from the site outside the normal construction hours of 7am to 6pm Monday to Friday and 8am to 1pm Saturday,
- Choose appropriate machines for each task and adopt efficient work practises to minimise the total construction period and the number of noise sources operating on the site. Avoid unnecessary noise due to idling diesel engines and fast engine speeds when lower speeds are sufficient,
- Ensure all machines used on the site are in good condition, with particular emphasis on exhaust silencers, covers on engines and transmissions and squeaking or rattling components. Excessively noisy machines should be repaired or removed from the site,
- Machines with excessively noisy reverse alarms should similarly be modified or removed from the site,
- Ideally, discuss the proposed construction work with residents before work begins, including machines required on the site and the expected construction program. Residents are generally more willing to accept a period of construction noise if they realise it will only occur for a limited time period and all reasonable steps are being taken to reduce noise,
- Should particular activities be required at night, such as drilling, raiseboring or delivery of large or heavy items, every effort should be made to warn residents a few days in advance and minimise noise produced by the activity,

These recommendations would not necessarily result in compliance with the noise criterion during worst case noise enhancing weather conditions but will provide the lowest construction noise levels that are practically and economically achievable.

5.5 Other Issues

A detailed sleep disturbance assessment is not required as no sources likely to cause sleep disturbance are expected to operate on the site, and most construction work would occur during the

day. Any construction activities required to continue at night, such as drilling and raiseboring, would not normally involve sources that are likely to cause sleep disturbance.

A detailed road traffic noise assessment is similarly not required as all construction and operational traffic would access the site via the New England Highway, which carries significant traffic volumes including a high proportion of trucks during the day and night. Vehicle movements associated with the site would have an insignificant effect on noise levels from the Highway to any residence or other noise sensitive property.

6 CONCLUSION

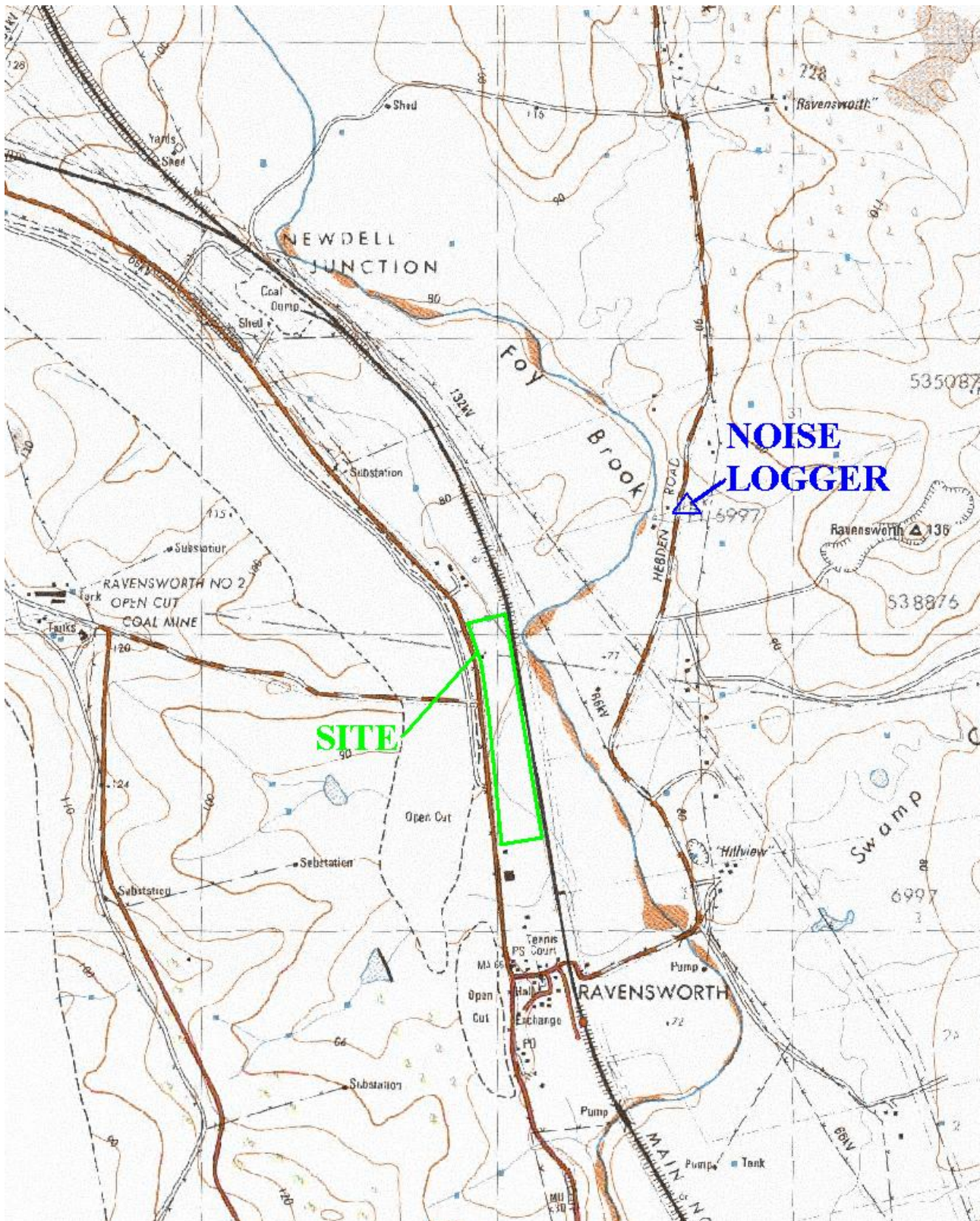
This assessment of noise levels from the proposed borehole infrastructure site adjacent to the New England Highway at Ravensworth shows appropriate noise criteria can be achieved at closest residences to the site with minimal noise control measures being adopted. The main ventilation fans should be fitted with vertical discharge ducts and the compressors should be fitted with insulated discharge ducts as offered by the currently preferred supplier.

Relatively minor exceedances of the conservative construction noise criterion may occur during busy periods that coincide with noise enhancing weather conditions such as a light south westerly breeze. Such a breeze typically occurs less than 10% of the time, based on previous analysis of Hunter Valley weather conditions, so construction noise exceedances would occur rarely. Noise mitigation measures have been recommended to minimise the chance of construction noise levels over the criterion.

No sleep disturbance or road traffic noise issues are expected to occur due to the nature of the site and its location adjacent to the New England Highway. Residents currently receive relatively high traffic noise levels during the day and night and such noise would effectively mask most construction and operational noise sources on the site.

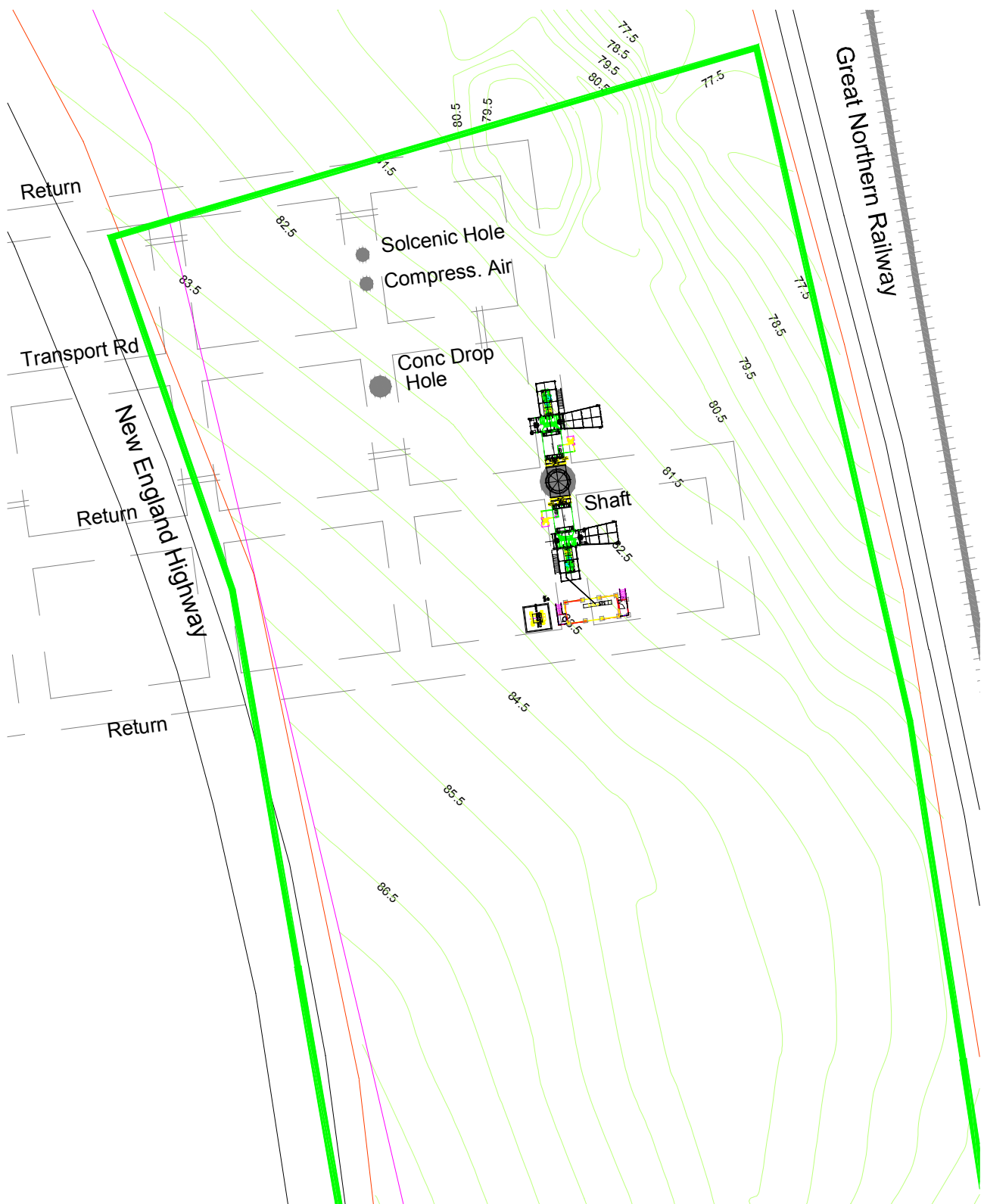
Based on the results of this assessment, the proposed borehole infrastructure site should produce a satisfactory level of environmental noise and is recommended for acceptance.

APPENDIX A1 – AREA PLAN



Closest residences are adjacent to the location of the noise logger but are not clearly shown on the topographic map.

APPENDIX A2 – SITE PLAN



Plan extracted from a drawing supplied by Connell Wagner. The grid of return and transport roads visible on the plan are underground mine features rather than surface features.