Hunter Enviro-Mining (Operations) Pty Limited

Chitter and Tailings Reclamation Project
Cessnock, NSW



Wells Environmental Services

October 2007

TABLE OF CONTENTS

1 INTRODUCTION 2

1.1 HEM 2
1.2 PROJECT APPLICATION 2
1.3 THE PREFERRED PROJECT REPORT 2
1.4 OVERVIEW OF THE PREFERRED PROJECT 2
1.5 STRUCTURE OF THIS REPORT 3

2 OVERVIEW OF ORIGINAL CHITTER AND TAILINGS RECLAMATION PROJECT 4

2.1 OBJECTIVES OF HEM 4
2.2 THE PROJECT AS ORIGINALLY PROPOSED 4
2.3 THE PROCESS TO DATE 6
2.3.1 Planning Focus Meeting 6
2.3.2 Project Application 6
2.3.3 Notice of Application 6
2.3.4 Environmental Assessment Requirements 6
2.3.5 Environmental Assessment Report 6
2.3.6 Consultation 7
2.3.7 Preferred Project Report 7

3 PUBLIC EXHIBITION 8

3.1 PUBLIC SUBMISSIONS TO EXHIBITION OF THE PROJECT 8
3.2 SUBMISSION ISSUES 8
3.3 SUBMISSIONS BY GOVERNMENT AGENCIES 8

4 RESPONSE TO SUBMISSIONS 9

5 PREFERRED PROJECT 12

5.1 OBJECTIVES OF PREFERRED PROJECT 12
5.2 PREFERRED PROJECT DESCRIPTION 12
5.2.1 Haulage Routes 12
5.3 REVISED STATEMENT OF COMMITMENTS 20

6 PREFERRED PROJECT ASSESSMENT 23

6.1 TRAFFIC 23
6.1.1 Overview 23
6.1.2 Traffic Assessment of the Preferred Project 23
6.2 ECOLOGY 24
6.2.1 Overview 24
6.2.2 Ecological Assessment of the Preferred Project 24
6.3 METEOROLOGICAL MONITORING 26
6.3.1 Wind Speed and Direction 26
6.4 AIR QUALITY 27
6.4.1 Air Quality Mitigation Measures 27
6.4.2 Air Quality Monitoring 27
6.5 NOISE 27
6.5.1 Acoustical Benefits of Preferred Project 27
6.5.2 Justification of Model Inputs and Model Verification 28
6.5.3 Non-Public Haulage Roads 28

6.5.4 Aberdare Pre-school 28
6.6 HERITAGE 29
6.6.1 Overview 29
6.6.2 Statement of Heritage Impact of Preferred Project 29

7 CONCLUSIONS 30

TABLES

Table 1: Summary of Major Issues and HEM Response 9

FIGURES

Figure 1: Location of the chitter and tailings reclamation areas. 5
Figure 2: The Preferred Haulage routes. 13
Figure 3: The Alternative Haulage route (if the Preferred Haulage route cannot be used). 17

APPENDICES

Appendix 1 Director Generals Requirements
Appendix 2 Notice for Public Exhibition of Environmental Assessment Report
Appendix 3 Letter from Director General requesting a Preferred Project Report
Appendix 4 Response to Government Submissions
Appendix 5 Response to Individual Submissions
Appendix 6 Response to Interest Group Submissions
Appendix 7 Traffic Impact Assessment – Sinclair Knight Merz Pty Limited
Appendix 8 Ecological Impact Assessment – Ecovision Consulting
Appendix 9 Noise Impact Review – Spectrum Acoustics
Appendix 9A Receptor Noise Levels – Spectrum Acoustics / Wells Environmental Services
Appendix 10 Statement of Heritage Impact – Wells Environmental Services

ABBREVIATIONS

A

ABE Aberdare East
ACARP Australian Coal Association Research Program
AEMR Annual Environmental Management Report
AHD Australian Height Datum
ANZECC Australian and New Zealand Environment and Conservation Council
ARD Acid Rock Drainage
ARI Average Recurrence Interval
AS Australian Standard

B - C

CO_2 carbon dioxide
CPP Coal Preparation Plant
CHPP Coal Handling Preparation Plant
CSIRO Commonwealth Scientific and Industrial Research Organisation
Cu Copper

D

DA development application
dB decibel
dB(A) A weighted decibel
dB(L) Linear decibel
DEC Department of Environment and Conservation (now DECC)
DECC Department of Environment and Climate Change
DGRs Director General's requirements
DMR Department of Mineral Resources
DoP Department of Planning
DPI-MR Department of Primary Industries – Mineral Resources
DNR Department of Natural Resources (now DWE)
DUAP Department of Urban Affairs and Planning (now DoP)
DWE Department of Water and Energy

E

EA Environmental Assessment
ECRTN Environmental Criteria for Road Traffic Noise (EPA, 1999)
EEC Endangered Ecological Communities
EMP Environmental Management Plan
EMS Environmental Management System
ENCM Environmental Noise Control Manual (EPA, 1994)
ENM environmental noise model
EP&A Act 1979 *Environmental Planning and Assessment Act* 1979 (NSW)
EP&A Regs,2000 *Environmental Planning and Assessment Regulation* 2000 (NSW)
EPA Environment Protection Authority of NSW (now DECC
EPBC Act *Environment Protection and Biodiversity Conservation Act* 1999 (Commonwealth)
EPL Environment Protection Licence

F - G

g/m^2/month grams per square metre per month

H

ha hectares
HEM Hunter Enviro-Mining (Operations) Pty Limited
HRSTS Hunter River Salinity Trading Scheme
HVAS high volume air sampler
HVS high volume sampler

I

INP Industrial Noise Policy

K

kcal kilocalories
kg kilograms
kL kilolitres
km kilometres
kph kilometres per hour

L

LEP Local Environmental Plan
LGA Local Government Area

M

m metres
m/s metres per second
Mg magnesium
µg/m^3 micrograms per cubic metre
MJ megajoules
ML megalitres
mL millilitres
ML Mining Lease
MLA Mining Lease Application
mm millimetres
MOP Mining Operation Plan
MR Main Road
MSB Mine Subsidence Board
MSDS Material Safety Data Sheets
Mt million tonnes
Mtpa million tonnes per annum

N

Na Sodium
NAF Non-acid forming
NGGI National Greenhouse Gas Inventory
NGRS National Greenhouse Response Strategy
NGS National Greenhouse Strategy
NPWS National Parks and Wildlife Service
NSW New South Wales

P

PAF Potentially acid forming
PAF-LC Potentially acid forming low capacity
PFM Planning Focus Meeting
PM_{10} particulate matter with a diameter less than 10 micrometres
POEO Act *Protection of the Environment Operations Act* 1997 (NSW)
PPR Preferred Project Report

R

RBL Rating Background Level
RFS Rural Fire Service
RME Richmond Main East
ROM run-of-mine
RTA Roads and Traffic Authority
ECRTN Environmental Criteria for Road Traffic Noise (EPA 1999)

S

SEPP State Environmental Planning Policy
SOC Statement of Commitments

T

t tonne
TAPM The Air Pollution Model
tph tonnes per hour
TSC Act *Threatened Species Conservation Act* 1995 (NSW)
TSP total suspended particulate matter, usually in the size range of zero to 50 micrometres.
TSS Total suspended solids

U - V - W

WES Wells Environmental Services

Y

yr Year

Z

Zn Zinc

1 Introduction

1.1 HEM

Hunter Enviro-Mining (Operations) Pty Limited (HEM) is an Australian owned company based in the Hunter Valley. The Hebburn No.3 coal washery located near Cessnock, NSW, is currently in care and maintenance until sufficient feed material can be supplied. Hence the need for this project.

1.2 Project Application

HEM has made application to the Minister for Planning (Minister) for project approval for the operation of the Chitter and Tailings Reclamation Project near Cessnock as a Major Project under Part 3A of the *Environmental Planning & Assessment Act 1979* (*EP&A Act*).

The application for the Project was placed on public exhibition in early 2007. Ninety seven (97) submissions were received during this exhibition period from Government Agencies, interest groups and individuals in relation to the project.

HEM has prepared this Preferred Project Report (PPR) in response to the issues raised.

1.3 The Preferred Project Report

This Preferred Project Report (PPR) is provided pursuant to Section 75H(6) of the *EP&A Act* as requested by the Director-General of Planning in his letter of April 2007. This Report:

- Is the response of HEM to the issues raised in the public submissions;
- Provides for a Preferred Project that modifies the Chitter and Tailings Reclamation Project to minimise its environmental impact in response to submissions;
- Adopts minor modifications to the Chitter and Tailings Reclamation Project for which approval is sought from the Minister;
- Provides a replacement Statement of Commitments for the Chitter and Tailings Reclamation Project in further response to the submissions;
- Provides an assessment of the changes in the Traffic, Flora and Fauna, and Noise, Air Quality and Heritage issues for the “Preferred Project”; and
- Incorporates issues raised by Government Agencies, interest groups and individuals.

1.4 Overview of the Preferred Project

In response to Government Agency, interest groups and individual submissions, HEM has modified the original Chitter and Tailings Reclamation Project to minimise the potential impact

on the community and the environment. The main aspects of the Preferred Project that differ from the original proposal include:

- Modifications to the preferred haulage routes that seek to minimise air, noise, traffic and ecological impacts;
- Operational changes including the cessation of operations in the event of unfavourable climatic conditions and the limitation of truck movements during peak periods, where feasible; and
- A new Statement of Commitments to improve the operating practices and reduce impacts on the Community.

1.5 Structure of this Report

This report has been structured to provide the reader with a logical progression of background, through to issues, responses, assessment and conclusion. The report follows the following structure:

Section 1 Provides a brief **background** of the project and to the Preferred Project.

Section 2 Provides an overview of the **original Environmental Assessment** and the legislative process undertaken to date with supporting correspondence included as Appendices 1, 2 and 3.

Section 3 Describes the **public exhibition** process for the project.

Section 4 Describes the key issues received during public exhibition process and provides a summary of the **responses to key issues**. Detailed Responses to issues raised by individuals, interest groups and government agencies are provided within Appendices 4, 5 and 6.

Section 5 Describes the **Preferred Project**, including a revised **Statement of Commitments**.

Section 6 **Assesses the key environmental aspects** of the changes to the preferred project and provides a summary of additional studies undertaken for the Preferred Project. Where additional studies have been undertaken, these are included as Appendices 7, 8, 9, 10 and 11.

Section 7 Is the **conclusion** to this Preferred Project Report.

2 Overview of Original Chitter and Tailings Reclamation Project

2.1 Objectives of HEM

The Chitter and Tailings Reclamation Project was developed by HEM with regard to the following principle objectives:

- To reprocess emplaced carbonaceous materials to produce saleable coal and other useful by-products;
- To safely, efficiently and profitably maximise the rehabilitation of lands degraded by past coal mining activities;
- To rehabilitate the land forms consistent with the surrounding land uses and zoning;
- To reduce the ongoing occurrence of adverse environmental impacts arising from emplaced carbonaceous materials, such as salt and acid leaching, and spontaneous combustion;
- To minimise the impacts of proposed operations on the local community and environment; and
- To provide ongoing local employment opportunities.

2.2 The Project as Originally Proposed

The Chitter and Tailings Reclamation Project as originally proposed is described in the Environmental Assessment Report (December, 2006) placed on exhibition in January and February of 2007. The project as originally proposed comprises:

- The recovery of the following resources illustrated in **Figure 1** at:
  - Aberdare East, approximately 1.7MT of tailings and chitter;
  - Neath, approximately 1 MT of tailings and chitter; and
  - Richmond Main East, approximately 160,000 tonnes of chitter materials.
- The rehabilitation of the three degraded mine sites;
- Haulage of the chitter and tailings back to the Hebburn No.3 Processing Plant along the preferred haulage routes, including haulage through the Werakata National Park; and

The processing of the recovered chitter and tailings at Hebburn No. 3 Processing Plant to extract saleable coal is covered under an existing consent approved in 2001.

348000 000000 | 350000 000000 | 352000 000000 | 354000 000000 | 356000 000000 | 358000 000000 | 360000 000000

6368000 000000 | 6366000 000000 | 6364000 000000 | 6362000 000000

Neath

Scale: 1:15,000

Aberdare East

Scale: 1:15,000

Richmond Main East

Scale: 1:7,500

CESSNOCK

KURRI KURRI

HEBBURN NO.3 (CML1)

WERAKATA NATIONAL PARK

See Inset B

OLD MAITLAND ROAD
TUNNEL ROAD
CARRS ROAD
YILGARN AVENUE
LONG STREET
MAITLAND ROAD
CESSNOCK ROAD
DUFFIE DRIVE
NEATH ROAD
CURRY STREET
MULBRING STREET
MELBOURNE STREET
CONGEWAI STREET
NORTHCOTE STREET
RAWSON STREET
ABERDARE STREET
GRETA STREET
CESSNOCK STREET
Kearsley Powerline Fire Trail
TUMBLEBEE TRAIL
HEZ SPINE ROAD
CALEDONIA STREET
COLLIERY ROAD
HEBBURN ROAD
LAKE ROAD
KEARSLEY ROAD
FERGUSON STREET
HOWELLS ROAD
COLEMANS ROAD
DAM ROAD
NEW STREET
GRETA STREET
ELFORD STREET
HOSPITAL ROAD
ABERDARE STREET
BRUNKER STREET
LANG STREET
LAWORTH STREET
RAWSON STREET
HOPETOUN STREET
EDWARD STREET
CORONATION STREET
RAILWAY STREET
MAITLAND STREET
WALLSEND STREET
JOHN RENSHAW DRIVE
MINMI STREET
STANFORD STREET
BELLBIRD STREET
LEGGETTS DRIVE
Tunnel Rd
AVERYS LANE

N
W E
S

Wells Environmental Services

BASE MAP: AERIAL SEPT 2004
PLATEAU IMAGES

Datum: MGA94 / Zone 56
Scale: 1:35,000 @ A3

Legend

Draft MLA Boundary
Hebburn No.3 CML1
Werakata_National_Park

0 500 1,000 2,000 3,000 4,000 5,000
Metres

HUNTER ENVIRO-MINING (OPERATIONS) PTY LIMITED

Chitter and Tailings Reclamation Project
Preferred Project Report

LOCATION OF CHITTER AND TAILING RECLAMATION SITES

Drawn: JPB	13 August 2007	Checked: JPB	04 October 2007
File Name:	PPR_Loco		

FIGURE 1

2.3 The Process to Date

2.3.1 Planning Focus Meeting

The Department of Planning, in conjunction with key statutory authorities and the Proponent, held a Planning Focus Meeting (PFM) on Tuesday 25 July 2006. The PFM is used to table potential issues associated with the project for the proponent to address within the Environmental Assessment. The PFM also provides the Director General with adequate information from each agency to formulate the Environmental Assessment Requirements.

2.3.2 Project Application

Following the PFM, the Proponent formally submitted an application for project approval on 17 October 2006. The Project Application was lodged with the Director-General of Planning (Director–General) for project approval by the Minister under Section 75E of Part 3A of the *EP&A Act* to carry out the Chitter and Tailings Reclamation Project as a Major Project under the Major Projects SEPP. The Project was accepted as a major project on 17 October 2006, and was assigned the Major Projects Application number of 06_0236.

2.3.3 Notice of Application

A public notice was placed in the Cessnock Advertiser newspaper on 20 October 2006 pursuant to clause 8F(3)(b) of the *Environmental Planning & Assessment Regulations 2000* (*EP&AR*) advising that the Project Application had been made to the Minister.

2.3.4 Environmental Assessment Requirements

On 22 October 2006, pursuant to section 75F of the *EP&A Act* the Director-General issued his requirements for the Environmental Assessment Report for the HEM Chitter and Tailings Reclamation Project (**Appendix 1**) pursuant to provisions of Section 75F(3) of the *EP&A Act*. Director General's Requirements were originally issued on 22 September 2007 (as shown in Appendix 1), but were reissued to comply with the EP&A Act.

2.3.5 Environmental Assessment Report

The Environmental Assessment Report was lodged with the Department of Planning in December 2006 following notice from the Director-General, pursuant to Section 75H of the *EP&A Act* advising that:

> *"…The Department has reviewed the draft Environmental Assessment (EA) for the Hebburn No. 3 Chitter and Tailings Reclamation Project, and … has determined that the EA is generally adequate for assessment purposes".*

Notice of Public Exhibition was made in the Cessnock Advertiser on 10 January 2007 and 31 January 2007 (refer **Appendix 2**).

2.3.6 Consultation

The Department of Planning consulted with relevant Government Agencies which made submissions in the course of the assessment process. The issues raised by the Government Agencies together with the response of HEM are contained in **Appendix 4.**

The Environmental Assessment Report was placed on public exhibition commencing 10 January 2007 and concluding on 14 February 2007 resulting in submissions from individuals and interest groups (refer **Appendix 5** and **Appendix 6**).

2.3.7 Preferred Project Report

By letter received 20 April 2007 (refer **Appendix 3**) the Director General has required that HEM should "respond to all issues raised in the submissions". The proponent should also provide a Preferred Project Report (PPR) that outlines any proposed changes to minimise its environmental impact, as well as a revised Statement of Commitments.

This PPR is submitted in response to that requirement. It incorporates some minor modifications to the HEM Chitter and Tailings Reclamation Project particularly in relation to the preferred Aberdare East and Neath haulage routes, response to all submissions and a revised Statement of Commitments.

This Preferred Project Report will be made publicly available on the website of the Department at www.planning.nsw.gov.au/asp/major_projects.asp and the website of HEM at www.hunterenviro.com.au.

3 Public Exhibition

3.1 Public Submissions to Exhibition of the Project

The Environmental Assessment Report for the Chitter and Tailings Reclamation Project was placed on public exhibition from 10 January 2007 until 14 February 2007. A total of 97 submissions were made by Government Agencies, individuals and interest groups with regard to a range of issues arising out of the proposed Chitter and Tailings Reclamation Project. These issues have been categorised and tabulated in **Appendix 4**, **Appendix 5** and **Appendix 6** of this Report.

3.2 Submission Issues

Whilst all issues raised in submissions during the exhibition period have been categorised and responded to in Appendix 4, Appendix 5 and Appendix 6 some of the major issues have been discussed further in **Section 4** of this Report.

3.3 Submissions by Government Agencies

The Chitter and Tailings Reclamation Project as detailed in the Environmental Assessment Report was developed involving an interactive and responsive assessment process with Government Agencies.

Government Agencies provided reviews on the Chitter and Tailings Reclamation Project Environmental Assessment. Issues raised in these reports have been considered by HEM and have been taken into account in this PPR.

The Agencies' that raised issues in respect of the Project are as follows:

- Hunter New England Area Health Service;
- Hunter Central Rivers Catchment Management Authority (Hunter Central Rivers CMA);
- Department of Environment and Conservation (DEC);
- Department of Lands;
- Heritage Department – Department of Planning;
- Mine Subsidence Board (MSB);
- Hunter Regional Development Committee (HRDC); and
- Cessnock City Council (CCC).

4 Response to Submissions

A total of 97 submissions were received from Government Agencies, the community and interest groups. The issues raised include:

- Air Quality
- Noise
- Groundwater
- Surface water
- Erosion and Sedimentation Control
- Ecology
- Threatened species
- Werakata National Park
- Rehabilitation
- Spontaneous Combustion/Bushfire risk
- Aboriginal Heritage
- European Heritage
- Subsidence
- Traffic
- Road Safety
- Community/Social Impacts
- Consultation
- Economic impacts
- Labour
- Crown Land
- Compliance/previous HEM performance

Appendix 4, Appendix 5 and Appendix 6 to this PPR identify the issues raised in submissions and detail HEM's response to those submissions.

The prevailing issues raised in the submissions and HEM's responses are summarised in **Table 1**.

Table 1: Summary of Major Issues and HEM Response

Issue	Description	HEM Response
Traffic	Impact of heavy vehicles on the local road network, road safety and road traffic noise to local residents and the community.	HEM has adopted alternative haulage routes to minimise impacts on the local road network, improve road safety and road traffic noise. The alternative routes, where possible avoid public roads and utilises existing fire trails on Crown Land. The proposed haulage routes will be constructed in accordance with relevant landowner standards, with intersections to public roads to Council or RTA requirements. Cessnock City Council in its Meeting of 21 March 2007 endorsed the haulage routes substantially the same as proposed in this report.
Ecology	Loss of threatened flora and fauna species, endangered ecological communities (EECs and native vegetation and lack	Impacts to threatened species, endangered EECs and native vegetation will be minimised where possible to allow HEM to undertake the rehabilitation operations. HEM will rehabilitate each site having

Issue	Description	HEM Response
	of consideration of the Native Vegetation Act 2003.	regard to the surrounding vegetation. Under Part 3A of the *EP&A Act* an authorisation referred to in section 12 of the *Native Vegetation Act 2003* (or under any Act to be repealed by that Act) to clear native vegetation or State protected land is not required. Not-withstanding the above, the proposed project will result in a net improvement of biodiversity within the locality following the rehabilitation of each of the sites. An Ecological Impact Assessment has been undertaken, refer to **Section 6.2** to address changes to the proposed haulage routes.
Air Quality	Impact of dust and degraded air quality on local residents and community.	Air quality and dust emissions will be strictly monitored to ensure levels are maintained with the accepted criteria and to minimise impacts to the local environs. An Air Quality Management Plan will be prepared and implemented detailing appropriate mitigation measures. Refer to **Section 5** for the proposed mitigation measures.
Noise	Impact of noise from heavy vehicles and machinery on nearby residents and local community.	Noise emissions will be strictly monitored to ensure levels are maintained within the accepted criteria and to minimise impacts to the local environs. Operations will be restricted to daylight operations to prevent typical sleep disturbance impacts.
European Heritage	Insufficient details on the heritage value of the sites and potential heritage impacts.	A Statement of Heritage Impact (SHI) has been prepared to better understand the heritage values of the site and assess the impact of the project on European Heritage. The SHI found the impacted area of the sites to be of limited cultural value and concluded that the proposed works are unlikely to impact on any heritage artefacts or footings present at the sites. Refer to **Section 6.6**.
Compliance	Concern over HEM's previous performance and lack of confidence to adhere to commitments made within the environmental assessment.	HEM is committed to creating beneficial environmental outcomes through final land form restoration, revegetation and contaminant removal. This is a Part 3A project and will therefore be subject to development consent and conditions that stipulate how the operations are to occur. HEM will develop and implement management plans to ensure consent conditions and their own commitments are achieved. HEM will also operate in accordance with the provisions of all additional relevant legislation including the *Mining Act 1992*, Occupational Health and Safety Act 1982, Coal Mine Health and Safety Act 2002, Coal Mines Regulation Act 1982 and the *Protection of the Environment and Operations Act 1997*.

Issue	Description	HEM Response
		In addition to the above, bonds will be held by the Department of Primary Industries, Department of Lands and the DECC to ensure that each site and the haulage route through the National Park are maintained in an appropriate condition.
Consultation	Lack of consultation	HEM has undertaken appropriate consultation with the community and government agencies. Should the project be approved, further ongoing consultation will be undertaken through a community reference group, dedicated website, telephone hotline, newsletter and complaints register allowing for ongoing community input and participation.
Overstated risks	Concern that spontaneous combustion and bushfire risks are overstated and misleading	HEM is aware of fires that have been directly propagated from spontaneous combustion of carbonaceous material at Hebburn No. 2. The Richmond Main East site was only discovered as a result of spontaneous combustion. Bushfires can ignite chitter material and burn underground.
Rehabilitation	Concern over final landform and proposed rehabilitation	The rehabilitation strategy will create a self sustaining, functional vegetated landscape promoting the development of more complex ecological processes consistent with the surrounding vegetated landscaped. A detailed Final Landform and Rehabilitation Management Plan will be submitted to the Department of Primary Industries, and the Department of Planning.

5 Preferred Project

HEM has developed the Preferred Project to address issues raised during the exhibition of the Environmental Assessment Report for the Chitter and Tailings Reclamation Project. The Preferred Project has been designed to further reduce potential community and environmental impacts of the Project.

5.1 Objectives of Preferred Project

The Preferred Project provides for:

(a) Modification of the proposed haulage routes to minimise impacts to road users and residents within residential areas;

(b) Operational changes including wind and air quality monitoring and limiting truck movements during peak traffic periods; and

(c) A revised Statement of Commitments that replace those originally detailed within the Environmental Assessment Report.

5.2 Preferred Project Description

The Director, Major Development Assessment, on behalf of the Director-General of the Department of Planning (**Appendix 3**) required HEM "to respond to all issues raised in the submissions" and prepare a Preferred Project Report with revised commitments by his letter (undated, received 20 April 2007). The request was made in accordance with section 75H(G)(a) of the *EP&A Act*.

In response to a number of the submissions HEM proposes some minor modifications to the Chitter and Tailings Reclamation Project which have been termed in this Report as the "Preferred Project" and are described below.

5.2.1 Haulage Routes

5.2.1.1 Preferred Haulage Route

A number of haulage routes were proposed in the original Environmental Assessment Report, these routes have now been revised. The revised and preferred haulage routes are illustrated on **Figure 2** These routes have been devised based on Government Agency, in particular Cessnock City Council, community and interest group submissions. The route for each site is described below:

Aberdare East

Laden vehicles leaving the Aberdare East site will utilise the southern arm of Government Circuit, turn left onto Caledonia Street.

348000 000000 | 350000 000000 | 352000 000000 | 354000 000000 | 356000 000000 | 358000 000000 | 360000 000000

6368000 000000 | 6366000 000000 | 6364000 000000 | 6362000 000000

Neath
CESSNOCK
Aberdare East
KURRI KURRI
HEBBURN NO.3 (CML1)
WERAKATA NATIONAL PARK
Richmond Main East
See Inset B
OLD MAITLAND ROAD
YILGARN AVENUE
LONG STREET
TUNNEL ROAD
MAITLAND ROAD
CESSNOCK ROAD
CARRS ROAD
CHARLES STREET
HEBBURN ROAD
NEATH ROAD
DUFFIE DRIVE
CURRY STREET
MULBRING STREET
MELBOURNE STREET
CONGEWAI STREET
NORTHCOTE STREET
RAWSON STREET
ABERDARE STREET
GRETA STREET
CESSNOCK STREET
Kearsley Powerline Fire Trail
TUMBLEBEE TRAIL
HEZ SPINE ROAD
ELFORD STREET
HOSPITAL ROAD
ABERDARE STREET
BRUNKER STREET
LANG STREET
LAWORTH STREET
RAWSON STREET
HOPETOUN STREET
EDWARD STREET
CORONATION STREET
RAILWAY STREET
MAITLAND STREET
WALLSEND STREET
JOHN RENSHAW DRIVE
Tunnel Rd
AVERYS LANE
MINMI STREET
STANFORD STREET
BELLBIRD STREET
LEGGETTS DRIVE
CALEDONIA STREET
COLLIERY ROAD
POKOLBIN STREET
LAKE ROAD
KEARSLEY ROAD
BRUCE STREET
RICHMOND VALE ROAD
DAM ROAD
NEW STREET
MAITLAND ROAD

0 500 1,000 2,000 3,000 4,000 5,000
Metres

Wells Environmental Services

N W E S

BASE MAP: AERIAL SEPT 2004
PLATEAU IMAGES

Datum: MGA94 / Zone 56
Scale: 1:35,000 @ A3

Legend

- Draft MLA Boundary
- Hebburn No.3 CML1
- Resource Boundaries
- Werakata_National_Park
- Neath Haulage - Preferred
- Aberdare East Haulage - Preferred
- Neath and Aberdare East - Preferred
- Richmond Main East Haulage - Preferred

HUNTER ENVIRO-MINING (OPERATIONS) PTY LIMITED

Chitter and Tailings Reclamation Project
Preferred Project Report

PREFERRED HAULAGE ROUTES

Drawn: JPB	13 August 2007	Checked: JPB	13 August 2007
File Name: PPR_Preferred Haulage			

FIGURE 2

Then cross the railway at the level crossing onto Cessnock Street and turning right at the entrance of *The Gordon Williams Memorial Lawn Cemetery, to* follow an existing fire trail within an electricity easement on Crown land.

The vehicles continue north east before crossing the South Maitland Railway and proceeding further along an electricity easement crossing Neath Road and entering the Werakata National Park, vehicles proceed west along the power easement in the National Park and will then turn left onto Hebburn Road and proceed to the Hebburn No.3 Processing Plant. The return trip follows the same path.

Neath

Laden vehicles leaving the Neath site will exit the site in a westerly direction travelling along an existing road corridor (the old Aberdare North Tunnel haulage road) through the Aberdare North pit top area to Tunnel Road, vehicles will turn left onto Tunnel Road, left onto Maitland Road, right onto Duffie Drive and turn left onto a fire trial over Crown Land within an electricity easement. The route will proceed to the south east before intersecting with the Aberdare East haulage route west of the South Maitland Railway. The vehicles would then continue along the same route as described above for the Aberdare East Route. The return trip follows the same path.

Richmond Main East

The haulage route from Richmond Main East is largely the same as that proposed within the Environmental Assessment, with the exception of the route that was utilising a small rail spur to allow two-way haulage. The preferred route will involve the construction of passing bays on the eastern and western ends to provide single direction haulage through a section of sensitive vegetation.

Preferred Haulage Route Benefits

The features of the preferred haulage routes include:

- Reduced haulage related impacts to residential areas, and no heavy vehicles passing the Kearsley Primary School;
- Reduced use of public roads;
- Utilisation of fire trails and cleared easements that minimise significant impacts to flora and fauna;
- Improvement of several public road intersections that will provide a beneficial legacy after the project finishes;
- Selection of haulage routes that minimise impacts to threatened biodiversity (11 *Eucalyptus Paramattensis ssp. decadens* will be conserved on the Richmond Main East haulage route); and
- Improvement of fire trails on Crown Land and in the National Park that will improve access for emergency vehicles during and after the project has finished.

5.2.1.2 Road Construction and Improvements

The proposed haulage routes traverse public roads and fire trails within freehold and Crown land. The public roads are under the care and control of Cessnock City Council and the

Roads and Traffic Authority, while roads within freehold or Crown land are under the care and control of the respective owner, the Department of Lands or the DECC.

Temporary bitumen seal will be utilised in conjunction with shaker grids at the intersection of all sealed and unsealed roads to ensure dirt, mud or any other debris is not transferred onto the sealed road surface. Should debris be transferred onto a sealed surface during construction it will be removed immediately, in accordance with the Traffic Management Plan.

Advance warning signs, such as "Trucks Entering" will be near all intersections where haulage vehicles enter the public road network. Signage will also be supplied at regular intervals along the non-public road haulage routes to remind users that heavy vehicles utilise the fire trail during daylight hours on weekdays.

Public Road Intersection and Road Improvements

HEM engaged Sinclair Knight Merz to undertake a traffic assessment (refer Section 6.1) of the proposed haulage routes. Considering the recommendations of Cessnock City Council and Hunter Regional Development Committee the following public road intersection and road improvements are proposed by HEM to facilitate the safe haulage of chitter and tailings form the site:

- Bitumen sealing of the southern arm of Government Circuit;
- Upgrade Government Circuit / Caledonia Street intersection to a Type AUR intersection to provide for the unrestricted passage of traffic travelling east when vehicles are waiting to turn right into Government Circuit;
- Upgrade Cessnock Street / *The Gordon Williams Memorial Lawn Cemetery* entrance intersection to a Type AUR intersection to provide for the unrestricted passage of traffic travelling west;
- Pavement marking on the cemetery intersection to ensure no cueing across intersection;
- Upgrade Maitland Road / Tunnel Road intersection to a Type AUR intersection to provide for the unrestricted passage of traffic travelling west;
- Widening and sealing of shoulders of Duffie Drive along the section used by the haulage route;
- Sealing of shoulders at the Aberdare Fire Trail and Duffie Drive intersection;
- Reduction in speed limits on Leggetts Drive and Duffie Drive from the existing sign posted speed limit of 100km/h to 80km/h for the duration of haulage operations; and
- Removal of vegetation on the preferred haulage routes intersection with Neath Road to improve sight distances.

Fire Trail Improvements

Several fire trails are proposed by HEM for haulage, these trails are unsealed, in some cases unformed and will require upgrading to permit use by heavy vehicles (33 tonne road registered vehicles) during wet and dry weather conditions.

Upgraded fire trails will be designed with respect to existing vegetation and topography to minimise the projects impacts. That is, where possible haulage roads will be up to 7.5m wide with shoulders to permit two-way haulage, however where sensitive vegetation is located adjacent to the existing fire trails or the topography is complex, trails will be restricted to

approximately 3.5m with opportunistic passing bays. Where applicable fire trails will be upgraded and maintained to a standard generally consistent with the minimum standard as per the Bushfire Co-ordinating Committee Fire Trails Policy.

HEM propose to utilise where possible carbonaceous reject generated from the processing of chitter and tailings at Hebburn No.3 in combination with burnt chitter and tailings in a 2:1 ratio for the upgrading and resurfacing of haulage roads. The material has demonstrated good compaction characteristics to provide a durable road surface for haulage.

The carbonaceous reject generated from the Hebburn No.3 plant has an ash in excess of 80%. The red/orange nature of the burnt material in combination with the carbonaceous reject provides a more natural appearance then obtained through the use of chitter or imported gravels alone. The blended material would be compacted to a nominal depth of 150-200mm.

A further benefit in the use of this blended material is that it significantly reduces the amount of material that would otherwise need to be sourced from local quarries, thereby reducing greenhouse emissions in its extraction, and conserving the virgin resource for future generations.

Given the strong coal mining history of the area, where coal and reject can still be observed today along road sides the use of the proposed blended material along fire trails will not be out of character with the existing environment. Many roads in the area have utilised reject coal in their construction.

Creek and drainage line crossings will utilise appropriate culverts designed to permit sufficient stormwater flows in a 1 in 20 year storm event. Swamp Creek within the Werakata National Park is the only named creek that will be crossed along the proposed haulage routes.

Notwithstanding the above, all road construction design (road material, design, creek and drainage line crossings) will be subject to landowner approval.

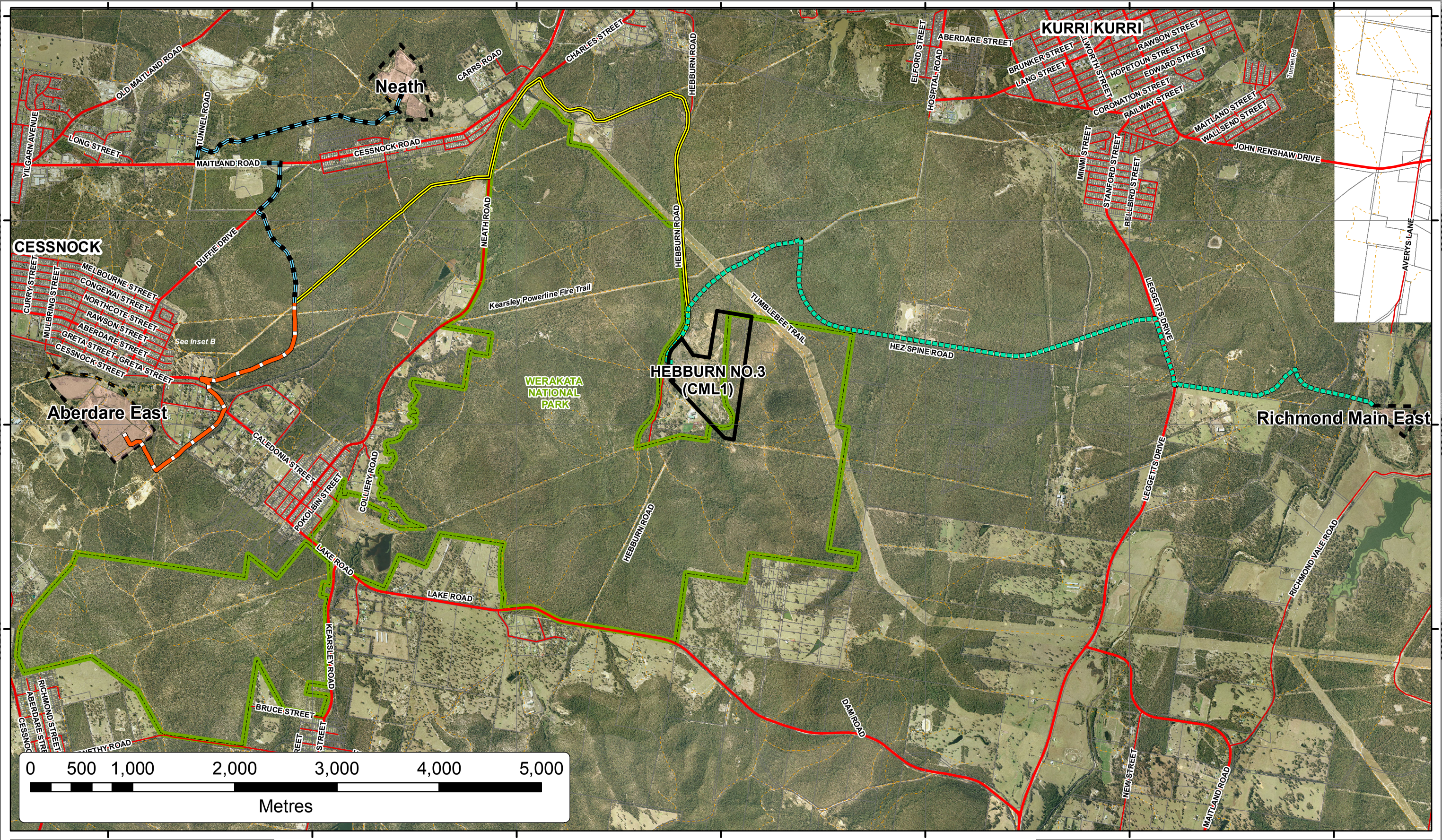
5.2.1.3 Alternative Haulage Route

One additional alternative haulage route (refer to Error! Reference source not found.) has been provided for assessment in the event that the preferred route cannot be used. This route and the relevant intersections were in part assessed during the previous Environmental Assessment Report (Refer Route N3).

5.2.1.4 Crown Lands

The Aberdare East and Neath extraction areas and the majority of the proposed haulage routes are along existing fire trails over land owned by the Crown and managed by the Department of Lands. The Department of Lands as the “land owner” will need to give consent to the use of the land in the form of a conditional licence issued under Section 45 of the Crown Lands Act 1989.

The licence will detail HEM’s obligations with respect to gates, fencing, road design and construction. Prior to any construction activities on Crown Lands, HEM will provide the Department of Lands with plans of the proposed construction activities for roads, gates, fences or other improvements required for HEM’s operations.



Wells Environmental Services

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BASE MAP: AERIAL SEPT 2004
PLATEAU IMAGES

Datum: MGA94 / Zone 56
Scale: 1:35,000 @ A3

Legend

- Draft MLA Boundary
- Hebburn No.3 CML1
- Resource Boundaries
- Werakata_National_Park
- Neath Haulage_Alternative
- Richmond Main East Haulage - Preferred
- Neath and Aberdare East Haulage_Alternative
- Aberdare East Haulage_Alternative

HUNTER ENVIRO-MINING (OPERATIONS) PTY LIMITED

Chitter and Tailings Reclamation Project
Preferred Project Report

ALTERNATE HAULAGE ROUTES
(if the Preferred Routes cannot be used)

Drawn: JPB	13 August 2007	Checked: JPB	04 October 2007
File Name: PPR_Alt Haulage			**FIGURE 3**

5.2.1.5 Werakata National Park

The Kearsley Powerline Trail traverses the Werakata National Park and is proposed for use by HEM in the haulage of chitter and tailings to facilitate the remediation of Aberdare East and

Neath. HEM have consulted with DECC and have been granted conditional approval for the use of the fire trail in accordance with the National Parks and Wildlife Act 1974. The fire trail is located within a cleared electricity easement as illustrated within **Photographs 1** and **2**.

Prior to any construction activities within DECC Estate, HEM will provide to the DECC plans of the proposed construction activities for roads, gates, fences or other improvements required for the HEM operations or as required within the conditions of consent.



Photograph 1: Looking west along the Kearsley Powerline Trail from Hebburn Road.



Photograph 2: Looking east along the Kearsley Powerline Trail from Neath Road.

5.2.1.6 Existing Use of Fire Trials

The fire trails proposed for use by HEM are presently used for the following purposes:

- The general access and inspection of Crown lands by the Department of Lands;
- Access for the purposes of fire fighting and control;
- General access and inspection of Werakata National Park by the DECC;
- Access by the general public into the Werakata National Park and other Crown Land for recreational activities both legal and illegal;
- Much of the haulage routes are within Energy Australia power easements where these would be used for the maintenance and inspection of utility infrastructure; and
- Use by native fauna for foraging and movement between established tracks of vegetation;

The upgrading of these fire trails by HEM for haulage will result in negligible detrimental impacts and long term benefits to the above users by improving access conditions. To ensure the existing legal uses of these fire trails are not impeded by the HEM haulage activities, HEM will abide by the following principles:

- Right of way to be given to emergency vehicles and vehicles involved in the repair and maintenance of utility infrastructure;
- Access is maintained throughout the duration of the project to legitimate users;
- All illegal activities on the fire trails (e.g. rubbish dumping, trail bike riding in National Park) are to be reported immediately to site manager and relevant authority;
- Protection of utility infrastructure in accordance with the requirements of the utility service provider;
- Erection of signs and appropriate community consultation to ensure legitimate recreational users of the National Park are aware of the operations, haulage is also restricted to weekdays and should therefore limit interaction between users;
- Maintain or improve native vegetation where possible and implement appropriate weed control; and
- Haulage is to be undertaken during daylight hours outside of the hours at dawn and dusk where native fauna movement is greater.

With the implementation of the above controls conflicts between users will be significantly reduced.

5.2.1.7 The Gordon Williams Memorial Lawn Cemetery

The Gordon Williams Memorial Lawn Cemetery at Aberdare commenced operation in 1991 and to date there has been more than 450 burials at the site. The Cemetery has an estimated 35 burials / internment of ashes per year, equating to less than 1 per week on average.

HEM appreciate that cemeteries provide residents with a place to remember their departed loved ones and provide families and communities with a sense of continuity, and history. They recognise the sensitivity of the location, especially during a funeral.

HEM will cease haulage during a funeral at the cemetery to minimise impacts from the haulage operations. HEM will provide a contact number to the local funeral homes to allow

notification of a funeral at the cemetery. Where prior notice has not been received truck drivers will be under strict instruction to notify other drivers if a funeral is underway that haulage past the cemetery is to cease, until otherwise notified by the site manager.

5.3 Revised Statement of Commitments

The Preferred Project proposes a new Statement of Commitments to replace those contained within Section 6 of the Environmental Assessment Report.

The revised commitments will address issues raised in the assessment process to date, and will ensure the minimisation of the environmental effects and the maximisation of the economic and social aspects of the Chitter and Tailings Reclamation Project. The revised commitments are:

(1) ***Community Consultation***

(a) *HEM will participate in a Community Reference Group developed for the project that will incorporate the following people:*

- *2 Community members from Aberdare East;*
- *2 Community members from Neath;*
- *1 Community member from Richmond Main East (if available);*
- *1 Representative of Cessnock City Council; and*
- *1 or 2 Representative for Hunter Enviro-Mining (Operations) Pty Limited.*

The reference group will meet on a quarterly basis, unless otherwise determined by the Group.

(b) *HEM will have a local telephone complaints line, complaints will be recorded and followed up within 24 hours;*

(c) *HEM will provide regular updates on a publicly accessible website regarding the status of the rehabilitation operations.*

(2) ***Management Plans***

(a) *A Traffic Management Plan (TMP) (construction and operations) will be developed for the three operations to the satisfaction of Cessnock City Council and the Roads and Traffic Authority prior to road construction or haulage works commencing.*

(b) *An Air Quality Management Plan (AQMP) will be developed for each site to the satisfaction of the Department of Environment and Climate Change and the Department of Planning prior to undertaking works onsite.*

(c) *A Noise Management Plan (NMP) will be developed for each site to the satisfaction of the Department of Environment and Climate Change and the Department of Planning prior to undertaking works onsite.*

(d) *A Landscape and Rehabilitation Management Plan (LRMP) will be developed for each site to the satisfaction of the landowner, Department of Primary Industries, Department of Environment and Climate Change and the Department of Planning within 6 months of commencing the project.*

(e) *A Water Management Plan will be developed for each site to the satisfaction of the Department of Environment and Climate Change and the Department of Planning prior to undertaking works onsite.*

(f) *HEM will undertake an assessment of feed and reject material to assess long term geochemical stability and appropriate management recommendations.*

(3) ***Mine Operations Plan***

(a) *HEM will prepare and submit to the satisfaction of the Department of Primary Industries a Mine Operations Plan (MOP) with the relevant supporting management plans prior to the commencement of operations.*

(b) HEM will abide by the relevant statutory obligations including the placement of a bond with the Department of Primary Industries to undertake repatriation of a site if HEM cannot appropriately discharge their duties under the Consent and the MOP.

(4) ***Road Surveys***

HEM will in conjunction with the Cessnock City Council, Road and Traffic Authority, Department of Lands and the Department of Environment and Climate Change undertake the following surveys:

- *Prior to the commencement of operations a survey of all public roads and fire trails involved in the proposed haulage routes to determine pre-operational conditions;*
- *At completion of the project a further survey to identify any damage and works needed to restore the road pavement and shoulders of public roads to pre existing or appropriate condition and fire trails to a minimum standard determined within the land use agreement.*

All identified and agreed works that are directly attributable to HEM haulage activities will be completed at cost to HEM.

(5) ***Monitoring***

HEM will monitor wind speed and direction at both the Neath and Aberdare East sites to enable a continuous assessment of the level of operations and operational controls required at each site.

(a) Noise

Two (2) sensitive locations at Neath and Aberdare East will be monitored at weekly intervals for the first four weeks when operations reach maximum extraction;

Following the first four week monitoring period, monitoring will be undertaken at quarterly periods to ensure the project is operating within the nominated assessment criteria and that all reasonable, feasible and economically achievable mitigation measures are being appropriately implemented.

(b) Air Quality

A light scatter photometer will be installed at both the Neath and Aberdare East sites to allow a continuous assessment of air quality and the operations and to allow management measures to be implemented to improve operational controls.

(c) Reporting

The location and nature of operations will be recorded on a daily basis for the first four weeks of operations to provide an assessment of operating conditions vs the meteorological, noise and air quality data collected.

An assessment of the results of the monitoring (air and noise) after the first four weeks will be supplied to Council, the Community Reference Group and the DECC to provide for an assessment of the operations against the relevant criteria, where relevant criteria has been exceeded, HEM will provide recommendations of reasonable and feasible and economically achievable mitigation measures to alleviate impacts to residents.

Following the first four week assessment an assessment will be provided to Council, DECC and the Community Reference Group at quarterly intervals.

Operations will be reviewed weekly against monitoring data and operations to ensure impacts on surrounding residents are minimised.

(6) ***Cessation of Works***

(a) Noise and Dust

HEM will implement a real time monitoring program where works will be reviewed and or cease during the following climate conditions.

Aberdare East – winds in the vectors 135 through to 270 degrees (clockwise);

Neath – winds in the vectors 250 – 60 degrees (clockwise);

(b) Cessation of Haulage.

HEM will cease haulage activities past the Gordon Williams Memorial Lawn Cemetery when a funeral is process.

(7) ***Heritage***

(a) *HEM will prepare plans of each of the relevant historical sites prior to undertaking works on any site (Aberdare Shaft and related Aberdare East infrastructure, Neath, Aberdare North and Richmond Main East). Plans will be submitted to the NSW Heritage Office and Cessnock City Council. The plans will include:*

- *Location of all remaining structures and visible infrastructure locations;*
- *Basic interpretation and naming of structures by experienced mining historians; and*
- *Regular revisions if additional infrastructure is identified.*

(b) *HEM will rehabilitate sites in a sympathetic manner, cognisant of the key historic features and locations of each site by only seeding grass where infrastructure was located.*

(8) ***Occupational Health and Safety***

An Occupational Health and Safety Management Plan will be developed for the project and implemented at each site (including the haulage routes) to ensure compliance with the provisions of the Occupational Health and Safety Act 2000, the Coal Mine Health and Safety Act 2002 and the Coal Mines Regulation Act 1982.

6 Preferred Project Assessment

Set out below is an assessment of the Preferred Project. Copies of supporting assessment reports are contained in **Appendix 7** in respect of traffic, **Appendix 8** in respect of Ecology, **Appendix 9** in respect of noise and **Appendix 10** in respect of heritage.

6.1 Traffic

6.1.1 Overview

The project will result in an increase in the number of heavy vehicles utilising the local road network as a result of the haulage of chitter and tailings from each of the resource locations to the Hebburn No.3 processing plant. Numerous submissions raised concerns in relation to the anticipated traffic impacts of the heavy vehicles on the local road network along with associated road safety impacts and road traffic noise on the local community.

The Preferred Project provides a preferred haulage route that seeks to address the concerns raised above. The preferred route where possible utilises and traverses roads and fire trails within Crown and publically owned land that are isolated from nearby residents, therefore minimising impact on the local road network, improving road safety and reducing road traffic noise.

6.1.2 Traffic Assessment of the Preferred Project

Sinclair Knight Merz Pty Limited has prepared a report on traffic impacts on the preferred haulage route. This report is included as **Appendix 7**. Anticipated traffic impacts of the preferred haulage routes and mitigation measures are summarised as follows:

- The maximum addition to the traffic network contributed by the proposal is 30 laden trucks per hour, which equates to ten (10) trucks per hour an average (4 hour period) per derelict mine site if all three (3) sites are operating. With a maximum of 18 trucks per hour from any one site
- The Level of Service for each of the above-named roads before and after project implementation was also considered. The Peak hour Level of Service is D or better for all roads, and the proposal results in negligible increase in volume/capacity ratio, Level of Service remains unchanged;
- The Maitland Road and Tunnel Road intersection, the Caledonia Street and Government circuit intersection and the Cessnock Road and Cemetery Access intersection to be upgraded to Type AUR to minimise delays to through traffic;
- Advance warning signs, such as “Trucks Entering” to be installed on the approach to the Maitland Road and Duffie Drive intersection, the Caledonia Street and Government Circuit intersection, the Richmond Main East Haulage Route and Leggetts Drive intersection and the Leggetts Drive and HEZ Spine Road intersection to advise approaching motorists of the potential for turning trucks;

- "Do Not Queue Across Intersection" signage and/or line marking to be installed at the cemetery access due to the proximity of the railway level crossing. Cemetery access to be modified to cater for heavier loads;
- Vegetation on the South West corner of the Neath and Aberdare East Haulage Route/Neath Road to be cleared. Advanced warning signs to be installed on Neath Road approaches to the proposed intersection to mitigate sight deficiencies;
- Shaker grids are to be installed wherever trucks would be leaving an unsealed fire trail and either crossing or turning onto a sealed public road to minimise the potential for mud and dirt to be trucked onto the road;
- There will be no adverse impact on pedestrian amenity within the area of operations;
- The proposed haulage routes does not pass through any school zones, nor past any schools;
- Due to the relatively minor increase in traffic volumes generated by this proposal, there will be no adverse impact on emergency vehicles within the area of operations; and
- The road safety audit identified two significant areas of concern associated with Duffie Drive – delineation and road edge formation and shoulder provision. In order to address these issues guide posts should be installed and maintained along the full length of the road to improve delineation in times of darkness, a reduction in the speed limit from 100km/hr to 80km/hr, road pavement edges to be checked and repaired regularly.

6.2 Ecology

6.2.1 Overview

A number of Government Agency, individual and interest group submissions were raised in response to the proposal's potential impact on ecology. In particular concerns included loss of threatened flora and fauna species, endangered ecological communities (EECs) and native vegetation that may result from the construction and operation of the proposed haulage route.

The preferred project includes a preferred haulage route to minimise a range of environmental impacts, including the impact upon ecology. Ecovision Consulting has prepared a report on the ecological impacts of the preferred haulage route.

6.2.2 Ecological Assessment of the Preferred Project

Ecovision Consulting have prepared an ecological assessment of the potential impacts of the preferred haulage route. This assessment is presented within **Appendix 8**.

The Preferred Haulage Route has the following benefits in relation to flora and fauna:

- Conservation of 11 specimens of the threatened species *Eucalyptus Parramattensis ssp. decadens*; and
- Utilisation of existing fire trails, that reduce the need to clear native vegetation.

The proposed transport corridors are generally restricted to terrain already disturbed by tar sealed roads and bushland tracks. Natural soils and intact native vegetation occurs along the length of these bush land tracks. The results of the field survey, impact review and assessment support the following conclusions.

- Two threatened plant species listed on the Threatened Species Conservation (TSC) Act and Environment Protection Biodiversity Conservation (EPBC) Act were observed within the site during the survey period (i.e. Eucalyptus parramattensis subsp. decadens and Grevillea parviflora subsp. parviflora);

- Two Endangered Ecological Communities (EECs) listed on the TSC Act were observed throughout areas that will be indirectly impacted by the transport corridors (i.e. Lower Hunter Spotted Gum Ironbark Forest and Kurri Sand Swamp Woodland);

- No Endangered Populations and/or Critically EECs (CEECs) are known to occur within the site;

- No Critical Habitat listed on the TSC Act and/or the EPBC Act occurs within the site;

- The proposed transport corridors will have a minor negligible direct/ indirect impact and will have no substantial affect on local biodiversity values in the medium to long term; and

- The impact on local and/or regional wildlife corridors will be low as development will be predominantly restricted to existing tracks and derived grasslands.

The following mitigation strategies are recommended to be included in the site Environmental Management Plan (EMP) to minimise the direct and indirect impacts of the proposed transport corridors on the natural environment:

- Restrict vehicle movements to daylight periods, after sunrise and before sunset to minimise impacts on active fauna populations;

- Restrict road construction to existing cleared tracks, with traffic along narrow long sections to be managed via the use of passing bays;

- Track construction, upgrade and maintenance is to occur wholly within a 10 m wide corridor;

- Implement appropriate weed control along fire trails;

- Identify and clearly mark out threatened biodiversity for protection, prior to trail upgrade works; and

- Trees are to be retained where possible within the landscape where vegetation clearing is required (i.e. at Tunnel Road).

Further, it is recommended that consideration be given to the protection of native vegetation through ongoing targeted weed management works along the proposed transport corridor, particularly within areas classified as National Park. Weed control works should be implemented prior to construction/track upgrade works to minimise the occurrence or intensification of weed populations.

6.3 Meteorological Monitoring

6.3.1 Wind Speed and Direction

Wind vectors will be monitored using a wind speed/direction sensor with data logging capabilities that is regularly reviewed by site personnel. The wind speed/direction sensor will be installed at both Aberdare East and Neath, at Richmond Main East where houses are more remote the effects of the wind will be monitored visually.

During conditions where little or no prevailing winds are present, operations onsite should be immediately reviewed and mitigation measures put in place that include:

- Increased dust suppression on haulage roads;
- Increasing moisture content of chitter being loaded into trucks; and
- Dust suppression of open un-vegetated areas (i.e. temporary stockpiles, pre reclamation stripped areas or un-vegetated rehabilitation areas).

Should HEM seek to increase the duration and variability of operating conditions outside of the stated vectors below, real-time compliance based PM_{10} monitors (that comply with the DEC document *Approved Methods for the Sampling and Analysis of Air Pollutants in NSW, 2007)* will be installed at representative nearby sensitive receptors. In addition to this installation, noise monitoring at potentially impacted receptors must be undertaken to ensure operations are maintained within the appropriate amenity criteria. Details of the proposed changes to operating conditions must be detailed within a Air Quality and Noise Management Plan and be approved by the DECC and DoP prior to undertaking works outside the stated wind vectors below.

Aberdare East

Review and/or cease work operations with winds between the vectors of 135 degrees and 270 degrees, that is when wind is blowing from generally a south easterly, southerly, south-westerly or westerly direction, toward the adjacent residential precinct.

Neath

Review and/or cease work operations with winds between the vectors of 250 degrees and 60 degrees, that is when wind is blowing from generally a westerly, north-westerly, northerly or north-easterly direction, toward the adjacent residential precinct.

Richmond Main East

Review work operations with winds between the vectors of 135 degrees and 225 degrees, that is when wind is blowing from generally a south easterly, southerly or south-westerly direction, toward private dwellings. Given the remote nature of this resource operations would only be ceased during episodic events.

6.4 Air Quality

6.4.1 Air Quality Mitigation Measures

Two "real-time" air quality mitigation measures in addition to the mitigation measures detailed in Section 5.3.7 of the Environmental Assessment will be incorporated to improve air quality in the vicinity of the sites and in particular at adjoining residences; these measures are:

- Utilisation of predominant wind vectors to improve operating conditions (see 6.3.1 – Wind Vectors); and
- Utilisation of a light scattering air quality monitor that relates to PM_{10} concentrations at key locations at Aberdare East and Neath (see 6.3.1.2 – Air Quality Monitors).

6.4.2 Air Quality Monitoring

In addition to the above controls HEM will implement a monitoring program to regulate operating conditions, the monitoring would be undertaken using a light scattering (laser photometer) aerosol monitor.

The monitor will be portable for occasional hand held monitoring but would generally be fixed on site boundaries adjacent to residential housing at Neath and Aberdare East.

Given the relative remoteness and short duration of the Richmond Main East sites only wind direction monitoring and management will be implemented.

The monitors will have a set alarm trigger level below the accepted PM_{10} criteria. The alarm will activate a strobe light /or similar alarm that is located in close proximity to the work area to notify operators that works on site should cease, with the exception of a water cart that will suppress dust coming from the key dust generating areas.

6.5 Noise

A review of key noise related issues raised during the exhibition period by individuals, special interest groups and government agencies and an assessment of changes associated with the Preferred Project was undertaken by Spectrum Acoustics. The assessment is presented within **Appendix 9**. A list of each receptor, the corresponding noise level and impact with regard to the noise criteria, with and without the effects of shielding is presented within **Appendix 9A**. A summary of key responses from Appendix 9 is presented below.

6.5.1 Acoustical Benefits of Preferred Project

The following benefits will be realised through the implementation of the Preferred Project:

- Increased commitments for noise monitoring and noise minimisation through the adoption reasonable feasible and best available technology, economically achievable mitigation measures;
- The Preferred haulage route from Neath does not use David Street, and therefore reduces noise impacts to residences near David Street and Cessnock Road.

6.5.2 Justification of Model Inputs and Model Verification

Model inputs used in noise modelling have been reviewed, these inputs were confirmed to be appropriate. Where the noise assessment within the Environmental Assessment had not assessed impacts of a scraper recovering resources, this has now been modelled. Noise emanating from the scraper was found to be very similar to the noise emitted from a bulldozer or front end loader that was presented within the original noise impact assessment.

Verification of traffic noise inputs and modelling has been supplied in the form of an acoustical study of haulage vehicles at another mining operation. This verification confirmed that the noise levels presented in the original noise impact assessment were conservative.

6.5.3 Non-Public Haulage Roads

A noise assessment of the potential impact of haulage vehicles using non-public roads results in an exceedance of INP based Project Specific Noise Level (PSNL) criteria at numerous receptors.

With regard to the exceedance of PSNLs calculated for the non-public haulage roads it should be noted that if the development was to utilise existing public roads the road traffic noise levels from the development would meet the ECRTN noise level of 55 dB(A) Leq (1-hour) or 60dB(A) Leq (1-hour) for local and arterial roads respectively. However the use of public roads would see trucks pass substantially more residential dwellings at significantly shorter distances. The adoption of the ECRTN local road criterion of 55 dB(A) Leq (1-hour) would see no noise level criterion exceedances. Cessnock City Council at its meeting of 21 March 2007 resolved to endorse the proposed haulage routes having regard to traffic and the reduced burden on the community.

It should be noted the Minister for Planning has the authority to permit exceedances of INP criteria where it can be demonstrated there are social and economic benefits to the community as a whole from the project proceeding.

The HEM Project will deliver economic and social benefits to the local and state economies based on an achievable criteria of 55dB(A) (i.e. the ECRTN criteria for suburban local roads). HEM in designing the project and in the preparation of management plans have and will continue to have regard to the application of "*best management practices*" and "*best available technology economically achievable*".

The HEM Project is consistent with the objects of the Environmental Planning and Assessment Act, 1979 and the Minister for Planning is respectfully requested to establish an achievable noise goal with regard to the unique circumstances that apply with regard to this project.

6.5.4 Aberdare Pre-school

The EA included the pre-school as a sensitive receptor. The The applicable goal for a school under the Industrial Noise Policy (INP) is greater than the residential criteria (that was adopted in the EA), the INP goal for a school is as follows:

- LA_{eq}. Noise Level of 35dB(A) internal, typically attenuation by building is 8-10dB(A);
- LA_{eq}. Noise Level of 55dB(A) external.

Therefore under a typical operations the preschool would be expected to receive a noise level in the order of 36dB(A) external, or 26-28dB(A) internal, therefore complying with INP noise criteria.

6.6 Heritage

6.6.1 Overview

In the Environmental Assessment Report for the Chitter and Tailings Reclamation Project limited heritage assessment was undertaken due to the nature of the project and its dealing with waste product. During the exhibition period the NSW Heritage Office provided a submission which raised concern over the extent of the limited heritage assessment that had been undertaken to date. The NSW Heritage Office express concern over the potential of the proposal to impact on European Heritage and requested that a Statement of Heritage Impact (SHI) be undertaken. A SHI and limited historical review of the project sites has been undertaken and included at **Appendix 10**.

6.6.2 Statement of Heritage Impact of Preferred Project

The SHI found that the works proposed by HEM will not impact on the historical buildings identified that still stand today. To ensure these buildings are not impacted, exclusion zones will be established. It is known that many buildings and infrastructure existed on the sites. HEM is aware that there may be footings of buildings and infrastructure present at these locations that may hold cultural significance. These locations will be avoided and are not the target of HEM's rehabilitation works. Whilst all care will be taken to avoid potential footing sites, work will stop and the NSW Heritage Office will be notified immediately in the unlikely event that footings or any other items of cultural significance are discovered.

The only areas likely to be impacted by HEM's rehabilitation works are chitter/coal emplacement areas and old tailings dams. Carbonaceous materials will be removed from such areas, transported to the Hebburn No. 3 washery, processed and sold for reuse. Each of the three emplacement sites will then be rehabilitated.

These emplacement areas and tailings dams are of limited (if any) cultural significance, essentially they are the waste streams of coal mining processes undertaken in the first half of the twentieth century. In addition to this, it has been calculated that the age of the tailings and chitter/coal emplacements is generally less than 50 years and therefore, they are not classified as relics and are not subject to the provisions of the *Heritage Act 1977*.

The removal of the carbonaceous material presents the potential for the discovery of isolated items of cultural heritage that may have been buried with the waste stream. Should such items be discovered they will be collected and handed over to the local historical society or NSW Heritage Office. This activity in itself will help to preserve any cultural heritage that exists at the sites by uncovering and identifying items that would have otherwise remained buried and with time deteriorate or be "lost". HEM have made a commitment to undertake a survey of the sites identifying key infrastructure locations and supply a copy of these plans to the Cessnock City Council and NSW Heritage Office.

Any potential minor impact on cultural significance is overridden by the need to rehabilitate the site to alleviate the current local and downstream environmental impacts caused by the leaching of salt and acid, and the risk to society and the environment of spontaneous combustion of remaining carbonaceous material.

7 Conclusions

The proposed chitter and tailings reclamation project is proposed as a feasible means of rehabilitating degraded and abandoned mines sites that are predominantly under the care and control of the NSW government.

The major issues of the project are noise, air quality and traffic; these issues are short term and will be appropriately mitigated during the project. The approval of the project is in the public interest and will not only alleviate the state government of the financial burden associated with these sites, but improve public road intersections, recycle an abandoned material, provide employment to local people and provide benefits in the form of taxes and royalties.

HEM has demonstrated that it has:

- Consulted with all stakeholders;
- Responded to all submissions made and issues raised in the public exhibition and assessment process;
- Developed the Preferred Project to respond to submissions made during the public exhibition;
- Demonstrated that environmental effects have been reduced/will be managed appropriately;
- Has made Project Commitments that will secure protection of interests of all stakeholders related to the operation of the Chitter and Tailings Reclamation Project; and
- Demonstrated material economic benefits to the local, regional, state and national community from the operation of the project.

The Minister can be satisfied that it is available to him to grant project approval to the proposed chitter and tailings reclamation project.

Dated: 09 October 2007



Jonathan Berry

Wells Environmental Services

Hunter Enviro-Mining (Operations) Pty Limited

Preferred Project Report

Chitter & Tailings Reclamation Project

Appendix 1

Director Generals Requirements

October 2007

Director-General's Requirements

Section 75F of the *Environmental Planning and Assessment Act 1979*

Application number	06_0236
Project	The proposed Chitter and Tailings Reclamation project, which includes: • reclamation of an estimated 2.86 million tonnes of coarse and fine carbonaceous material from historic coal reject heaps at Neath (1 million tonnes), Aberdare East (1.7 million tonnes) and Richmond Main East (0.16 million tonnes); • transportation of reclaimed material by road to the Hebburn No. 3 washery, or directly to market; and • rehabilitation and restoration of reclaimed areas.
Location	Neath, Aberdare East and Richmond Main East, within the Cessnock LGA
Proponent	Hunter Enviro-Mining (Operations) Pty Limited
Date of Issue	22 September 2006
Date of Expiration	22 September 2008
General Requirements	The Environmental Assessment (EA) must include • an executive summary; • a detailed description of the project including the: – need for the project; – various components of the project; and – any likely inter-relationship between the proposed operations and existing or approved reclamation operations supplying material to the Hebburn No. 3 washery; • consideration of any relevant statutory provisions, including the permissibility of road haulage through the Werakata National Park; • a general overview of the environmental impacts of the project, identifying the key issues for further assessment, and taking into consideration the issues raised during consultation; • a detailed assessment of the key issues specified below, and any other significant issues identified in the general overview of environmental impacts of the project (see above), which includes: – a description of the existing environment; – an assessment of the potential impacts of the project including potential cumulative impacts (particularly on traffic and transport, noise, and air quality); • a description of the measures that would be implemented to avoid, minimise, mitigate, offset, manage, and/or monitor the impacts of the project; • a draft Statement of Commitments, outlining environmental management, mitigation and monitoring measures; • a conclusion justifying the project, taking into consideration the environmental impacts of the project, the suitability of the sites, and the benefits of the project; and • a signed statement from the author of the Environmental Assessment report certifying that the information contained in the report is neither false nor misleading.
Key Issues	• **Surface and Groundwater** – including, for each site, a detailed assessment of the surface and groundwater impacts (including potential saline and/or acidic discharges), a site water balance, and a detailed description of the water management system. A surface and groundwater contingency strategy must be included as part of the mitigation measures for the project which details the measures proposed to protect the supply of water to landowners and the environment.

	• **Flora and Fauna** – including impacts on critical habitats (including riparian habitat), threatened species, populations, ecological communities and native vegetation; • **Rehabilitation and Land Use Management** – including a detailed Rehabilitation Strategy that describes how the sites would be progressively rehabilitated, revegetated, and integrated with the surrounding landscape and land use, taking into consideration any relevant strategic land use plans and objectives (including the Draft Lower Hunter Regional Strategy, the Hunter Catchment Blueprint, the Wallis and Fisheries Creek Total Catchment Management Strategy, and the Hunter and Central Coast Regional Environmental Management Strategy). The Rehabilitation Strategy should also describe what measures would be put in place for the long term protection and management of the sites following mine closure; • **Noise** – including operational and off-site road noise impacts; • **Air Quality** – including spontaneous combustion, off-site dust emissions from road haulage, and an assessment of the project-related greenhouse gas emissions; • **Heritage** - both Aboriginal and non-Aboriginal; • **Traffic and Transport**; • **Visual**; • **Hazard and Risk** – including public safety and site security; and • **Social and Economic**.
References	The Environmental Assessment should take into account relevant State government technical and policy guidelines. While not exhaustive, guidelines which may be relevant to the project are included in the attached list.
Consultation	During the preparation of the Environmental Assessment, you must consult with the relevant local, State or Commonwealth government authorities, service providers, community groups or affected landowners. The consultation process and the issues raised must be described in the Environmental Assessment. In particular you must consult with: • Department of Environment and Conservation; • Department of Natural Resources; • Department of Primary Industries; • NSW Roads and Traffic Authority; and • Cessnock City Council. The consultation process and the issues raised must be described in the Environmental Assessment.
Deemed refusal period	60 days

State Government Technical and Policy Guidelines - For Reference

Aspect	Policy /Methodology
Soil and Water	
	• *Managing Urban Stormwater: Soils & Construction* (Landcom); • *Guidelines for Fresh and Marine Water Quality* (ANZECC); • *Rehabilitation Manual for Australian Streams* (Land and Water Resources Research and Development Corporation); • *Draft Guidelines: Management of Stream/Aquifer Systems in Coal Mining Developments* (DNR); • the various *State Groundwater Policy* documents (DNR); • *Approved Methods for the Sampling and Analysis of Water Pollutants in NSW* (DEC).
Flora and Fauna	
	• draft *Guidelines for Threatened Species Assessment* (DEC); • *Threatened Biodiversity Survey and Assessment: Guidelines for Development and Activities* (DEC); • *NSW Groundwater Dependent Ecosystem Policy* (DNR).
Vibration	
	• *Assessing Vibration: a technical guideline* (DEC).
Noise	
	• *NSW Industrial Noise Policy* (DEC); • *Environmental Criteria for Road Traffic Noise* (DEC); • *Environmental Noise Control Manual* (DEC).
Air Quality	
	• *Approved Methods for the Modelling and Assessment of Air Pollutants in NSW* (DEC).
Heritage	
	• draft *Guidelines for Aboriginal Cultural Heritage Assessment and Community Consultation* (DEC); • *Assessing Heritage Significance* (NSW Heritage Office); • *NSW Heritage Manual* (NSW Heritage Office); • *Archaeological Assessment Guidelines* (NSW Heritage Office, 1996)
Traffic	
	• *Guide to Traffic Generating Development and Road Design Guide* (RTA); • *RTA Road Design Guide* (RTA); • relevant AUSTROAD standards.
Waste	
	• *Environmental Guidelines: Assessment and Classification and Management of Liquid and Non-Liquid Wastes* (DEC).

Hunter Enviro-Mining (Operations) Pty Limited

Preferred Project Report

Chitter & Tailings Reclamation Project

Appendix 2

Notice for Public Exhibition of the Environmental Assessment

October 2007

ve are mak- **nomic development manager, and (bottom) Deputy Chairman Ken Warren, Secretary Erin Williams and Chairman Ron Besoff.**

MAJOR PROJECT APPLICATION

Proposed Hebburn No.3 Chitter and Tailings Reclamation Project

Application number	06_0236
Location	Neath, Aberdare East, and Richmond Main East, within the Cessnock local government area
Proponent	Hunter Enviro-Mining (Operations) Pty Limited
Council area	Cessnock

Description of the Project

The proposal includes the:

- reclamation of greater than 3 million tonnes of carbonaceous material from historic coal reject heaps at Neath, Aberdare East and Richmond Main East;
- transportation by road of reclaimed material to the Hebburn No. 3 coal washery; and
- rehabilitation of reclaimed areas.

Approval Authority

Minister for Planning under Part 3A of the *Environmental Planning and Assessment Act 1979* (EP&A Act)

Exhibition

The Environmental Assessment (EA) for the project will be made publicly available from **Wednesday 10 January 2007** until **Wednesday 14 February 2007**. During this period you may:

- view a copy of the EA at:
  - **Department of Planning**, Information Centre, 23-33 Bridge Street, Sydney;
  - **Cessnock City Council Offices**, 62 - 78 Vincent Street, Cessnock; and
  - **Nature Conservation Council**, Level 2, 301 Kent Street, Sydney;
- download a copy of the EA from the Department of Planning's website at www.planning.nsw.gov.au (go to Major Project Assessments/On Exhibition/ Major Projects Part 3A); or
- ask the Department of Planning (1300 305 695) to send you a CD-ROM copy of the EA.

Submissions

You are invited to make a written submission on the project. Your submission should include:

- your name and address;
- the project application number (No. 06_0236);
- a statement on whether you support or object to the project; and
- the reasons why you support or object to the project.

Your submission must reach the Department by **14 February 2007**, and should be:

- posted to: Major Development Assessment, Department of Planning, GPO Box 39, SYDNEY NSW 2001;
- faxed to: (02) 9228 6466; or
- emailed to: information@planning.nsw.gov.au

Under Section 75H of the EP&A Act, the Director-General is required to provide copies of submissions received during the exhibition period, or a report of the issues raised in those submissions, to the proponent, the Department of Environment and Conservation and other interested public authorities. If you do not want your submission to be made available to the proponent or these public authorities, please state this in your submission.

Enquiries

Michael Moore: (02) 9228 6306

NSW GOVERNMENT
Department of Planning

778658

IVER CAMPBELL
ERS

18 VINCENT STREET, CESSNOCK
PHONE: 4990 1122

3617330035

Hunter Enviro-Mining (Operations) Pty Limited

Preferred Project Report

Chitter & Tailings Reclamation Project

Appendix 3

Letter from Director General requesting a Preferred Project Report

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October 2007

NSW GOVERNMENT
Department of Planning

Mining & Extractive Industries
Major Development Assessment

Phone: (02) 9228 6306
Fax: (02) 9228 6466
Email: michael.moore@planning.nsw.gov.au

Level 4 Western Gallery
23-33 Bridge Street
GPO Box 39
SYDNEY NSW 2001

Mr Peter Lamell
Hunter Enviro-Mining (Operations) Pty Limited
PO Box 205
EAST MAITLAND NSW 2323

Our ref: 9042879

Dear Mr Lamell,

Hebburn No. 3 Chitter and Tailings Reclamation Project (06_0236)
Response to Submissions

I refer to your project application for the proposed reclamation and rehabilitation of historic coal mine chitter and tailings reject heaps at Neath, Aberdare East and Richmond Main East, in the Cessnock local government area. The exhibition of the EA ended on 14 February 2007 and the Department received 97 submissions. Major issues raised in submissions included the following:

- Air quality impacts
- Soil and groundwater impacts;
- Traffic impacts including preferred haulage routes;
- Noise impacts; and
- Rehabilitation of the three sites.

You should respond to all issues raised in the submissions received by the Department during the exhibition period, a copy of which has previously been supplied to your representative. A preferred project report should also be provided, outlining any proposed changes to the project to minimise its environmental impact, as well as a revised statement of commitments.

I would appreciate it if you would provide a response to these issues at the earliest convenience. If you would like to discuss this matter in more detail, please contact Michael Moore on (02) 9228 6306.

Yours sincerely,

David Kitto
Director, Major Development Assessment

Hunter Enviro-Mining (Operations) Pty Limited

Preferred Project Report

Chitter & Tailings Reclamation Project

Appendix 4

Response to Government Submissions

October 2007

Table of Contents

1. CESSNOCK CITY COUNCIL 6
   - 1.1. Haulage Routes 6
   - 1.2. Intersection works – general 7
   - 1.3. Operating Hours 7
   - 1.4. Intersection works - Aberdare East Haulage 7
   - 1.5. Intersection works - Neath Haulage 7
   - 1.6. Intersection works – Richmond Main East Haulage 8
   - 1.7. General Support of HRDC 8
   - 1.8. Pre-commencement Road Survey 8
   - 1.9. Completion Road Survey 8
   - 1.10. Landowner Consent 8
   - 1.11. Traffic Management and Road Safety Works 8
   - 1.12. Air Quality Monitoring and Fencing 9
   - 1.13. Rehabilitation and Monitoring 9
   - 1.14. Richmond Main East 10
   - 1.15. Cessation of Works 10

2. HUNTER NEW ENGLAND AREA HEALTH SERVICE 10
   - 2.1. Dust Mitigation 10
   - 2.2. Dust Modelling Assumptions 11
   - 2.3. Measurement of Prevailing Winds 11
   - 2.4. Air Quality Management Plan 11
   - 2.5. Hours of Operation 11

2.6. Dust Levels 11
2.7. Groundwater Users 12
2.8. Groundwater Monitoring 12
2.9. Water Treatment 13
2.10. Consultation 13
2.11. HEM Previous Performance 13

3. KEARSLEY RURAL FIRE BRIGADE 14
3.1. Bushfire 14
3.2. Bushfire ..... Error! Bookmark not defined.
3.3. Spontaneous Combustion 14
3.4. Spontaneous Combustion 15
3.5. Bushfire 15
3.6. Traffic 15
3.7. Road Safety 15
3.8. Compliance 15

4. HUNTER CENTRAL RIVERS CATCHMENT MANAGEMENT AUTHORITY 16
4.1. Native Vegetation Act 16
4.2. Vegetation Loss and Compensation 16
4.3. Future Management of Sites 16
4.4. Groundwater 16
4.5. Rivercare Plan 17

5. DEPARTMENT OF ENVIRONMENT AND CONSERVATION 17
5.1. Individual Receivers and NIA 17
5.2. Omission of NIA Appendix A 18
5.3. Sound Power Levels of Road Truck 18
5.4. NIA and Insufficient Truck Numbers 18
5.5. NIA and Non-Public Roads 18

5.6. Sound Power Levels and Other Plant 19
5.7. Modifying Factor Corrections 19
5.8. Stop Work Procedures 19
5.9. Noise and Mitigation Measures 19
5.10. Noise impact surrounding Hebburn 3 20
5.11. Noise and Existing Road Traffic Noise 20
5.12. NIA Model Inputs 20
5.13. Noise Model Calibration/Verification 20
5.14. Noise and Haulage Routes 20
5.15. Noise and Commitments 20
5.16. Dust Emissions 21
5.17. Greenhouse Reduction 21
5.18. Thermal Efficiency of Recovered Coal 21
5.19. Dust Impacts 21
5.20. Dust Criteria 22
5.21. Dust Control Commitments/Cessation of Work 22
5.22. Loss of Native Vegetation 23
5.23. Clearing Impacts on Fauna Habitat 23
5.24. Native Vegetation Avoidance/Mitigation Strategies 24
5.25. Offsets 24
5.26. Deficit of Rehabilitation Area 25
5.27. EEC Rehabilitation in Other Mine Sites 25
5.28. Rehabilitation Strategy 25
5.29. Strategic Land Use 25
5.30. Long Term Management of SItes 26
5.31. Aboriginal Cultural Heritage Assessment 26
5.32. Justification for Use of Werakata National Park 27
5.33. Outdated Vegetation Mapping 27
5.34. Removal of Threatened Species from Werakata National Park 27
5.35. Spontaneous Combustion 27
5.36. Archaeological Sensitivity of Werakata National Park 27
5.37. Erosion and Sediment Control of Werakata National Park 27

5.38. Dust and Soil Impact within Werakata National Park 28
5.39. Werakata National Park and Park Users 28
5.40. Haulage Impacts on Kearsley Residents 29

6. DEPARTMENT OF LANDS 29
6.1. Impact on Crown Land 29
6.2. Crown Land and Consent 29
6.3. Rehabilitation of Crown Lands 30
6.4. Crown Land and Haulage Routes 30

7. DEPARTMENT OF NATURAL RESOURCES 30
7.1. Water and Dust Suppression 30
7.2. Use of Surface Water and Farm Dams Policy 31
7.3. Groundwater Monitoring 31
7.4. Rehabilitation 31

8. DEPARTMENT OF PRIMARY INDUSTRIES 31
8.1. Mining Leases 31
8.2. Rehabilitation Outside Mining Lease 32
8.3. MOP 32
8.4. Rehabilitation Completion Criteria 32
8.5. Compliance with Coal Mining Legislation 32
8.6. Responsible Persons 32
8.7. Safety Procedures 33
8.8. Community Consultation 33
8.9. Soil Management 33
8.10. Rehabilitation Strategy and MOP 33

9. HERITAGE DEPARTMENT - DEPT OF PLANNING 33

9.1. Insufficient Detail on Heritage Values 33
9.2. Statement of Heritage Impact 34

10. MINE SUBSIDENCE BOARD 34
10.1. Subsidence 34

11. HUNTER REGIONAL DEVELOPMENT COMMITTEE (HRDC) 34
11.1. Haulage Route 34
11.2. Traffic Control 34
11.3. Erosion and Sediment Control 35
11.4. Gravel Roads and Dust 35
11.5. Hours of Operation and Peak Periods 35
11.6. Duffy Drive Haulage Route 35
11.7. Intersection Treatment 35
11.8. Traffic Control Signage 35
11.9. Upgrade of Rail Level Crossings 35
11.10. Speed Zones 36
11.11. Visual Messaging Signs 36
11.12. Leggetts Drive Shoulder Upgrade 36
11.13. Traffic Management Plan 36
11.14. Traffic Access 36
11.15. Employee Access 36
11.16. Employee and Haulage Traffic 37
11.17. Car Parking Provisions 37
11.18. Truck Turning Signs 37
11.19. Turning Templates 37
11.20. Traffic Requirements 37

This table addresses issues raised by the various government departments during the public exhibition period. The major issues and responses have been summarized within the Preferred Project Report (PPR).

Aspect	Issue	HEM Response
1. Cessnock City Council		
1.1. Haulage Routes	Endorsement of the following routes at the meeting of 21 March 2007: • Aberdare East - Exit via Route A2, proceed over railway line to cemetery, right hand turn off Allandale onto fire trail, then travel along a fire trail till its meets Route N2 and then continue via Route N2 to the washery; • Proceed via fire trail to Maitland Road, a right hand turn onto at Maitland Road then right hand turn off Maitland Road onto another fire trail, proceed to Duffie Drive, right hand turn onto Duffie Road, proceed along Duffie Road, left hand off Duffie onto fire trail, proceed along fire trails until it bisects with N2, travel along route N2 under electricity easement and Hebburn Road to washery; • Support of the preferred route within the EA for the Richmond Main East site.	HEM supports the routes endorsed by Cessnock City Council in their meeting of 21 March 2007, with the exception to the location of the intersection of the haulage route with Tunnel Road. HEM propose to enter Tunnel Road to the south of the suggested Council location to minimise impacts to Tunnel Road.

1.2. Intersection works – general	Shaker grids and temporary seal should be installed on the approaches to all sealed roads.	HEM will install shaker grids and temporary seal on the approaches to all public sealed roads.
1.3. Operating Hours	Hours of operation should be restricted or eliminated during school / peak periods.	During operations movements will be restricted during peak traffic periods, however given the limited distance travelled on public roads the impacts to peak period traffic flows is expected to be minimal.
1.4. Intersection works - Aberdare East Haulage	Implementation of the following controls for Aberdare East haulage: 1. Sealing of Government Circuit from the southern connection to Aberdare East through to Caledonia Street. 2. Installation of stop signs at Government Circuit at Caledonia Street. 3. A Type B intersection should be constructed on Cessnock Road at the intersection with the Cemetery, subject to approval from the RTA.	1. HEM will undertake the sealing of Government Circuit where it is utilised for haulage of chitter and tailings from Aberdare East. 2. HEM will install stop signs as required at the intersection of Caledonia Street and Government Circuit. In addition the HEM traffic study by SKM on the alternative routes identified the need for a Type AUR intersection at this location to provide for the safe passage of traffic on Caledonia Street travelling east. 3. HEM will construct a Type B (type AUR) intersection at the intersection with the Cemetery to provide a slip lane for traffic travelling west on Cessnock Road. In addition HEM propose a "KEEP CLEAR" line marking to avoid east bound traffic from cuing across the intersection, when stopping at the level rail crossing.
1.5. Intersection works - Neath Haulage	Implementation of the following controls for Neath haulage: 1. Type B intersection in Duffie Drive; 2. Type B intersection on Maitland Road at Tunnel Road; 3. Installation of stop signs; and 4. Shoulder widening and sealing along the	1. HEM does not support the installation of a type B (type AUR) intersection on Duffie Drive. SKM undertook a traffic assessment of the intersection and recommended the improvement of shoulders at the intersection, installation of shaker grids, a temporary seal at the entrance of the fire trail and a reduction in the speed limit on Duffie Drive from 100km/h to 80km/h in the area used by and surrounding the haulage route was also recommended. 2. HEM is satisfied that the installation of a Type B (type AUR)

	affected length of Duffie Drive.	intersection at the intersection of Maitland Road and Tunnel Road is preferable for road safety and operational requirements. 3. Stop signs will be installed where necessary along each haulage route. 4. HEM is satisfied that the improvement of shoulders along the affected length of Duffie Drive will be beneficial to the project and the community.
1.6. Intersection works – Richmond Main East Haulage	Installation of truck turning signs at the southern intersection with Leggetts Drive.	HEM supports the installation of truck warning signs at the intersection with Leggetts Drive.
1.7. General Support of HRDC	General support of the HRDC recommendations.	As stated in Responses 11.1 to 11.20, HEM generally supports the HRDC recommendations with exception of those stated.
1.8. Pre-commencement Road Survey	Prior to commencement all routes are to have a dilapidation survey, including Council, RTA and HEM representatives.	HEM will undertake the road survey prior to the commencement of operations inline with the Cessnock City Council recommendation.
1.9. Completion Road Survey	At completion of project a further inspection will be required to assess works required to remedy roads to their pre-existing condition.	HEM will undertake the road survey at the completion of operations inline with the Cessnock City Council recommendation.
1.10. Landowner Consent	Preferred haulage routes will require consent from relevant land owners.	The use of the land and all road construction design (road material, design, creek and drainage line crossings) will be subject to landowner approval.
1.11. Traffic Management and Road Safety Works	All traffic management and road safety facilities including rail crossing, shakers, trail widening, road shoulders, signage, and intersection treatments as required by Council and the RTA	HEM will supply details of all traffic management and road safety facilities on public roads prior to commencement

	shall be installed after approval - details should be provided to Council and RTA for approval prior to commencement.	
1.12. Air Quality Monitoring and Fencing	Wind speed/direction sensors, dust trackers and fencing should be installed at all sites prior to works commencing.	HEM will install wind speed/direction sensors and dust trackers at the Aberdare East and Neath sites prior to works commencing, given their proximity to residential dwellings. Given the relatively short duration and isolation of the Richmond Main East site the operations on site will be visually regulated. The Richmond Main East is private land with adequate rural fencing, gates will be installed on the property boundary to restrict access to the land when the haulage route is not in use. The Aberdare East site contains adequate rural style fencing and is leased by HPOTS, signage will be installed at regular locations along the boundary fence to notify would be trespasses of the potential dangers of entering the site. Gates will be installed on haulage roads to limit access when the site is not in use. The Neath site is partially fenced with a rural style fencing, discussions have occurred with the Department of Lands (the land owner) and the proponent, regarding the installation of adequate fencing and gates to prevent unlawful access into the site and surrounds. The conditions of HEM's licence with the Department of Lands will detail the location and extent of fencing and gates to be erected.
1.13. Rehabilitation and Monitoring	Plans for remediation of the sites with appropriate monitoring should be submitted prior to work commencing.	Prior to the commencement of site rehabilitation a Final Landform and Rehabilitation Plan will be submitted to the Department of Primary Industries – Minerals.

1.14. Richmond Main East	Department of Planning are to ensure a full assessment of the environmental impact of reclaiming the chitter at Richmond Main East.	Richmond Main East has been assessed along with the Neath and Aberdare East sites to identify and mitigate potential impacts associated with the reclaiming operations.
1.15. Cessation of Works	Works at the three sites should cease during adverse climatic conditions where noise limits may be excluded.	HEM has included a commitment to the cessation of works during prevailing meteorological conditions in the revised Statement of Commitments provided in the Preferred Project Report. Further HEM have detailed a monitoring strategy to allow the project to be effectively monitored during operations to ensure and dust and noise impacts are minimised.
2. Hunter New England Area Health Service		
2.1. Dust Mitigation	Insufficient dust mitigation measures.	Dust mitigation measures are outlined in Section 5.3.7 of the Environmental Assessment. These measures include a daily review of meteorological conditions to minimise impacts to residences by coordinating operations with respect to prevailing climatic conditions and maintaining disturbed surfaces, haul roads and stockpiles in a damp condition to minimise dust generation. To facilitate these measures a wind speed/direction sensor and dust tracker will be installed at key locations to allow HEM operations to operate without adversely affecting surrounding residences by monitoring weather conditions and regulating the operations in accordance with an Air Quality Management Plan. A monitoring regime will be implemented to provide the DECC and Council with regular updates of the operating and corresponding air quality conditions, details of this are specified within the PPR.

2.2. Dust Modelling Assumptions	A table outlining all dust assumptions.	Dust assumptions are detailed within the Air Quality Impact Assessment (AQIA) prepared by Holmes Air Sciences (Appendix 3 of the Environmental Assessment). Section 5 and Appendix B of the AQIA contain all dust assumptions used in dust emission inventories and calculations.
2.3. Measurement of Prevailing Winds	How will prevailing winds be measured.	HEM will install a wind speed/direction sensor to measure prevailing winds.
2.4. Air Quality Management Plan	Air Quality Management plan should be finalised in consultation with local residents.	HEM will prepare an Air Quality Management Plan in consultation with Cessnock City Council (CCC) and the Department of Environment and Climate Change (DECC) in accordance with consent conditions and current relevant legislation and guidelines. HEM have made a Statement of Commitment within the PPR to participate in a Community Reference Group to provide a regular conduit to HEM for residents to comment on the Project. In addition HEM will have a telephone complaints line.
2.5. Hours of Operation	Conflicting hours of operation (7am - 6pm, or 10hours)?	The proposed hours of operation for the Chitter and Tailings Reclamation Project will be restricted to daytime hours of 7am to 6pm Monday to Friday light permitting. It is believed the confusion surrounding the conflicting hours of operation may have arisen from the references in the Environmental Assessment to the daytime background noise levels (7am to 6pm) derived from the NSW *Industrial Noise Policy* (INP), and the daytime road traffic noise criteria (7am to 10pm) derived from the EPA *Environmental Criteria for Road Traffic Noise*, 1999 (ECRTN).
2.6. Dust Levels	Maintenance of levels well below 50µg/m^3 to ensure 50µg/m^3 not exceeded over 24 hours.	Section 5.3.4 of the Environmental Assessment illustrates that the maximum predicted 24 hour average PM_{10} concentrations for Aberdare East, Neath and Richmond Main East operations are

		generally well below the DECC 24 hour average goal of 50µg/m^3 therefore ensuring that the goal will not be exceeded over 24 hours. To ensure that levels are minimised a wind speed/direction sensor and dust tracker will be installed at key locations to allow HEM operations to operate without adversely affecting surrounding residences by monitoring weather conditions and regulating the operations in accordance with an Air Quality Management Plan. A monitoring regime will be implemented to provide the DECC and Council with regular updates of the operating and corresponding air quality conditions, details of this are specified within the PPR. Further to this mitigation measures have been devised and an Air Quality Management Plan will be prepared to ensure amenity criteria is not exceeded.
2.7. Groundwater Users	No detail on proximity of local water users and risks associated with discharge to groundwater.	The Austar Underground Coal Mine and the Hebburn No.3 Processing Plant are the only known licensed users of the deep groundwater in the area. Given these coal mines source this poor quality groundwater for use in industrial related uses, the discharge to this water will not have an adverse impact on known users. Risks associated with discharge to groundwater are detailed within Section 5.5.3 of the Environmental Assessment. Impacts associated with this practice are thought to be minimal given the highly reducing environment and existing poor water quality within the underground workings.
2.8. Groundwater Monitoring	Groundwater monitoring needed.	Section 5.5.4 of the Environmental Assessment specifies that regular monitoring of groundwater will be undertaken to monitor changes in water quality prior to being discharged underground along with the downstream surface water catchment.

2.9. Water Treatment	More detail needed on treatment.	Dirty water will be directed to a series of sedimentation basins. Where water will be reused onsite it may be treated with flocculent, lime or acid ameliorant as required, water reuse from each site will be limited to that site only and only in disturbed working areas. Excess or poor quality waters will be conveyed by a pump to the pre-borehole discharge basin at Aberdare East and Neath for discharge to underground workings or to a polishing Basin at Richmond Main East. A Water Management Plan will be prepared detailing specific water treatment requirements, triggers and actions for each site.
2.10. Consultation	No consultation with Hunter New England Area Health Service.	HEM was not required to consult with New England Area Health Service during the preparation of the Environmental Assessment. In the course of preparing the Environmental Assessment HEM undertook consultation with the Department of Planning, Department of Environment and Conservation, Department of Primary Industries, Cessnock City Council and the Department of Natural Resources as required in the Director-General's Requirements (DGR's) dated 22 October 2007, therefore fulfilling their consultation requirements.
2.11. HEM Previous Performance	Community complaints received about the existing operations.	HEM is committed to creating beneficial environmental outcomes through land form restoration, revegetation and contaminant removal. Prior to the commencement of site rehabilitation, HEM is required under the Mining Act 1992 to develop and have approved a detailed Mine Operations Plan (MOP). The MOP will contain detailed plans of the proposed rehabilitation operations, and also a detailed Environmental Management System (EMS) that is supported by equally detailed Environmental Management Plans (EMPs). The EMPs will address air pollution, erosion and sediment, surface water pollution, groundwater pollution, contaminated polluted land, threatened flora and fauna, weeds, operational noise, visual/stray light, aboriginal heritage, spontaneous combustion, bushfire,

		hydrocarbon contamination, public safety, hazards and risks and final landform and rehabilitation. HEM will also be required to regularly prepare an Environmental Management Report to the Department of Primary Industries that addresses operations undertaken onsite including the extraction, rehabilitation, monitoring and complaints during the period. Further to this HEM will be required to obtain an Environmental Protection Licence (EPL) under the Protection of the Environment and Operations Act 1997 which will regulate the level of monitoring of waters, noise and air quality required. The EPL is prepared and submitted on an annual basis to the DECC.
3. Kearsley Rural Fire Brigade		
3.1. Bushfire	Commendation on removal of the Hebburn No.2 bushfire ignition point.	The removal of the Hebburn No.2 Bushfire ignition point is consistent with HEM's project objectives of reducing ongoing adverse environmental impacts such as spontaneous combustion and creating beneficial environmental outcomes.
3.2. Spontaneous Combustion	No records of spontaneous combustion causing bushfire in the area.	HEM are aware of fires that have been directly propagated from spontaneous combustion of carbonaceous material at Hebburn No.2. The Richmond Main East site was in fact discovered as it spontaneously combusted and was extinguished by Coal and Allied. In recent times it has also become apparent that bushfires can ignite the chitter material and burn underground for weeks after the fires are put out. These areas are of significant danger to human health and the environment as the fires are often not easily visible and could easily create significant burns to animals and people using the area

		and also damage to vehicles. Whilst bushfires at in the area may not have specifically been started by spontaneous combustion from chitter or tailings emplacements in the past, conditions similar to those prevailing at Hebburn No. 2 presents increased risk of spontaneous combustion of carbonaceous material leading to ground and bushfires.
3.3. Spontaneous Combustion	Misleading and incorrect information supplied by representatives of HEM.	Refer to HEM Response 3.2.
3.4. Bushfire	Inappropriate assumption that spontaneous combustion is a bushfire source and could impact human life, given fears that exist from the devastating fire in 2002.	Refer to HEM Response 3.2.
3.5. Traffic	Delay of emergency vehicles due to increased truck numbers on the road and few areas where trucks can pull over.	The preferred haulage routes specified in the PPR use very little public roads, as such the travelling time of emergency vehicles will not be adversely affected as a result of HEM haulage operations. Not withstanding the Traffic Impact, Road Safety and Railway Level Crossing Assessment undertaken by Sinclair Knight Merz (SKM), **Appendix 7** of the PPR concluded that due to the relatively minor increase in traffic volumes generated by the proposal, there will be no adverse impact on emergency vehicles within the area of operations.
3.6. Road Safety	Safety at the Kearsley School Crossing.	HEM have adopted an alternative trucking route from Aberdare East as specified in the PPR, this route will not pass the Kearsley Public School.
3.7. Compliance	HEM's existing environmental performance to date is poor, how can they be trusted with these	Refer to HEM Response 2.11.

	bigger projects.	
4. Hunter Central Rivers Catchment Management Authority		
4.1. Native Vegetation Act	No consideration of the proposal in the context of the Native Vegetation Act 2003.	Consideration of the proposal in the context of the Native Vegetation Act 2003 has been included in Section 4 of the PPR.
4.2. Vegetation Loss and Compensation	No like for like compensation provided for losses.	As stated with Section 4.9 and Section 5.9.6.2 HEM will mitigate the vegetation loss by rehabilitating the final landforms with plant species consistent with surrounding vegetation communities, including threatened species and species of endangered ecological communities. The proposed rehabilitation value of these sites is difficult to determine in a like for like basis, as the rehabilitation proposed is likely to consist of a longer term vegetation communities of greater ecological value then what presently exists.
4.3. Future Management of Sites	No timeframe assigned for the sites future management and when the provisions of the NVA 2003 would again apply.	The proponent is responsible for the satisfactory rehabilitation of each site to standards administered by the DPI and to the satisfaction of the land owner. The provisions of the Native Vegetation Act will apply to the site when HEM's security bond for the site is released and the Mining Lease over the land has been removed.
4.4. Groundwater	Concern regarding the potential impact to groundwaters, low risk rating applied to groundwater impacts and the lack of groundwater assessment provided in the EA.	Coffey Geotechnics Pty Ltd assessed the groundwater impacts of discharge into underground workings at Aberdare East and Neath (Appendix 5 of the Environmental Assessment). The report notes that the reprocessing of coal waste material would take place at Hebburn

		No. 3 using water recovered from the abandoned underground workings beneath the site. Return water will be pumped back underground through a borehole, therefore there are no waste products being processed at either the Aberdare East or Neath sites. The only concern at these sites is the effect of the discharge of excess runoff into undergrounds mine workings. Coffey Geotechnics concluded that given the nature of the sites it is unlikely that the disturbance of the material will cause a marked change in the discharge/inflow at times of high rainfall, and that rainfall may help to dilute water going into underground workings. In addition with regard to shallow groundwaters that are retained within the tailings emplacements, the removal of this contaminant from the catchment would improve groundwater qualities in the catchment. Therefore a low risk rating was therefore applied to the groundwater assessment.
4.5. Rivercare Plan	Adoption of the Rivercare Plan for the Rehabilitation of Wallis Creek at Richmond Main East is welcomed.	The adoption of the Rivercare Plan for the Rehabilitation of Wallis Creek at Richmond Main East is consistent with HEM's project objectives of reducing adverse environmental impacts and creating beneficial environmental outcomes.
5. Department of Environment and Conservation		
5.1. Individual Receivers and NIA	Individual receivers in Noise Impact Assessment (NIA) have not been identified.	Individual noise receivers that would potentially experience impacts above the project specific noise criteria were identified within the Table 5.11 of the Environmental Assessment Report. The identification of the received noise levels at all receptors below the criteria would not be given the changing ambient noise levels moving away from the site. Notwithstanding the above noise levels for receptors have been identified within **Appendix 9A**, inclusive

		estimated shielding effects of houses between source and receptor.
5.2. Omission of NIA Appendix A	The NIA has excluded Appendix A that shows noise monitoring undertaken, as such DEC is unable to assess if the Project Specific Noise Levels have been applied in accordance with the INP.	Appendix A of the NIA was erroneously omitted from the Environmental Assessment Report. This omission from the Environmental Assessment Report has been included as an appendix to the Noise Impact review presented in **Appendix 9**.
5.3. Sound Power Levels of Road Truck	Sound power levels for the road truck is too low and may not account for loading of the truck.	Sound power levels presented within the Noise Impact Assessment are believed to be correct, justification of these noise levels is provided in Appendix 9.
5.4. NIA and Insufficient Truck Numbers	Modelling has assumed insufficient numbers of trucks onsite in a 15 minute period.	A revision of truck numbers and the associated noise levels is provided in Appendix 9.
5.5. NIA and Non-Public Roads	No noise assessment on truck movements on non-public roads.	A noise assessment of the potential impact of haulage vehicles using non-public roads results in an exceedance of INP based Project Specific Noise Level (PSNL) criteria at numerous receptors (refer Appendix 9). With regard to the exceedance of PSNLs calculated for the non-public haulage roads it should be noted that if the development was to utilise existing public roads the road traffic noise levels from the development would meet the ECRTN noise level of 55 dB(A) Leq (1-hour) or 60dB(A) Leq (1-hour) for local and arterial roads respectively. However the use of public roads would see trucks pass substantially more residential dwellings at significantly shorter distances. The adoption of the ECRTN local road criterion of 55 dB(A) Leq (1-hour) would see no noise level criterion exceedances. Cessnock City Council endorsed the Preferred Haulage Route in their meeting of 21 March 2007 having regard to traffic and the reduced burden on the community.

		It should be noted the Minister for Planning has the authority to permit exceedances of INP criteria where it can be demonstrated there are social and economic benefits to the community as a whole. The HEM Project will deliver economic and social benefits to the local and state economies based on an achievable criteria of 55dB(A) (i.e. the ECRTN criteria for suburban local roads). HEM in designing the project and in the preparation of management plans have and will continue to have regard to the application of "*best management practices*" and "*best available technology economically achievable*". The HEM Project is consistent with the objects of the Environmental Planning and Assessment Act, 1979 and the Minister for Planning is respectfully requested to establish an achievable noise goal with regard to the unique circumstances that apply with regard to this project.
5.6. Sound Power Levels and Other Plant	Sound power levels of other plant (excluding bulldozers) also appears to be too low resulting in an under estimate of noise levels.	Sound power levels presented within the Noise Impact Assessment are believed to be correct, justification of these noise levels is provided in Appendix 9.
5.7. Modifying Factor Corrections	No modifying factor corrections have been applied to the predicted noise to account for impulsiveness.	Based on the noise model inputs detailed in the NIA the results of the noise modelling show that the received noise will not contain low frequency or impulsive noise components as per the definitions in the INP. Further detail in this regard is contained within Appendix 9.
5.8. Stop Work Procedures	No details of the proponents procedure for when to stop or reduce works.	A Noise Management Plan will be prepared prior to site rehabilitation detailing procedures for when to stop or reduce works. Further detail on stop work procedures has been included in the PPR.
5.9. Noise and Mitigation Measures	All reasonable and feasible mitigation measures should be investigated (DEC may licence exceedances if they can be confident that this	All reasonable, feasible, economically achievable mitigation measures will be implemented to minimise noise to the receiver during the rehabilitation of each site. Further discussion on mitigation

	has been undertaken).	measures has been included within Appendix 9.
5.10. Noise impact surrounding Hebburn 3	The noise scenario of up to 30 trucks coming into Hebburn (60 total) has not been assessed.	HEM propose to haul 10 laden trucks per hour on average from each site, conditions prevailing. This will culminate at 20 laden trucks (40 movements) per hour where haulage routes from Neath and Aberdare East combine, and would consequently total 30 laden vehicles (60 total) from all three sites. The rate of 60 vehicles per hour is only used along a section of road less then 800m long in a location that is more than 2000m from the nearest residential receptor, noise impacts are therefore likely to be minimal. Generally haulage routes are largely removed from residential receptors with the exception of residents adjacent to where the preferred haulage route crosses Neath Road. An assessment of the potential impacts to these residents has been provided in Appendix 9 of the PPR
5.11. Noise and Existing Road Traffic Noise	The NIA has not determined existing road traffic noise levels.	Existing traffic noise levels are unlikely to reach levels that would impact residential receptors above the ECRTN criteria, further detail on this has been provided within Appendix 9.
5.12. NIA Model Inputs	No justification of model inputs for the traffic noise assessment is provided.	Justification of model inputs is supplied within Appendix 9.
5.13. Noise Model Calibration/Verification	No calibration or verification of the model has been included.	Verification has been included within Appendix 9.
5.14. Noise and Haulage Routes	Clarification of the haulage routes should be supplied.	HEM have adopted alternative haulage routes to those within the Environmental Assessment these are detailed in the PPR.
5.15. Noise and Commitments	Modification of the Statement of Commitments to ensure the impacts will be appropriately managed.	A revised Statement of Commitments has been provided in the Preferred Project Report, that incorporates additional controls, monitoring and reporting commitments.

5.16. Dust Emissions	Insufficient certainty as to the extent and control of dust emissions.	In addition to the dust control measures contained within the Environmental Assessment, HEM will prepare and Air Quality Management Plan prior to site rehabilitation detailing specific measures to control dust emissions. **Section 6** of the PPR details the proposed mitigation measures and monitoring to be employed for the operation to minimise dust generation, reduce potential impacts and monitor dust generation to provide a continual improvement of the operations.
5.17. Greenhouse Reduction	The consideration of the shorter haulage paths through the National Park should not be considered as part of the Greenhouse reduction strategy.	Shorter haulage routes will result in a reduction in the amount of greenhouse gases generated as a result of the project.
5.18. Thermal Efficiency of Recovered Coal	The proponent needs to confirm that the coal recovered from the chitter and tailings emplacements will not have a lower thermal efficiency than virgin coal from an open cut or underground mining operation.	The primary objective of this project is to provide an economically viable solution for lands impacted by past coal mining activities by reprocessing emplaced carbonaceous materials generating beneficial environmental outcomes that eventuate through land form restoration, revegetation and contaminant removal (ie surface salts and acid mine drainage). The coal recovered from chitter and tailings emplacements is expected to have varying thermal efficiency. HEM have identified marketable export and domestic opportunities for the chitter and tailings.
5.19. Dust Impacts	A review of dust impacts and measures that will clearly identify circumstances when operations can occur without adverse impacts including: • Meteorological conditions	The AQIA for the project undertaken to date provides a reliable assessment of the nature, intensity and duration of the anticipated air quality impacts, HEM believes that further AQIA modelling will be of no substantial benefit as the predicted impacts from revised modelling will not vary significantly from those already predicted. Instead of remodelling with the infinite number of variables that could

	• Location of excavation area • The size of excavation area • Excavation/haulage rates • The use of non National Park haulage routes.	exist during operations HEM propose to develop a monitoring and reporting program as detailed within the PPR to regulate operations to ensure DECC criteria are maintained. HEM will utilise information provided in the AQIA to develop the Air Quality Management Plan (AQMP) that outlines specific management measures and a detailed monitoring program. Given the long term environmental outcomes that will be derived from this project. Specifically the AQMP in line with the monitoring program will identify circumstances when operations can occur without adverse impacts including: • Meteorological conditions; • Location of excavation area; • The size of excavation area; • Excavation/haulage rates; Haulage through the National Park will accrue significant benefits to the National Park and
5.20. Dust Criteria	The review could include a refined contemporaneous impact assessment that demonstrates no additional exceedances of the DEC's PM10 24 hour criterion.	Refer to HEM Response 5.19.
5.21. Dust Control Commitments/Cessation of Work	Clear commitments relating to dust controls to be implemented and commitment to cessation of works during prevailing meteorological conditions.	Dust mitigation measures are outlined in Section 5.3.7 of the Environmental Assessment. These measures include a daily review of meteorological conditions to minimise impacts to residences by coordinating operations with prevailing climatic conditions and maintaining disturbed surfaces, haul roads and stockpiles in a damp

		condition to minimise dust generation. In addition to the measures outlined HEM will install a wind speed/direction sensor to allow HEM operations to operate without adversely affecting surrounding residences. Dust impacts upon surrounding residences will be managed by monitoring PM10 concentrations, further to this HEM have committed to developing an Air Quality Management Plan. HEM has included a commitment to the cessation of works during prevailing meteorological conditions in the revised Statement of Commitments provided in the Preferred Project Report.
5.22. Loss of Native Vegetation	Loss of native vegetation, EEC and threatened plants.	The loss of native vegetation will be restricted to disturbed vegetation communities within the site and small areas on the edge of sections of fire trails. As stated in Section 5.9.5 of the Environmental Assessment the proposed project is generally restricted to terrain already disturbed by former coal mining activity, which has resulted in the creation of a partially rehabilitated landscape overlying emplacements of carbonaceous materials containing polluting elements. Natural soils and intact native vegetation is generally restricted to lands surrounding the project area. Therefore, the majority of biodiversity losses will be associated with existing disturbed landscapes that are exposed to elevated levels of soil salinity and acidity.
5.23. Clearing Impacts on Fauna Habitat	Impacts of clearing native vegetation on fauna habitat.	As detailed above the loss of vegetation will be restricted to disturbed vegetation communities within the site and on the edge of sections of fire trails. While this vegetation may be used for foraging, there are no hollow bearing trees proposed to be removed, and the proposed revegetation will result in an improved landscape with potential greater long term ecological value.

5.24. Native Vegetation Avoidance/Mitigation Strategies	Failure of proponent to identify effective avoidance or mitigation to address loss and degradation of native vegetation.	The HEM rehabilitation project has been designed to provide for the improvement of degraded landscapes, this includes the removal of coal wastes that presently leach salt and acid into the environment, further the haulage routes selected have utilised cleared power easements where possible or existing fire trails to avoid clearing of sensitive vegetation. A review of the impacts to flora and fauna along the proposed haulage routes has been undertaken and is presented within **Appendix 8**, it should be noted that the preferred haulage routes will reduce impacts to threatened species along the proposed haulage routes. Section 5.9.6 of the Environmental Assessment clearly outlines mitigation strategies to be implemented by HEM to minimise loss and degradation of native vegetation. Further to this, rehabilitation works will be undertaken to achieve improved biodiversity outcomes by promoting growth of local plant species characteristic of significant vegetation types found within the Cessnock locality.
5.25. Offsets	Inadequate offset for threatened species.	A review of the impacts to flora and fauna along the proposed haulage routes has been undertaken and is presented within **Appendix 8**, it should be noted that the preferred haulage routes will reduce impacts to threatened species. While the project will result in the loss of some threatened biodiversity within the existing sites and on the edge of small sections of fire trails. The rehabilitation of the sites will utilise provenance seed where possible including threatened species consistent with surrounding vegetation communities that will result in a net improvement of threatened species in the longer term.

5.26. Deficit of Rehabilitation Area	There is an apparent net deficit of clearing to rehabilitation (75ha cleared, 26ha replaced) meaning a deficit of 62ha.	The 62ha figure is incorrect. These areas will be revegetated with grass species not inconsistent with the existing species on the sites. These sites have limited good native vegetation, a large portion of these areas are grassed with scattered acacias that have limited life spans. Further the area is limited as the growing of larger trees is not advisable due to the underlying tailings. As such the proposed rehabilitation of these sites is difficult to determine in a like for like basis, as the rehabilitation proposed could consists of a longer term vegetation community and grasses not dissimilar to what presently exists. A review of the flora and fauna impacts along the proposed haulage routes has been undertaken and is presented within **Appendix 8,** this includes a revised tabulation of rehabilitation and clearing impacts.
5.27. EEC Rehabilitation in Other Mine Sites	Potential mitigation measures could include the rehabilitation with EEC in other mines sites under control of HEM or the acquisition and conservation of biodiversity focused lands in the locality.	Refer to HEM Response 5.26.
5.28. Rehabilitation Strategy	There is no detailed rehabilitation strategy.	HEM will prepare and submit to the Department of Primary Industries a detailed Landscape and Rehabilitation Plan as part of the MOP prior to the commencement of site rehabilitation consistent with industry standards and the relevant catchment management plan where relevant.
5.29. Strategic Land Use	There is no reference to any of the strategic land use plans and objectives.	The Wallis Creek Landcare plan was incorporated into the document as noted in the CMA documentation. The proposed project is consistent with the objectives of the *Lower Hunter Regional Strategy 2006*. The three sites are within lands

		identified as "Rural and Resource Land" within the Lower Hunter Regional Strategy that provide valuable economic, environmental and social benefits to the region, Haulage routes traverse "Rural and Resource Land", "National Park" and "Employment Land". The proposed project is consistent with the objectives of the *Lower Hunter Regional Conservation Plan 2006.* Spotted Gum Ironbark EEC and threatened woodland birds are identified as an investment priority within the Cessnock area. Rehabilitation outcomes from this project will support this investment priority, especially in relation to Neath.
5.30. Long Term Management of Sites	The EA does not describe the long term measures for the protection and management of the sites following completion.	The long term protection of these sites will be provided under the Native Vegetation Act 2003. It is not at the discretion of the proponent to determine the long term protection and management of these lands. It is the proponents responsibility to appropriately rehabilitate to standards administered by the DPI and to the satisfaction of the land owner. The provisions of the Native Vegetation Act will apply to the site when HEM's security bond for the site is released and the Mining Lease over the land has been removed, that is when the land ceases to be subject to conditions of approval under Part 3A of the EP& A Act. Management of the sites after the extinguishment of the mining lease then becomes the responsibility of the land owner.
5.31. Aboriginal Cultural Heritage Assessment	The Aboriginal Assessment is deficient and greater consultation is required, however DEC can recommend conditions to address these issues.	The assessment of Aboriginal Heritage within the EA was discussed with the DECC prior to the lodging of the document. Given the minimal scope to avoid artefacts along a narrow fire trails any preliminary study would not be beneficial, with the greatest benefit accruing at the time of road construction in consultation with aboriginal communities.

5.32. Justification for Use of Werakata National Park	The current proposal does not contain sufficient justification of benefits to the Park to allow the construction and use of fire trails for the haulage of material.	HEM have undertaken further consultation with the DECC, DECC have given support to a conditional approval. The conditions of approval and use will be determined by the DECC prior to use of the fire trail.
5.33. Outdated Vegetation Mapping	Mapping used in the EA is out-dated, DEC was not asked to provide any updated mapping.	All areas that may be disturbed as a result of the project have been mapped in the field by a qualified and experienced ecologist.
5.34. Removal of Threatened Species from Werakata National Park	Up to 23 Threatened species are proposed to be removed from the Park.	This is incorrect, no threatened species will be removed from the Werakata National Park. Appendix 8 of the PPR provides an assessment of the revised haulage routes and details regarding threatened species removal.
5.35. Spontaneous Combustion	The EA makes reference to removing a potential spontaneous combustion source, however all the recording has indicated only Hebburn No.2 has caused bushfire.	Bushfires have propagated from Hebburn No.2 tailings dams from spontaneous combustion. Whilst no bushfires have been started from the spontaneous combustion of carbonaceous materials at Richmond Main East, Aberdare East and Neath, similar conditions increase the risk of ground and bushfire hazards. The Richmond Main East site was in fact discovered as it spontaneously combusted. In recent times it has however become apparent that bushfires can ignite the chitter material and burn underground for weeks after the surface fires are extinguished. These areas are of significant danger to human health and the environment as the fires are often not easily visible and could easily create injury or damage to people, vehicles and animals.
5.36. Archaeological Sensitivity of Werakata National Park	No assessment of archaeological sensitivity within the Werakata National Park.	Refer to HEM Response 5.31.
5.37. Erosion and Sediment	Erosion and sediment control in the park are not	Prior to the construction of haulage roads all details of construction, operations and maintenance activities on the haulage roads will be

Control of Werakata National Park	specifically dealt with.	subject to approval of construction plans, erosion and sediment control plans and construction materials by the relevant land owners (including DECC as the owner/manager of the National Park). Notwithstanding the above erosion and sediment control will be managed according to the Landcom Blue Book or to the standards of the DECC.
5.38. Dust and Soil Impact within Werakata National Park	Impacts of dust and disturbance of soils from trucks has not been dealt with in the main section of the EA and have no justification for the potential impact being short term and reversible.	The improvement of the fire trails through the National Park to facilitate the haulage of material to the Hebburn No.3 washery to permit the rehabilitation of degraded mine sites will provide a beneficial legacy for the National Park's management. Materials used in the improvement of the fire trails and the use of water carts will minimise the generation of dust, and may reduce impacts to soils through the creation of a stable fire trail that will reduce erosion of fire trials that currently occurs within the National Park. In addition given the fire trail is located within an electricity easement where vegetation is to be kept to a minimum the impacts of dust will be substantially reduced. Therefore given the beneficial operational uses of fire trails in National Park management, the reduction of erosion through the creation of a stable road form and the location of the trail within a electricity easement minimises impacts an provides a net benefit to the National Park.
5.39. Werakata National Park and Park Users	The EA provides only limited information on the impact of haulage routes within the National Park to legitimate and non-legitimate Park users.	Haulage along fire trails within Crown Land and the Werakata National Park does have the potential to adversely impact some recreational activities such as bush walking during weekdays when haulage is being undertaken. To minimise impacts to recreational activities, trails in use will be signposted to alert users. No impacts will occur to those using the

		trails on the weekend and for some the operations will result in a beneficial impact on weekends during operations and after the closure of the operations as access will be improved. Further detail on Existing Fire Trail Uses has been provided with Section 5.2.1.6 of the PPR.
5.40. Haulage Impacts on Kearsley Residents	The proponent consistently states the National Park will alleviate impacts of trucks on the community, despite the Tomalpin Trail resulting in the impacting of numerous residents in Kearsley.	HEM have adopted alternative haulage routes as detailed within the PPR. These routes will reduce impacts to numerous residents in Kearsley and Neath, however some residents near Neath Road may be impacted by noise as a result of the proposed haulage route. Given the relatively short duration of the impacts and the beneficial outcomes as a result of the project, these impacts are considered acceptable. Notwithstanding the net community benefit of using the preferred haulage routes HEM will work with the impacted residents to minimise impacts. Refer to HEM Response 5.32 for addition information regarding potential impacts, criteria and justification for the use of the fire trail.
6. Department of Lands		
6.1. Impact on Crown Land	Impacts on crown lands have not been suitably assessed in the EA.	HEM has consulted with the Department of Lands with regard to the preferred haulage routes detailed within the PPR. A flora and fauna assessment has been undertaken on the proposed fire trails. All road construction design (road material, design, creek and drainage line crossings) operational and maintenance activities will be subject to landowner approval prior to construction.
6.2. Crown Land and Consent	Use of crown land outside areas that will be	HEM acknowledges that the Department of Lands may recommend

	under a mining lease will require departmental assessment and conditional consent.	consent conditions to the Department of Planning for their consideration and determining this development application.
6.3. Rehabilitation of Crown Lands	Rehabilitation on mine sites that are on crown land should be done to the Departments standards.	The Environmental Assessment states that the final landform and rehabilitation approach will be subject to negotiations with key government agencies and the landowner and will be detailed within the Landscape and Rehabilitation Plan prepared for the MOP. The Land and Rehabilitation Plan will be prepared in general accordance with the standards of the Department of Lands and the ACARP Project C13048 Rehabilitation Completion Criteria for Native Ecosystem Establishment in the Hunter Valley.
6.4. Crown Land and Haulage Routes	The Department would like the proponent to consider alternate haulage routes that will minimise impacts on Crown land.	HEM has adopted an alternative haulage route as detailed in the PPR, following consultation with community groups and the Department of Lands. These routes have been endorsed by Cessnock City Council in their meeting of 21 March 2007.
7. Department of Natural Resources		
7.1. Water and Dust Suppression	No information on the volume of water to be used for dust suppression or the nature of the proposed sedimentation structures is contained in the EA.	Based on an estimated length of unsealed haulage road for the entire project of 10.5km, with dust suppression occurring for the full day each working day, it would expected that approximately 30ML of water would be applied per year for the suppression of dust. However water use will be minimised through its application only where required and in close proximity to residential properties. Should dust suppression be required on a exceedingly frequent basis changes to the pavement surface will be investigated. Details of the proposed sedimentation structures is contained in Section 6 of the Soil and Survey Management Plan prepared by the

		Department of Lands (Appendix 6 of the Environmental Assessment). Other sedimentation structures for haulage roads and other project areas would be constructed in accordance with the Landcom Blue Book or the landowners standards where applicable (Hunter Water, DECC or Department of Lands).
7.2. Use of Surface Water and Farm Dams Policy	The use of water from sedimentation basins must comply with the NSW Farm Dams Policy and must be confirmed in writing to the approval authority and DNR.	The use of water from sedimentation basins will comply with the NSW Farm Dams Policy.
7.3. Groundwater Monitoring	HEM must undertake groundwater monitoring as part of the project approval in order to quantify if impacts to groundwater has occurred.	Section 5.5.4 of the Environmental Assessment stated that regular monitoring will be undertaken to monitor changes in water quality being discharged underground and of the downstream surface water catchment. Should the monitoring identify significant changes to existing water qualities, site practice will be reviewed and amended as required.
7.4. Rehabilitation	The approval authority must ensure HEM rehabilitate the Richmond Main East site to an adequate form to ensure the long term stability of the landform and Wallis Creek, armoring protection may be required at the toe of the rehabilitated batter.	Section 4.9 of the EA states that the final landform at each site will be stable. Section 4.9.3 of the Environmental Assessment states that Richmond Main East will be rehabilitated to a final landform suitable to grazing, a corridor of the site adjacent to Wallis Creek will be revegetated using appropriate riparian plant species. If required, armoring protection will be installed at the toe of the rehabilitated batter.
8. Department of Primary Industries		
8.1. Mining Leases	Mining Leases issued under the Mining Act will be required for each site and annual reporting	HEM acknowledges that a mining lease under the Mining Act 1992 is required for each of the sites and that a key requirement of the

	will be captured within the Hebburn No.3 Annual Environmental Management Report.	mining lease will be the regular preparation of an environmental management report as specified by the Department of Primary Industries as noted in Section 4.15 of the Environmental Assessment.
8.2. Rehabilitation Outside Mining Lease	Area F at Aberdare East is outside the bounds of the Proposed Mining Lease, this area does not contain resource but will require rehabilitation, as such its coverage under a Mining Lease will be required.	No coal resources have been identified in this area. If it is determined that work is required to take place in this area HEM will apply for the relevant licences and permits prior to work commencing.
8.3. MOP	The MOP should be prepared in accordance with the Departmental Guideline EDG03.	Section 4.14 of the Environmental Assessment acknowledges that a MOP for the project will need to be prepared. The MOP will be prepared in accordance with the Departmental Guideline EDG03.
8.4. Rehabilitation Completion Criteria	The completion criteria for the rehabilitation will need to be developed in consultation with the DPI and in general accordance with the ACARP Project C13048 Rehabilitation Completion Criteria for Native Ecosystem Establishment in the Hunter Valley.	Section 4.9 of the Environmental Assessment states that the final landform and rehabilitation approach will be subject to negotiations with key government agencies and will be detailed within the Land and Rehabilitation Plan prepared for the MOP. The Land and Rehabilitation Plan will be prepared in general accordance with the ACARP Project C13048 Rehabilitation Completion Criteria for Native Ecosystem Establishment in the Hunter Valley.
8.5. Compliance with Coal Mining Legislation	DPI requires commitment to compliance with the Coal Mine Health and Safety Act 2002 and Coal Mines Regulation Act 1982.	Section 5.13 of the Environmental Assessment states that each site will require a commitment to compliance with the Occupational Health and Safety Act 2000 and additional as each site is classified as a coal mine they will similarly require compliance with the Coal Mine Health and Safety Act 2002 and Coal Mines Regulation Act 1982. This has been included in the revised statement of commitments.
8.6. Responsible Persons	DPI requires the nomination of a person as Operator and Manager as required under the Coal Mine Health and Safety Act 2002 and Coal	HEM acknowledges the requirement for the nomination of a person as Operator and Manager under the Coal Mine Health and Safety Act 2002 and Coal Mines Regulation Act 1982. The Operator and

	Mines Regulation Act 1982.	Manager will be detailed in the MOP.
8.7. Safety Procedures	DPI requires details of the procedures the proponent intends to adopt in addressing any safety issues raised by an Inspector or other authorised officer.	Procedures to be adopted in the event of safety issues raised by an Inspector or other authorised officer will be detailed in the Health and Safety Management System to be developed for each site as a component of the MOP.
8.8. Community Consultation	The proponent must engage in regular and extensive consultation with relevant stakeholders, especially landowners adjacent to Neath and Aberdare East.	Section 3.2 of the Environmental Assessment states that HEM will implement a communications program consisting of a website, telephone hotline, newsletters and one on one discussions with residents living along the haulage routes and at Aberdare East, Neath or Richmond Main East.
8.9. Soil Management	Further detail on soil management should be provided within the MOP.	Further detail on soil management will be included within the MOP.
8.10. Rehabilitation Strategy and MOP	Further detail of the rehabilitation strategy for the site should be provided in the MOP with the view of establishing a landform that enhances the natural ecology of the area.	Further detail of the rehabilitation strategy for the site will be provided in the Final Landform and Rehabilitation Plan within the MOP. Section 4.9 of the Environmental Assessment confirms that the rehabilitation strategy will create a self sustaining, functional, vegetated landscape promoting the development of more complex ecological processes consistent within the surrounding vegetated landscapes.
9. Heritage Department - Dept of Planning		
9.1. Insufficient Detail on Heritage Values	Insufficient detail on heritage values of the sites and the potential heritage impacts.	As stated in Section 5.15.2 the areas that HEM are seeking to rehabilitate are not known to contain any items of historical significance. An assessment of the potential heritage value and potential impact of the rehabilitation operation on each of the areas

		has been undertaken and is included within Appendix 10 of the PPR.
9.2. Statement of Heritage Impact	Statement of Heritage Impact (SHI) required to allow Heritage Office to recommend consent conditions.	An assessment of the potential heritage value and potential impact of the rehabilitation operation on each of the areas has been undertaken and is included within **Appendix 10** of the PPR.
10. Mine Subsidence Board		
10.1. Subsidence	If the applicant is to construct any permanent improvements on the land the approval of the MSB should be sort at the appropriate time.	HEM does not propose to construct any permanent improvements on the land as part of this application.
11. Hunter Regional Development Committee (HRDC)		
11.1. Haulage Route	Route A2 (with the Tomalpin Fire Trail, Caledonia Street, Government Circuit should be used for haulage in both directions from Aberdare East.	HEM has adopted an alternative haulage routes as detailed in the PPR. The alternative route presented in the PPR has been adopted in line with the Cessnock City Council's recommendations, refer Response 1.1.
11.2. Traffic Control	Traffic control should remain as is at Allandale and Caledonia Street.	HEM has adopted an alternative haulage routes as detailed in the PPR. The alternative route presented in the PPR has been adopted in line with the Cessnock City Council's recommendations, refer Response 1.1. This route will not utilise the Allandale and Caledonia Street intersection.

11.3. Erosion and Sediment Control	Shaker grids and temporary seal should be provided at the access to all sealed roads.	HEM will install shaker grids and temporary seals at the access to all sealed roads.
11.4. Gravel Roads and Dust	Gravel roads should be regularly watered to minimise dust.	Section 5.3.7 of the Environmental Assessment states that all roads and trafficked areas will be watered to minimise the generation of dust. Alternatively where dust generation cannot be adequately suppressed, HEM will alter the pavement material or incorporate appropriate dust suppressants with consent of the landowner.
11.5. Hours of Operation and Peak Periods	Hours of operation and movements should be restricted or eliminated during school / peak periods.	HEM have adopted alternative haulage routes as detailed in the PPR. These haulage routes do not utilise public roads in the vicinity of schools. The proposed routes minimise the use of public roads. During operations movements will be restricted during peak traffic periods, however given the limited distance travelled on public roads by the Preferred haulage routes the impacts to peak period traffic flows is expected to be minimal.
11.6. Duffy Drive Haulage Route	Route N2 should be adopted with a connection to Duffy Drive with appropriate intersection treatment in consultation with Council.	HEM has adopted Route N2 with a connection through to Duffie Drive. Measures to improve the intersection are detailed within the PPR. The proponent will consult with the Council prior to construction of the intersection.
11.7. Intersection Treatment	A Type B intersection should be provided at the Tunnel Road/Maitland Road Intersection.	HEM support the construction of a Type B (or Type AUR) intersection on Tunnel Road as proposed within the PPR.
11.8. Traffic Control Signage	Appropriate traffic control signage should be provided at all major fire trail intersections, this should be referred to Council's Traffic Committee.	HEM will install W5-22 “Trucks Entering” signs on all intersections.
11.9. Upgrade of Rail Level	Railway level crossings should be upgraded to	HEM has consulted with the owners and operator of the South Maitland Railway, the Neath and Aberdare East haulage route

Crossings	the relevant standards.	crossing will be upgraded to an appropriate standard.
11.10. Speed Zones	An 80kph speed zone should be provided on Leggetts Drive from the access along the haulage route to Pelaw Main.	HEM supports a reduction in the speed limit on Leggetts Drive during the haulage operations from Richmond Main East.
11.11. Visual Messaging Signs	Visual Messaging Signs (VMS) should be provided on Leggetts Drive.	HEM does not support the use of Visual (variable) Messaging Signs (VMS) on Leggetts Drive. SKM undertook an assessment of the haulage route and recommended that W5-22 "Trucks Entering" advanced warning signs would be sufficient for the haulage operation.
11.12. Leggetts Drive Shoulder Upgrade	The shoulders on Leggetts Drive should be upgraded to a width of 3m.	HEM does not support the blanket upgrading of shoulders on Leggetts Drive. SKM undertook an assessment of the haulage route and recommended that only the shoulders adjacent to the intersection be upgraded, given the limited period of haulage from Richmond Main East. Extensive upgrading of shoulders on Leggetts Drive would not permit the rehabilitation of the Richmond Main East site as it would become economically unviable.
11.13. Traffic Management Plan	A Traffic Management Plan that includes details of haulage should be prepared and submitted to Council and RTA for approval.	HEM will prepare and submit to the Department of Primary Industries, Council and the RTA a detailed Public Safety Management Plan (Incorporating a Traffic Management Plan) as part of the MOP prior to the commencement of site rehabilitation.
11.14. Traffic Access	No access via Hebburn or Lake Road.	HEM has adopted an alternative haulage route as detailed in the PPR this route will not utilise Lake Road or its intersection with Hebburn Road for the haulage of chitter or tailings back to the HebburnNo.3 washery.
11.15. Employee Access	All employee access via the HEZ Spine Road.	HEM encourage employees to use the HEZ Spine Road, however it is not possible to regulate the access to the site given the public

		access that is provided via Hebburn Road, to both the north and south.
11.16. Employee and Haulage Traffic	Clear separation between employee and haulage traffic should be maintained.	Employee inductions will emphasise the importance of maintaining safe gap distances between all vehicles and maintaining a safe separation distance between haulage and employee traffic.
11.17. Car Parking Provisions	Car parking on site should be to Council requirements.	Car parking will be provided on site in accordance with the Cessnock City Council City Development Control Plan 2006.
11.18. Truck Turning Signs	Truck turning signals should be provided on haulage routes where appropriate.	HEM will provide truck turning signals and W5-22 “Trucks Entering” advanced warning signs where necessary on all haulage routes.
11.19. Turning Templates	Turning templates should be provided for all critical turn movements for the design vehicles.	Turning templates will be applied to all intersection treatments to ensure the safe turning of vehicles.
11.20. Traffic Requirements	All of the requirements must be to Council/RTA requirements.	HEM will consult with Council and the RTA prior to the construction of intersections or road improvements. HEM are generally satisfied with the recommendations of the RTA and Council except where noted.

Hunter Enviro-Mining (Operations) Pty Limited

Preferred Project Report

Chitter & Tailings Reclamation Project

Appendix 5

Response to Individual Submissions

October 2007

Table of Contents

1.1. Aberdare East Alternate Route 3
1.2. Aberdare Pre-School 3
1.3. Air Quality 3
1.4. Air Quality and Children 4
1.5. Caledonia / Allandale St Intersection 4
1.6. Caledonia / Pokolbin St Intersection 4
1.7. Community burden 4
1.8. Compatibility of Land Use 5
1.9. Compensation 5
1.10. Consultation 5
1.11. Damage to past rehab 5
1.12. Diesel emissions and health 6
1.13. Dirt on roads 6
1.14. EA Problems 6
1.15. Economics 8
1.16. Extraction Rates 8
1.17. Fauna impacts 8
1.18. Fencing 9
1.19. Flora impacts 9
1.20. Greenhouse 9
1.21. Heavy vehicle traffic 9
1.22. Hebburn No.3 10
1.23. HEM Performance 11
1.24. HEM Subsidisation 11
1.25. House values 11
1.26. Market 11
1.27. Move Washery 11
1.28. Neath Alternative Route 12

1.29. Neath Road Usage 12
1.30. Noise and dust health impacts 12
1.31. Noise Assessment 12
1.32. Noise from extra traffic on roads 14
1.33. Noise Mitigation 14
1.34. Other works by HEM 14
1.35. Possible Future Routes 14
1.36. Project Costs 15
1.37. Property access difficulties 15
1.38. Recreational Activities 15
1.39. Rehabilitation 16
1.40. Risk of Disturbance 16
1.41. Road capacities 16
1.42. School safety and learning (Kearsley) 17
1.43. Social issues of increased traffic 18
1.44. Spontaneous Combustion 18
1.45. Traffic Assessment 19
1.46. Transport of Coal by Rail 20
1.47. Vibration 20
1.48. Water Mains impact 20
1.49. Water Quality 20
1.50. Water use 21
1.51. Wells Environmental Independence 21
1.52. Werakata National Park Haulage 21

The following table provides a list of issues raised by the general public during the Public Exhibition period and the subsequent responses to issues raised.

Aspect	Issue	HEM Response
1.1. Aberdare East Alternate Route	The alternate route from Aberdare East should be used.	HEM has reviewed the alternative haulage routes proposed and adopted Preferred route as presented in the Preferred Project Report (PPR). The Preferred Route was endorsed by Cessnock City Council in their meeting of 21 March 2007. The route utilises fire trails and does not pass the Kearsley Primary School.
1.2. Aberdare Pre-School	Aberdare Pre-School will be exposed to potentially near maximum dust levels and could be adversely impacted by noise.	HEM will instigate strict operating practices that will ensure the operations do not adversely impact Aberdare Preschool.
1.3. Air Quality	1. Stringent dust control critical, many asthma suffers live near these sites, could have detrimental impact; 2. Who will be responsible for monitoring prevailing weather conditions and ceasing operations; 3. Who will monitor the sufficiency of dust on roads and ability of the two water carts to service the three sites; 4. Government Circuit should be tar sealed; 5. Stockpiling needs to be kept to a minimum; 6. How relevant is the use of the meteorological station data in the modelling given the distance from Aberdare and Neath and is it recent	1. As detailed within the EA and PPR HEM will instigate strict operating procedures to minimise impacts to surrounding residents in accordance with amenity criteria and conditions of Approval. 2. HEM will be required to monitor and report prevailing weather conditions in accordance with conditions of approval and Environmental Protection Licence (EPL) conditions. 3. HEM will be responsible for maintaining the haulage roads in an acceptable state, and will regularly assess the ability of the two water carts servicing the area. Not-withstanding a complaints line will be arranged to provide for quick response by HEM to issues observed by the public. 4. Tar sealing of Government Road will be undertaken to the satisfaction of Cessnock City Council.

	enough to be valid; 7. Minor changes in the perceived background could detrimentally impact significantly more residents; 8. Westerly winds prevail and would cause major impact to Southwood Estate and surrounds.	5. Stockpiling will be kept to a minimum, given the operation is for the clean up and recovery of a resource (previously considered a waste stream), it is not in HEM's best financial interest to double handle material. 6. The use of meteorological station data as presented within the EA is believed to be sufficient to appropriately undertake the modelling. Onsite stations will be installed to guide operating conditions. 7. During an episodic event, operations will cease, given the generation of dust from numerous sources outside of the HEM operations. 8. Operations at Neath during south and south westerly winds will be restricted to minimise the potential dust impacts to surrounding residential areas, including Southwood Estate.
1.4. Air Quality and Children	Air quality and health of children such as increases in asthma.	As detailed within the EA and PPR, HEM will instigate strict operating procedures to minimise impacts to surrounding residents.
1.5. Caledonia / Allandale St Intersection	The Caledonia and Allandale Street is a major and dangerous intersection, extra trucks will exacerbate problem.	HEM has reviewed the alternative haulage routes proposed and adopted an alternative route as presented in the PPR. The route utilises fire trails and does not pass through the Caledonia and Allandale Street intersection.
1.6. Caledonia / Pokolbin St Intersection	Intersection is ambiguous, three giveway signs not four.	HEM has reviewed the alternative haulage routes proposed and adopted an alternative route as presented in the PPR. The preferred route will not utilise this section of road or pass through this intersection.
1.7. Community burden	The burden of the project on local residents outweighs the benefits of the project.	HEM has proposed to undertake a project that will employ local residents and remove a significant environmental burden from the

		area. It is the view of the Author that given the relatively short time frame of the project, with the implementation of appropriate controls and working with the community, this project is of great benefit to the community.
1.8. Compatibility of Land Use	The DoP stated that mining applications would be required to address compatibility with adjoining land uses - the proposed operations do not appear to be compatible with the adjoining residential land use.	Legislatively this project is considered to be a mining operation, however practically the operation is removing a burden from previous mining operations and is a rehabilitation project which will render the land compatible with adjoining land uses.
1.9. Compensation	Medical costs. Professional Laundromat costs. Extra water costs for cleaning off coal dust. Impacts to businesses (B&Bs etc).	Providing appropriate controls are implemented impacts from the HEM operations should be minimal and relatively short term. HEM will have a complaints telephone number to provide the community with a point of access for issues they may be experiencing as a result of the operations. HEM will respond to each complainant quickly and professionally to establish appropriate actions to remedy the issue.
1.10. Consultation	Consultation by HEM has been inadequate to date, the following is proposed to go forward: • establish a local complaints line, with a local number to minimise call costs. • the complaints line should be displayed on the website. • all requirements relating to consultation should be fixed within the approval to make it binding.	HEM are committed to ensuring the operations have minimal impact on the local community as such a telephone complaints line will be established with regular updates of the operations progress posted in the HEM website. These commitments to consultation are detailed within the Section 3 of the Environmental Assessment and Statement of Commitments by HEM in the PPR.
1.11. Damage to past rehab	Damage to past rehabilitation works that had substantial amounts of money already spent on	While past rehabilitation activities at both the Neath and Aberdare East were undertaken it is evident that given the acid leaching from these areas the past rehabilitation activities were not as successful

	them.	as envisaged. The proposed removal of these wastes will remove the source of acid and will result in a long term improvement of the landform. HEM will be bound by a security bond held by the Department of Primary Industries, conditions of the Part 3A approval and EPL conditions to ensure that works are undertaken to an appropriate standard.
1.12. Diesel emissions and health	Added diesel emissions and coal dust may result in a community health crisis with more asthma, and other afflictions resulting in drop in attendances at school and work.	As detailed within the EA and PPR, HEM will instigate strict operating procedures to minimise impacts to surrounding residents.
1.13. Dirt on roads	Trafficking of dirt from trucks onto local sealed roads.	Each site will have sufficient controls to ensure that dirt is not tracked onto local sealed roads, this will include tar sealed entrances and shaker grids to remove excess dirt. Further HEM and all vehicles will monitor the operations and should dirt be trafficked onto sealed roads form the operations the material will be removed as soon as possible.
1.14. EA Problems	The following problems with the main volume of the EA are: 1. Haulage numbers underestimated in EA and no detail on what period "ten trucks per hour on average" is taken over, this needs to specified. 2. Aberdare Preschool was excluded from EA despite being adjacent to the Aberdare East site. 3. No assessment of the impacts (noise and traffic) to the residents of Pelaw Main and Stanford	1. Haulage from the each site (Neath, Aberdare East and Richmond Main East) will not exceed 10 laden trucks per hour (20 trucks per hour including incoming and outgoing) on average. Vehicle haulage will be averaged over 4 hours, with haulage not exceeding 18 in any one hour. The EA does include the pre-school as a sensitive receptor. The applicable goal for a school under the Industrial Noise Policy (INP) more stringent then residential criteria (that was adopted in the EA) the INP goal for a school is as follows: • LA_{eq}. Noise Level of 35dB(A) internal, typically attenuation by building is 8-10dB(A);

	Methyr. 4. The ESD principal on "polluter pays" is not correct for this project, the level of impact on the community seems to be increased while HEM profits from the project. 5. EA not complete unless management plans also publicly exhibited. 6. Northumberland Street does not exist on the ground, despite the maps showing it does. 7. The EA fails to detail labour related issues on wages, economic benefit and conditions of employment.	• LA_{eq}. Noise Level of 55dB(A) external. Therefore under a typical operations the preschool would be expected to receive a noise level in the order of 36dB(A) external, or 26-28dB(A) internal, therefore complying with INP noise criteria. 2. Impacts to the residents of Pelaw Main and Stanford Methyr will not change form that previously approved for the Hebburn No.3 operations, this application does not seek to increase haulage from Hebburn No.3 to the Port of Newcastle. 3. Whilst HEM is not the original polluter of each of the three resource sites, they will bear the clean up and rehabilitation costs of these sites at no economic cost to the community (which may have been incurred in the event that local or state authorities undertook such rehabilitation efforts). HEM concedes that there may be some short term impacts in terms of dust and noise generation, however these will be within specified compliance limits and amenity criteria. The long term environmental benefits of the project will outweigh any short term impacts. The project will employ local residents and remove a significant environmental burden from the area. With the implementation of appropriate controls and working with the community, this project is of great benefit to the community and environment. 4. Management plans will be detailed and submitted to key government authorities for approval, where relevant HEM will consult with the community to determine the detail of the management plans. 5. Mapping used within the EA has been sourced from NSW Department of Lands, the existence of Northumberland Street

		has no material bearing on the proposed Project. 6. Labour related issues on wages and conditions of employment are a matter for HEM to determine with each employee, individually, collectively or with representation from the relevant Unions. HEM is committed to providing a safe work place. An economic analysis of the project was not undertaken given the projects relatively short project life. The projects economic benefits are evident form the increased employment, royalties on coal, and removal of a financial burden on the State government from the sites rehabilitation.
1.15. Economics	No quantification of the economic benefits to the community and State.	A traditional economic analysis of the project was not undertaken given the projects relatively short project life. The projects economic benefits are evident from the increased employment, royalties on coal, and removal of a financial burden on the State government from the sites rehabilitation.
1.16. Extraction Rates	Will allowable extraction rates be detailed in an approval?	HEM supports the detailing of allowable extraction rates within the Conditions of Approval. The limits of extraction are detailed within the Preferred Project Report.
1.17. Fauna impacts	Fauna habitat and foraging losses should be averted Increase in road kill.	The proposed HEM operation will remove some relatively poor fauna and foraging habitat for local fauna in the short term, however the proposed operation will be staged to minimise short term loses and in the longer term with the final rehabilitation of habitat and foraging areas will be improved. An increase in road kill as a result of the operation is possible, however with appropriately inducted staff, haulage routes appropriately speed limited and with operations restricted to daylight hours an increase in road kill will be minimised.

1.18. Fencing	Strong safety fence around the site to prevent unauthorised access and children entering the site day or night, such as high perimeter fencing.	These sites are currently predominantly unfenced and considered unsafe, especially with regard to children. HEM will where necessary repair and install fencing and signage to prevent unauthorised access to the site. In addition at the close of each operation HEM will ensure that excavations are battered and any trenches have appropriate escape ramps.
1.19. Flora impacts	Impacts to threatened species, EEC and native vegetation is not acceptable.	Impacts to threatened species, EEC and native vegetation will be minimised were possible to allow HEM to undertake the rehabilitation operations. HEM will rehabilitate each site having regard to the surrounding vegetation.
1.20. Greenhouse	Greenhouse gas generation and climate change.	Given the project recovers abandoned coal wastes from the surface of the ground, the project recovers a saleable product from this waste, that would otherwise be sourced from a traditional coal mining operation which may generate relatively higher greenhouse gas emissions. Not withstanding HEM commissioned Holmes Air Sciences to undertake an assessment of Scope 1, 2 and 3 Greenhouse gas emissions (refer Appendix 3 of the EA Report) that would be generated as a consequence of this project. The report concludes that the development will result in a negligible increase of global greenhouse gas emissions and have an immeasurable impact on climate change.
1.21. Heavy vehicle traffic	The project will double the number of heavy vehicles on the road, impacting safety, any increase in accident potential is not acceptable, also increases stress of road users, could have detrimental impact	HEM have adopted an alternative haulage route as detailed within the PPR, this haulage route will reduce impacts to the travelling public. HEM commissioned SKM to undertake an assessment of the

	on tourism (B&Bs and travelling). What measures will be put in place to ensure haulage rates are not exceeded for the sake of increased profit by the haulage contractor.	alternative traffic route and its potential impact on the public road network, providing the recommended intersection treatments are constructed and vehicle operators comply with site restrictions and road laws the impact of the haulage operations on the community and travelling public should be minimised. HEM will regulate haulage contractors to ensure that the project operations and community safety are not put at risk through inappropriate haulage operations.
1.22. Hebburn No.3	1. Does the existing approval permit the additional empty vehicles leaving the washery? 2. What impact will additional vehicles have on the residents of Pelaw Main? 3. Who will monitor approval condition on number of vehicles leaving site? 4. Does original approval support the processing of additional 2.86Mt? 5. No assessment of the stockpiles or water quality impact at the Hebburn No.3 Operation, will HEM guarantee its rehabilitation if material not removed?	1. The existing approval permits the importing of material from external sites, and subsequently would authorise these empty vehicles to leave the Hebburn No.3 site. 2. The rate of haulage will not increase through Pelaw Main, however the original period of time proposed for the operation will be greater then first envisaged. It is worth noting that while this time period may be extended, the total volume of product material exported from the site is within the original Hebburn No.3 approval and associated modifications. 3. HEM will monitor and regulate the vehicles leaving and entering the Hebburn No.3 site and all other sites to ensure haulage rates are maintained within safe and approved rates. 4. Given the significant reduction in the assumed resources within the approved extraction areas, the existing approval can support the processing of the additional material proposed within this application. 5. HEM is required under the existing approval to provide for the appropriate rehabilitation of the Hebburn No.3 site, and a security bond is held by the DPI to ensure this outcome. Rehabilitation of the site will consider long term water management.

1.23. HEM Performance	HEM's past performance including: 1. Failure to adequately rehabilitate the SEPP 55 sites 2. Trust related issues 3. Past promises about sealing Government Road not fulfilled 4. What measures are in place that will ensure the proposed promises are honoured 5. Inability to observe local Council requirements and statutory obligations.	HEM has previously undertaken rehabilitation of sites that has not required consent. This application is a Part 3A major project and as such will be subject to a development consent and conditions that will stipulate how the operation are to run. Commitments by HEM will form a component of this consent. Further each site will be the subject of a mining lease that will have a secured bond held by the DPI to ensure the site is adequately rehabilitated if HEM forfeit the bond.
1.24. HEM Subsidisation	The HEM operation should be subsidised by the government to allow more funds to be put into the local community that will be impacted by the operation to improve local facilities.	HEM supports the view of subsidisation of the rehabilitation operation given the project will be recovering and rehabilitating material from previously abandoned mine sites that are presently a financial burden to the NSW State government.
1.25. House values	The project will devalue houses	The project will not adversely affect home values.
1.26. Market	Need to clearly identify a real market for the chitter and tailings, and benefits of recovery are greater then impact.	HEM have identified a market for this material allowing value adding to abandoned mine waste, while providing employment for the local community and rehabilitating degraded mine sites. Impacts associated with the recovery of the material are short term and will be minimised using reasonable and feasible measures.
1.27. Move Washery	Why can't the washery be moved to the sites to minimise truck movements.	The present location of the washery is the preferred location given the isolation of the plant with respect to residential housing and the fact that the plant operates 24 hours per day. Further truck movements from Neath or Aberdare East for product coal would be required to travel through more residential communities, creating a

		greater impact to the community.
1.28. Neath Alternative Route	Alternative trucking route from Neath is supported.	HEM have adopted an alternative trucking route from Neath as specified in the PPR.
1.29. Neath Road Usage	Cessnock City Council should not give consideration to the use of Neath Road by heavy vehicles without prior consultation with the community.	Cessnock City Council is not required to consult with the community regarding the use of Neath Road by HEM. However the HEM EA identifying the potential use of Neath Road has been publicly exhibited and advertised with input from the community. Under the proposed revised haulage routes the use of Neath Road will be further limited. HEM will be responsible for ensuring the standard of Neath Road is maintained or enhanced as a consequence of haulage operations, refer to the Statement of Commitments in the PPR.
1.30. Noise and dust health impacts	Noise and dust emissions may be damaging to the health of residents adjacent to these sites - potential psychological and family impacts due to deprived sleep especially for shift workers and children.	Noise and dust emission will be strictly monitored to ensure levels are maintained within the approved condition and amenity criteria.
1.31. Noise Assessment	The noise assessment fails to: 1. Comment on the impact of empty coal trucks on residences in Allandale Street 2. Noise at Kearsley school from breaking and accelerating trucks 3. Assess noise impacts on Pokolbin Street 4. Assign appropriate noise criteria to the development, Government Circuit and Neath	1. The preferred haulage routes as nominated in the PPR do not utilise Allandale Street. 2. The preferred haulage routes as nominated in the PPR do not pass Kearsley Public School. 3. Impacts on residences in Pokolbin Street, Aberdare have been calculated as per Figure 5.5 of the EA, Pokolbin Street, Kearsley is remote from the current preferred haulage route proposed within the PPR.

	Road is a rural not suburban environment 5. Criterion for Rural Roads (Government Circuit and Neath Road) is 50dB, therefore there is a substantial exceedence of this criteria 6. Consideration should be given to the RTA's criteria of land use developments with potential to create additional traffic to an increase of not more than 2dB 7. Who will enforce the criterion 8. How is model calibrated or verified 9. Incessant reverse alarms more disturbing 10. Assumption of no houses inside 10m from road centre incorrect, boundary of property in David street 8m.	4. Government Circuit and properties adjacent to Neath Road meet the classification of a suburban environment as defined within the NSW Industrial Noise Policy. 5. Neath Road is by definition a sub-arterial road, given that it conveys traffic between two arterial roads, however in the local context it is typical of a local road like Government Circuit as defined by the NSW, Environmental Noise Control Manual, the resulting noise criteria is therefore 55dB(A). 6. HEM have adopted alternative haulage routes as detailed within the PPR, these routes have sought to avoid residential areas where possible, increases in traffic noise (of more then 2dB(A) but less then the 55dB(A) criterion) from the rehabilitation is considered acceptable given the short time frame and beneficial outcome of the project. 7. HEM have specified within the revised Statement of Commitments in the PPR a noise monitoring program to identify noise levels as a result of the development, these noise levels will be reported to both the DECC, Council and the Community Reference Group. 8. The acoustical assessment of the project has been undertaken by experienced acoustical specialists, **Appendix 9** of the PPR provides detail on model verification. The results of modelling will be assessed against monitored noise levels during project operations. 9. Where feasible and reasonable HEM will adopt alternative noise control measures to minimise disturbances associated with the development, such as alternatives to reversing alarms. In addition, where possible site operations will be configured to minimise the need for vehicles to reverse.

		10. The preferred haulage route as nominated in the PPR does not utilise David Street.
1.32. Noise from extra traffic on roads	Extra trucks on the road will impact activities inside home.	HEM have adopted alternative haulage routes as detailed within the PPR, these routes have sort to reduce impacts on residential areas. Where haulage through residential areas will be undertaken, the noise levels will be within ECRTN road noise criteria.
1.33. Noise Mitigation	Appropriate noise mitigation to ensure that the levels are at acceptable criteria.	HEM will adopt reasonable, feasible and economically achievable noise mitigation measures to ensure the noise levels are within accepted criteria. HEM have committed to a periodic monitoring program to ensure appropriate mitigation measures are employed. It should be noted that while HEM will endeavour to keep noise levels to a minimum the nature of the rehabilitation operation being in close proximity to residential housing means that there may be periodic short term disturbance at various residences.
1.34. Other works by HEM	HEM must be made to disclose any other works that may occur in tandem with the proposed development and the respective impacts should be considered.	Any works outside the scope of the EA or the PPR will require approval and the statutory processes will be followed.
1.35. Possible Future Routes	Should HEM haul directly to power stations: • The route would need to be scrutinised • The volume of heavy vehicles to use these roads • The adequacy of local roads	Should HEM haul directly to power stations the routes selected for haulage would utilise public main roads that minimise impacts to the local community. The nominated haulage routes to power stations will be discussed with the relevant local councils and the DOP prior to the haulage being undertaken.

	• The social and environmental impacts of these routes • The maintenance responsibilities of these routes • Cost benefits of this haulage should be directed to alternate haulage suggested by the Kearsley Committee.	
1.36. Project Costs	The estimated project costs of the application appear to be very conservative given the substantial monies outlayed on the existing HEM operations.	The estimated project costs are not related to the existing development, no fixed plant or infrastructure other then road improvements are required for the proposed operation.
1.37. Property access difficulties	Additional traffic will cause problems for accessing properties (Cessnock Rd, Neath Rd, Kearsley).	The haulage routes presented within the PPR have reduced haulage distances along public roads. The traffic assessment prepared by SKM concluded that the proposed traffic generated by the development will be a relatively minor increase with respect to the vehicles currently using the roads. Access to the property on the corner of Neath Road and the preferred haulage route through the National Park will be maintained to provide a safe access for these residents.
1.38. Recreational Activities	Impacts to recreational activities such as bushwalking.	Haulage along fire trails within Crown Land and the Werakata National Park does have the potential to adversely impact some recreational activities such as bush walking during weekdays when haulage is being undertaken. To minimise impacts to recreational activities, trails in use will be signposted to alert users. No impacts will occur to those using the trails on the weekend. For some of the trails the operations will result in a beneficial impact at the weekend during operations and after the closure of the operations as access will be improved. The PPR

		details a list principles that HEM will adopt regarding the use of the fire trails.
1.39. Rehabilitation	There is no contours of the proposed final landform, or what is to become of the concrete structures currently onsite.	The areas that will be subject to the removal of chitter and tailings are primarily waste dumps and would not have been used for the placement of infrastructure. However during the mine closure some structures when demolished may have been buried by chitter. Prior to operations commencing HEM will mark out areas that based on examination of past aerial photography may have been the site of some form of infrastructure. In these areas, operations will be conducted slowly and carefully to ensure that any insitu footings / structures remain un-impacted by the operation. Rehabilitation in the areas that were used for infrastructure in the past will incorporate grasses and low shrubs to allow future interpretation of the mining operations.
1.40. Risk of Disturbance	Why take the risk of disturbing sites such as Aberdare East that already seem to have a commercial use.	The portions of Aberdare East that are subject to this proposal do not have an existing commercial use. Existing commercial operations, namely the Hunter Plant Operators School are restricted from operating within the tailings area as a condition of their lease agreement.
1.41. Road capacities	1. Local roads cannot handle the extra traffic 2. Neath Road not designed for this volume of heavy traffic 3. Safety concerns 4. David Street not built to cater for trucks, what upgrading will be done, what traffic control will be on the David Street / Maitland Road	1. SKM have undertaken a traffic assessment of the proposed routes (refer **Appendix 7**), and have found that subject to several road improvements the proposed routes will be adequate for the proposed haulage operation. Further the proposed routes have been supported by Cessnock City Council, having regard to traffic and community burden. 2. HEM will be responsible for ensuring the standard of Neath Road is maintained or enhanced as a consequence of haulage

	intersection on haulage from Neath, safety concerns at this intersection. 5. Who is responsible for repair of the damaged roads and how long will the repair take? 6. Who will be responsible for the costs of upgrading Neath Road to facilitate safe heavy vehicle usage 7. Government Road not sealed and dust and road repair potentially major issues 8. Damage or injury from stones that are flicked up from trucks 9. Roads have little available width to enable trucks to pull over to allow for emergency services.	operations, refer to the Statement of Commitments in the PPR. 3. HEM will enforce a strict policy for all haulage contractors to ensure that there are significant penalties for any breach of safe haulage practices. 4. As per the revised haulage route identified in the PPR, David Street will not be used for haulage, therefore no upgrading will be undertaken. 5. Council or an agreed contractor will be responsible for the repair of the roads that are damaged as a result of the HEM operations, all costs to repair damage caused by HEM haulage will be borne by HEM. 6. Council or an agreed contractor will upgrade Neath Road to facilitate its use for haulage as required. All costs associated with the upgrade will be borne by HEM. 7. Government Road will be upgraded by Council or an agreed contractor with costs borne by HEM, sealing would form part of the upgrade. 8. HEM will install shaker grids and bitumen seals at the interface of all sealed roads to reduce the chance of debris entering the sealed roadway. Damage from stones on public roads is an unavoidable and infrequent occurrence. 9. The preferred haulage routes specified in the PPR use very little public roads, as such the travelling time of emergency vehicles will generally not be adversely affected as a result of HEM haulage operations.
1.42. School safety and	Issues relating to Kearsley Public School including:	HEM have adopted an alternative trucking route from Aberdare East as specified in the PPR, this route will not pass the Kearsley Public

learning (Kearsley)	• Safety • Learning ability due to extra noise from traffic and braking etc • Pedestrian crossing could be very dangerous • If noise levels exceeded, who funds the mitigation works (HEM or taxpayer)?	School.
1.43. Social issues of increased traffic	The EA fails to detail the social impacts of increased heavy vehicle haulage.	Possible social issues of increased traffic, will be minimised through the adoption of the preferred haulage routes presented in the PPR. The routes presented within the PPR have are supported by Cessnock City Council having regard to potential traffic and community burden. Further, the social benefits accrued to the community from employment opportunities and the rehabilitation of degraded will offset any short term potential detrimental impacts.
1.44. Spontaneous Combustion	Spontaneous combustion has been reported as a major factor in the need for these sites to be remediated, yet local records do not support this argument.	HEM are aware of fires that have been directly propagated from spontaneous combustion of carbonaceous material at Hebburn No.2. The Richmond Main East site was in fact discovered as it spontaneously combusted and was extinguished by Coal and Allied. In recent times it has also become apparent that bushfires can ignite the chitter material and burn underground for weeks after the fires are put out. These areas are of significant danger to human health and the environment as the fires are often not easily visible and could easily create significant burns to animals and people using the area and also damage to vehicles. Whilst bushfires at in the area may not have specifically been started by spontaneous combustion from chitter or tailings emplacements in the past, conditions similar to those prevailing at Hebburn No. 2

		presents increased risk of spontaneous combustion of carbonaceous material leading to ground and bushfires.
1.45. Traffic Assessment	The traffic assessment: 1. Does not appear to consider the return haulage of the material 2. Fails to detail that there would be a 100% increase in heavy vehicle traffic (based on a private road count) above the number of heavy vehicles currently using the roads 3. Fails to mention any detail on the use of the northern portion of Allandale Road (the section between Caledonia Street and Neath Road) 4. RTA counts used in report over 24 hours, as opposed to the 10-14 hours in the report, under estimates impact 5. No sight distance analysis for right hand turns from Allandale Street onto Caledonia Street 6. No detail of crash statistics for the Allandale / Kearsley intersection where trucks have lost control 7. No assessment on the impact on local school buses.	1. The traffic assessment does include an assessment of the return haulage. 2. The traffic assessment assessed the impact of the operation on existing traffic volumes, where traffic generated by a light vehicle or truck has similar impacts with regard to traffic, notwithstanding other associated impacts may increase. The PPR details alternative haulage routes that minimise the use of public roads. 3. The northern portion of Allandale Street has been included with Neath Road, notwithstanding haulage will not be along this section of road. HEM have adopted alternative haulage routes as detailed within the PPR, that reduce the use of public roads. 4. The traffic assessment assessed the impact of the operation on existing traffic volumes. The PPR details alternative haulage routes that minimise the use of public roads. The routes presented within the PPR have are supported by Cessnock City Council having regard to potential traffic and community burden. 5. HEM have adopted alternative haulage routes as detailed within the PPR, that will not utilise this section of intersection. 6. Crash statistics were sourced from available records at the time of report preparation. HEM have adopted an alternative haulage route that does not utilise this intersection. 7. The traffic assessment included an assessment of the impacts to local school bus routes. Further to this, HEM have adopted alternative haulage routes that utilise less public roads, therefore

		having a reduced impact to any public or school bus transport.
1.46. Transport of Coal by Rail	Consideration of the transportation of coal by rail If the washery was relocated to Aberdare East or Neath.	Given the short time frame of this project and the increases in potential noise conflicts with residences at Aberdare and Neath, transportation by rail to the port is not a feasible alternative.
1.47. Vibration	What impact will the increased traffic have on vibration and damage to adjacent houses and possible mine subsidence.	HEM have adopted haulage routes that are detailed within the PPR that minimise the impact to residential properties. Vibration from passing traffic will not adversely impact structurally stable dwellings. While much of the local area has been mined in the past the probability of mine subsidence is primarily greatest where the depth of cover is at its lowest, i.e. north of Neath and the proposed operations. Mine subsidence and compensation for related impacts is assessed by the Mine Subsidence Board.
1.48. Water Mains impact	Hunter Water should be consulted with regard to all roads and there potential to withstand heavy vehicles over the water mains, who would be responsible for the water mains repair.	It is the responsibility of the service provider to ensure that service infrastructure is adequately maintained. The roads proposed for use by HEM do not currently have any restrictions on vehicles that are permitted to use them due to utility infrastructure limitations.
1.49. Water Quality	Water quality not as bad as HEM claim given the number of frogs present in the area. Who will ascertain if water quality in sediment dams	Water qualities in areas surrounding chitter and tailings dumps have been measured with a pH as low as 2.5, while this is in the extreme, many of the chitter dumps are detrimental to the environment. While

	is of sufficient quality to use for localised dust suppression.	some aquatic fauna may have adapted to the at times poor water qualities, the removal of these emplacements should promote an improved aquatic environment. Water quality within some of the sediment dams will be monitored as a condition of the EPL. The quality of water to be reused and its suitability for dust suppression will be monitored and determined by HEM.
1.50. Water use	Is the use of potable water for this project environmentally responsible given current water shortages.	Where feasible HEM will construct pavement (sealed or unsealed) with materials that will minimise the need for dust suppression. Some potable water will be required for dust suppression to reduce the impacts on the community to provide employment for residents in the local community. Where possible dust suppression on each site will be undertaken using water captured from that site. The Hebburn No.3 processing plant does not use potable water.
1.51. Wells Environmental Independence	The independence of Wells Environmental independence is questioned in that they could not be the project managers and provide a independent assessment of the issues.	The reader has misinterpreted the EA in terms of the stated "project management". The project management undertaken only relates to the preparation of the Environmental Assessment and not with regard to the physical operations of HEM. Wells Environmental Services are a wholly independent company that has no conflict of interest in providing a fair commentary on the environmental issues, notwithstanding the Environmental Assessment supports an application for approval to the Minister for Planning by HEM, of whom all related costs are borne.
1.52. Werakata National Park Haulage	HEM should not be allowed to haul through the Werakata National Park as it is not consistent with its ideology, and is not in the interests of our community to allow such an activity. It will also result	HEM has sort approval from the DECC to utilise a electricity easement fire trail for the haulage of material associated with the rehabilitation of the Neath and Aberdare East sites. HEM are of the opinion that the use is permitted under the National Parks and

	in improved access for litterers and recreational vehicles. Should HEM be permitted who will ensure strict management measures are adhered to?	Wildlife Act. If the DOP and DECC permit the haulage of this material through the Werakata National Park HEM will be bound by a series of consent conditions enforceable by both the DECC and DOP. A security bond will also be held by DECC to ensure construction works and operations are undertaken in a competent and environmentally responsible manner.

Hunter Enviro-Mining (Operations) Pty Limited

Preferred Project Report

Chitter & Tailings Reclamation Project

Appendix 6

Response to Interest Group Submissions

October 2007

Table of Contents

1. UNITED MINEWORKERS FEDERATION OF AUSTRALIA 2
1.1. Labour 2
1.2. Compliance 2
1.3. Consultation 2

2. KEARSLEY COMMUNITIES COMMITTEE 2
2.1. Compliance 2
2.2. Consultation 3
2.3. Risks 3

3. NEATH CONCERNED CITIZENS 3
3.1. Consultation 3
3.2. Compliance 3
3.3. Noise and Air Quality 3

4. ABERDARE PRESCHOOL 4
4.1. Community 4
4.2. Noise and Air Quality 4
4.3. Road Safety 4
4.4. Air Quality 4
4.5. Community 4

The following table summarises the submissions made by the various interests groups and the respective response.

Aspect	Issue	HEM Response
1. United Mineworkers Federation of Australia		
1.1. Labour	Labour related issues were not addressed in the EA.	Employment issues are discussed in Section 4.13 and 5.10 of the Environmental Assessment. Labour related issues on wages and conditions of employment are a matter for HEM to determine with each employee, individually collectively or with representation from the relevant Unions. HEM is committed to providing a safe and equitable work place.
1.2. Compliance	Support provided Management Plans are put in place and adhered to.	This is a Part 3A major project and as such will be subject to development consent and conditions that will stipulate how the operations are to run. HEM have committed to the development and implementation of management plans. In addition to this each site will be subject to a mining lease and will require the preparation and implementation of a detailed Environmental Management System (EMS) supported by detailed Environmental Management Plans (EMPs) under the *Mining Act 1992*.
1.3. Consultation	Support provided appropriate consultation is undertaken.	HEM has undertaken appropriate consultation with the community and government agencies as detailed in Chapter 3 of the Environmental Assessment. Should the project be approved, consultation will be ongoing through the community reference groups, dedicated website, telephone hotline, newsletter and complaints register.
2. Kearsley Communities Committee		
2.1. Compliance	No confidence in HEM's ability to undertake work in a proper manner	This application is a Part 3A major project and as such will be subject to a conditional approval and conditions that will stipulate under what conditions the project is to operate and satisfy. Commitments by HEM will form a component of this consent. Further each site will be the subject of a Mining Lease that will

		have a secured bond held by the DPI to ensure the site is adequately rehabilitated should HEM not undertake the works in a satisfactory manner. There are adequate statutory controls through the Part 3A approvals process and subsequent licensing and permitting of operations to ensure that the proponent meets the necessary obligations and undertakes operations in a manner that will not adversely impact the community.
2.2. Consultation	Poor consultation with community	Consultation that has been undertaken with the community is detailed in Section 3 of the Environmental Assessment. At a joint meeting attended by Kearsley residents, representatives of Cessnock City Council and the proponent it was concluded that a Community Reference Group be formed in the event the project is approved by the NSW Minister of Planning. In addition to this Community Reference Group future consultation would include a dedicated website, telephone hotline, newsletter and complaints register.
2.3. Risks	Dangers of sites are overstated	The emplaced carbonaceous materials at the three sites currently present environmental impacts including the leaching of acid and salt into surrounding soils and water and also present the risk of spontaneous combustion. The issues and environmental risks associated with each site has been properly reported in the EA.
3. Neath Concerned Citizens		
3.1. Consultation	Poor Community consultation with community	Refer to HEM response 2.2.
3.2. Compliance	Poor past record	Refer to HEM response 2.1.
3.3. Noise and Air Quality	Impacts from noise and dust on elderly population	Noise and dust emission will be strictly monitored to ensure levels are maintained within the accepted criteria. HEM will have a complaints phone number and email address to provide the community with a simple avenue to report “unacceptable” impacts that they may be experiencing.

4. Aberdare Preschool		
4.1. Community	No mention of preschool.	The EA does include the pre-school as a sensitive receptor.
4.2. Noise and Air Quality	No detail on noise and dust impacts to preschool.	The EA does include the pre-school as a sensitive receptor, refer to receptor A676. The applicable goal for a school under the Industrial Noise Policy (INP) more stringent then residential criteria (that was adopted in the EA) the INP goal for a school is as follows: • LA_{eq}. Noise Level of 35dB(A) internal, typically attenuation by building is 8-10dB(A); • LA_{eq}. Noise Level of 55dB(A) external. Therefore under a typical operations the preschool would be expected to receive a noise level in the order of 36dB(A) external, or 26-28dB(A) internal, therefore complying with INP noise criteria.
4.3. Road Safety	Traffic and safety of children.	HEM have adopted an alternative trucking route from Aberdare East as specified in the PPR, this route will not pass the Aberdare Preschool.
4.4. Air Quality	Inability for pre-school to continue to meet regulatory requirements to operate in a safe clean and suitable environment.	HEM will operate in accordance with Part 3A conditional approvals, permits and licences necessary for HEM to operate. Noise and dust limits at the Aberdare Preschool will be maintained with criteria set within the Conditions of Approval and licence conditions.
4.5. Community	Impact to community if preschool cannot remain open.	HEM's operation will not impact upon the longevity of Aberdare Preschool.

Hunter Enviro-Mining (Operations) Pty Limited

Preferred Project Report

Chitter & Tailings Reclamation Project

Appendix 7

Traffic Impact Assessment

October 2007

Hunter Enviro-Mining (Operations) Pty Limited Chitter and Tailings Reclamation Project

TRAFFIC IMPACT, ROAD SAFETY AND RAILWAY LEVEL CROSSING ASSESSMENT

- Final
- October 2007

Hunter Enviro-Mining (Operations) Pty Limited Chitter and Tailings Reclamation Project

TRAFFIC IMPACT, ROAD SAFETY AND RAILWAY LEVEL CROSSING ASSESSMENT

- Final
- October 2007

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Contents

1. Introduction 1

1.1 Background 1
1.2 References 1
1.3 Document Outline 1

2. Existing Situation 3

2.1 Site Location 3
2.2 Local Road Network 8
2.3 Existing Traffic Volumes 9
2.4 Local Public Transport Network 9
2.5 Rail Network 10

3. Proposed Development 11

3.1 Operation and Internal Traffic Movements 11
3.1.1 Product Coal Haulage 11
3.2 External Road Access 12
3.2.1 Aberdare East 12
3.2.2 Neath 14
3.2.3 Richmond East 15
3.3 Staffing 18
3.3.1 Traffic Generation 18

4. Operational Traffic Impact Assessment 20

4.1 Road and Intersection Operation 20
4.2 Sight Distance Requirements 22
4.3 Sight Distance and Intersection Comments 24
4.3.1 Intersection of Maitland Road and Tunnel Road 24
4.3.2 Intersection of Maitland Road and Duffie Drive 25
4.3.3 Intersection of Duffie Drive and Neath Haulage Route 26
4.3.4 Intersection of Caledonia Street and Government Circuit 26
4.3.5 Intersection of Cessnock Road and Cemetery Access 27
4.3.6 Neath and Aberdare East Haulage Route / Neath Road 27
4.3.7 Intersection of Richmond Main East Haulage Route and Leggetts Drive 28
4.3.8 Intersection of Leggetts Drive and HEZ Spine Road 28
4.3.9 Summary of Mitigation Measures 28
4.4 Pedestrians 29
4.5 School Zones 29
4.6 Emergency Vehicles 29

5. Road Safety Issues 30

5.1 Road Safety Audits 30

5.1.1 Key Findings 31

5.1.2 Recommendations 31

5.2 Speed and Fatigue Management 32

5.3 Crash Records 32

6. Road Condition Report 34

6.1 Pavement Condition Summary 34

6.2 Inspection Record 36

6.2.1 Leggetts Drive (between Railway Museum Access Rd and HEZ Spine Road) 36

6.2.2 HEZ Spine Road 37

6.2.3 Cessnock Road (between Penniment Street and railway crossing) 38

6.2.4 Caledonia Street (between railway crossing and Allandale Street) 39

6.2.5 Maitland Road (between Tunnel Rd and Cessnock Pistol Club) 40

6.2.6 Tunnel Road 41

6.2.7 Duffie Drive (between Maitland Rd and Fire Trial) 42

7. Railway Level Crossing Assessment 43

7.1 Existing Train Operation 43

7.1.1 Potential Train Operation 43

7.1.2 Crossing Protection and Operation 43

7.1.3 Crossing Condition / Maintenance 43

7.2 Conclusions 43

8. Conclusions 44

Appendix A Bus Timetables 45

Appendix B Protection Levels for Railway Level Crossings 46

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1. Introduction

1.1 Background

Hunter Enviro-Mining Pty Limited (HEM) specialise in the rehabilitation of derelict mine sites through the removal and processing of chitter (reject coal) and coal fines at the previously approved Hebburn No.3 Processing Plant, located off Lake Road south west of Kurri Kurri.

To allow the processing of additional coal reserves HEM are seeking to process three other large chitter and fines deposits in the locality. The three resources, Aberdare East, Neath and Richmond Main East, illustrated on **Figure 2-1**, are contained within the Cessnock City Council local government area. The three deposits could be characterised as follows:

1) Aberdare East is located immediately south of the South Maitland Railway and contains approximately 1.7 million tonnes of coarse and fine reject material;
2) Neath is located north of the Neath township and contains approximately 1 million tonnes of coarse and fine reject material; and
3) Richmond Main East is located west of Leggetts Drive and north east of Richmond Vale Road, it contains approximately 160,000 tonnes of chitter.

Road haulage from these deposits will be required to transport the material to the Hebburn No.3 processing plant. Haulage will be undertaken using truck and dog trailer or similar combinations suitable for the proposed haulage routes, and their respective road capacity.

An Environmental Assessment was lodged with the Department of Planning in December 2006. Consequently as a result of public comment the haulage routes from some of the sites required changing. This traffic assessment forms part of a Preferred Project Report responding to public comment and assessing changes to the original project.

1.2 References

This assessment makes reference to a number of technical and policy guidelines, including:

- NSW Roads and Traffic Authority's *Guide to Traffic Generating Developments*;
- NSW Roads and Traffic Authority's *Road Design Guide*;
- Austroads' *Guide to Traffic Engineering Practice – Part 2: Roadway Capacity*;
- Austroads' *Guide to Traffic Engineering Practice – Part 5: Intersections at Grade*; and
- Hunter Enviro-Mining (Operations)Pty Ltd – Preliminary Assessment, May 2006

1.3 Document Outline

This document is structured as follows:

- **Section 2** describes the existing road situation in the local area;
- **Section 3** details the proposed development in terms of traffic generating activities;
- **Section 4** assesses the impact of the proposed development on the local road network;
- **Section 5** presents a discussion of road safety issues, including the outcomes of the road safety audits undertaken for this project;
- **Section 6** summarises the pavement condition inspection carried out on public roads affected by the proposal;
- **Section 7** contains the assessment of railway level crossings on the *South Maitland Railway; and*
- **Section 8** summarises the findings of the study.

2. Existing Situation

2.1 Site Location

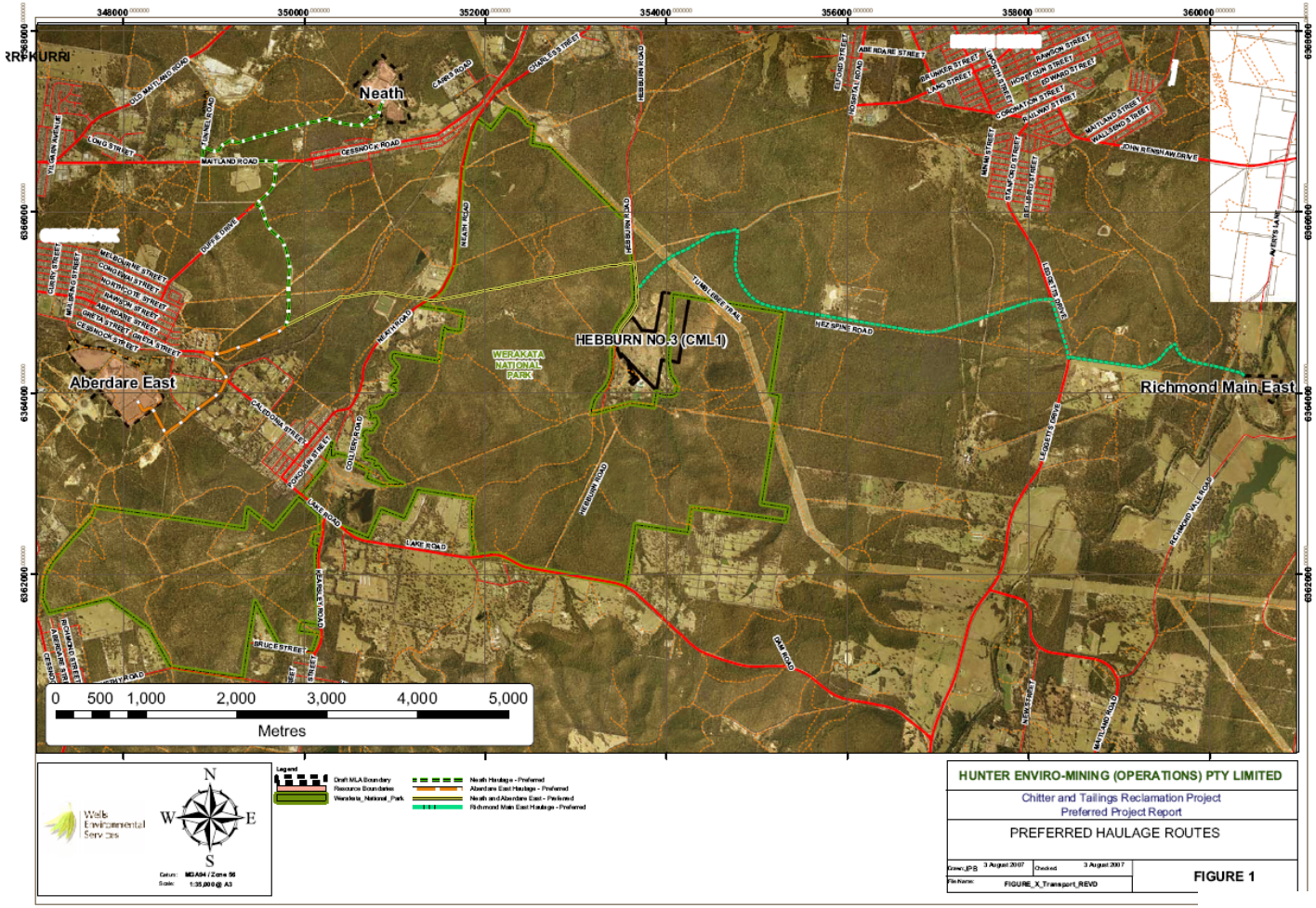
The previously approved Hebburn No. 3 Processing Plant is located approximately 4.4km south west of Kurri Kurri and 5.6km east of Cessnock.

The proposed operation involves the extraction of chitter (reject coal) and coal fines from three derelict mines in the locality.

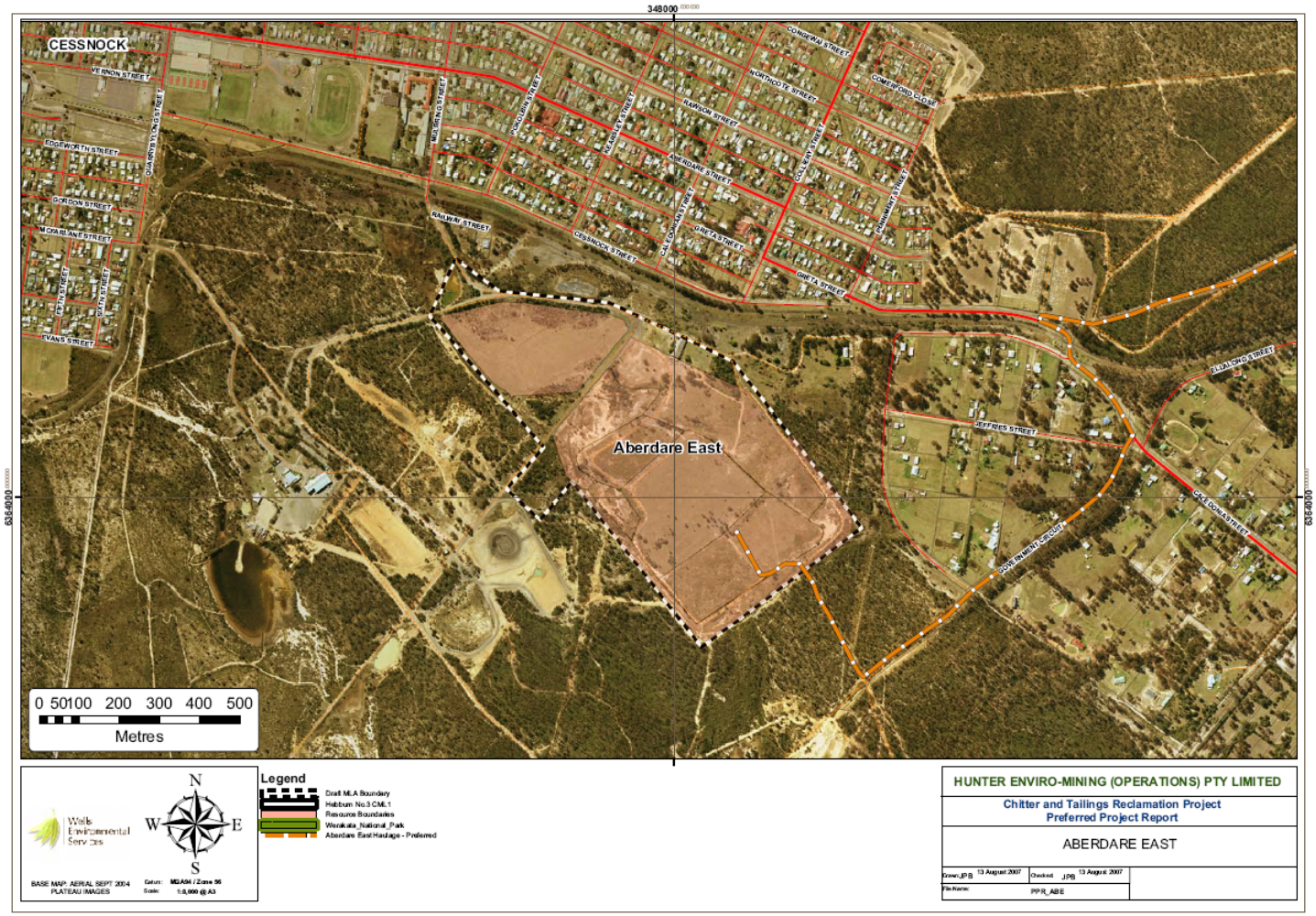
Figure 2-1 shows the regional context of the site locations.

1) Aberdare East is located immediately south of the South Maitland Railway, to the south of Cessnock, and is approximately 6.1km west of Hebburn No. 3 Processing Plant (**Figure 2-2** shows the site layout);
2) Neath is located north of the Neath township and is approximately 4.3km north west of Hebburn No. 3 Processing Plant (**Figure 2-3** shows the site layout);
3) Richmond Main East is located west of Leggetts Drive and north east of Richmond Vale Road, and is approximately 7.1km east of Hebburn No. 3 Processing Plant (**Figure 2-4** shows the site layout).

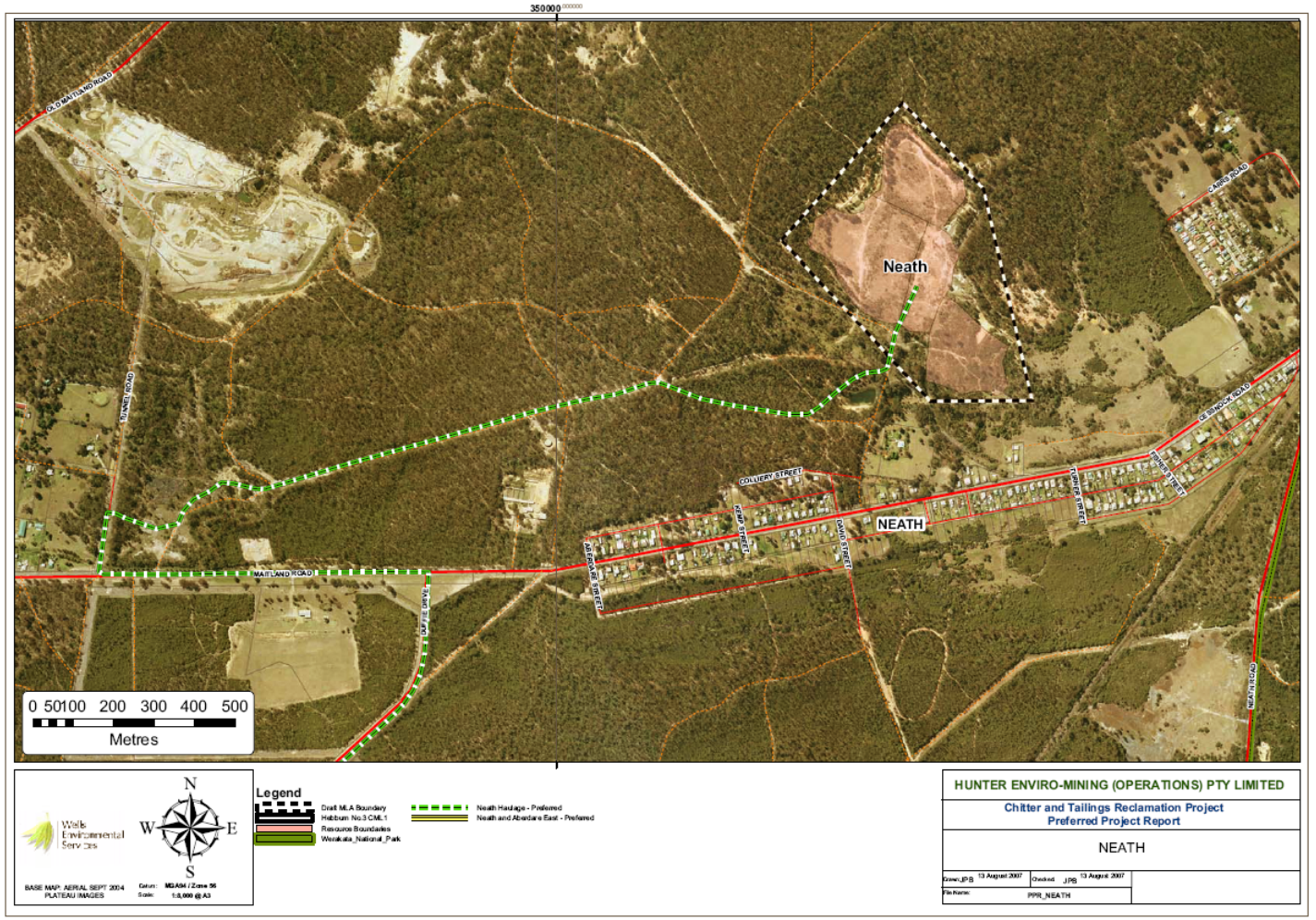
- **Figure 2-1 Site Locations and Proposed Haulage Routes**



- **Figure 2-2 Aberdare East Site Location**

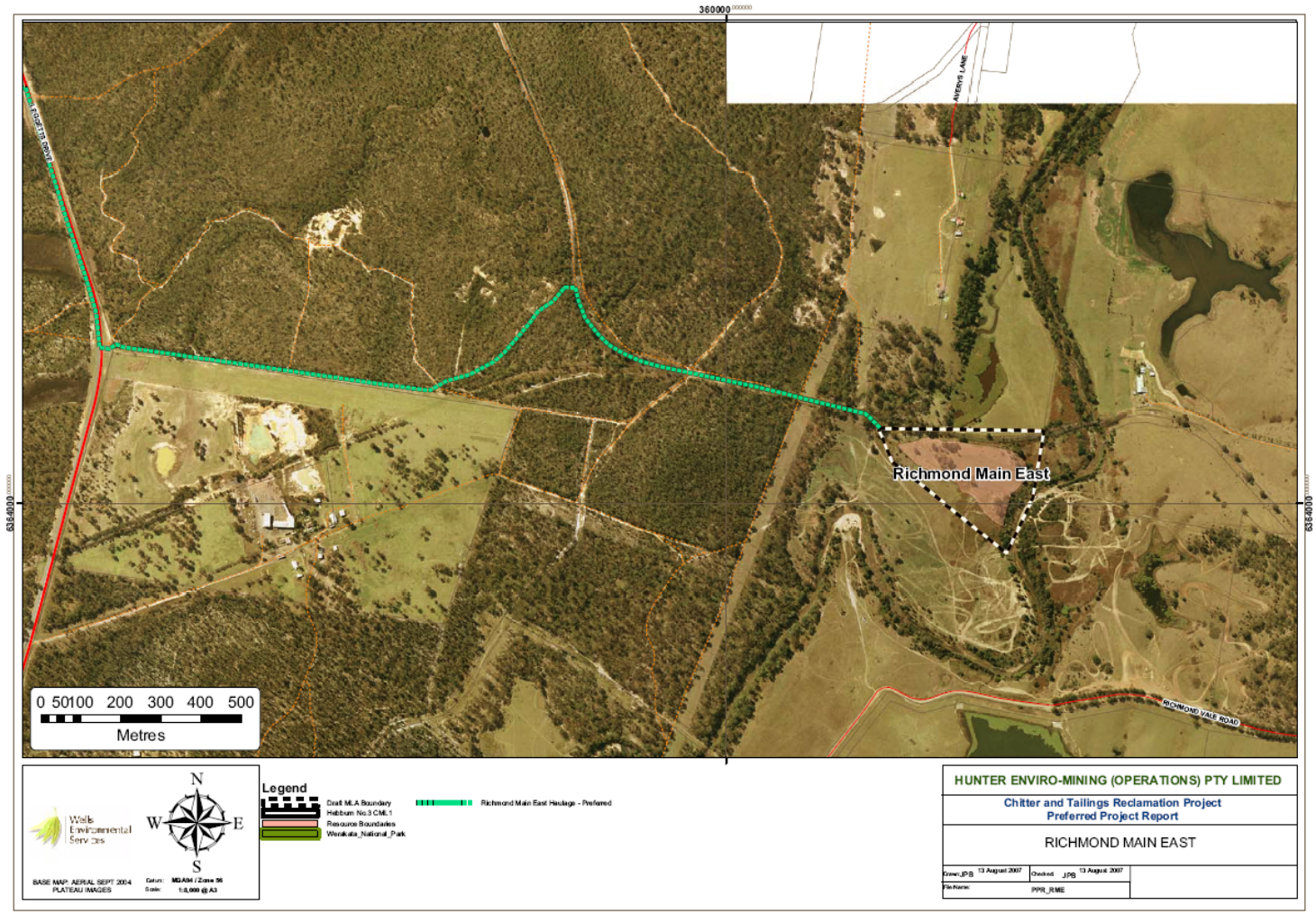


- **Figure 2-3 Neath Site Location**



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- **Figure 2-4 Richmond Main East Site Location**



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2.2 Local Road Network

Hebburn No. 3 Processing Plant and the associated derelict mine sites are located in and around the Werakata National Park in the Cessnock / Kurri Kurri area of the Hunter Valley. The area is bounded and serviced by three designated main roads: Main Road (MR) 588 (Maitland Road, Cessnock Road) which connects Cessnock with Kurri Kurri and Hexham; Main Road (MR) 195 (Leggetts Drive) which runs from Kurri Kurri to Mulbring; and Main Road (MR) 220 (Lake Road) which forms part of the route between Branxton and the F3 Freeway at Toronto.

Maitland Road has a posted speed limit of 60km/hr throughout the strip residential development through which it passes at Neath. West of Neath the speed limit is 80 km/hr. In the area of the mine access, Maitland Road has been upgraded with 3.5m lanes and 2.5m paved shoulders. Further east, the road is in a poor state of repair with significant signs of movement within the concrete slab construction. Upgrading of this road is currently being undertaken. The road passes over predominantly level terrain.

Lake Road runs east through Elrington and the Aberdare State Forest before intersecting with Leggetts Drive north of Mulbring. The speed limit is 100km/hr and the road passes through rolling terrain.

Leggetts Drive runs between Kurri Kurri and Mulbring. The road runs through rural land with a posted speed limit of 100km/hr.

Maitland Road, Lake Road and Leggetts Drive are paved two lane two-way roads. These are classified State Roads and are thus the responsibility of the NSW RTA.

The main inter-regional road links are provided by two local roads:

- Neath Road, which runs roughly north/south between Maitland Road east of Neath, and Allandale Street, Kearsley ;and
- Duffie Drive, which runs roughly northeast/southwest between Maitland Road west of Neath, and Aberdare Street, Aberdare.

Neath Road is a two lane, two-way road carrying only a small volume of traffic. It passes through predominantly rolling terrain with only a small number of properties having direct access to the road. Neath Road has a speed limit of 80km/hr and a vehicle weight restriction of 5 tonnes GVM.

Duffie Drive is a two lane, two-way road with a posted speed limit of 100km/hr and a vehicle weight restriction of 25 tonnes GVM, although in June 2007 it was observed that signs identifying the weight restriction had been covered up.

Hebburn No. 3 Processing Plant is bounded by Werakata National Park to the East, West and South and is accessed by privately constructed unpaved roads to the south, Hebburn Road to the north, and in part the HEZ Spine Road to the east.

2.3 Existing Traffic Volumes

Traffic volume data for roads affected by the proposal was obtained from the RTA and Cessnock City Council. This data was used to determine the volume / capacity ratio and existing level of service of the roads proposed to be used for haulage of the excavated materials.

Table 2-1 shows existing daily volumes on Maitland Road, Duffie Drive, Cessnock Road, Neath Road and Leggetts Drive. Growth rates of 2-3% per annum have been applied to bring all data to an equivalent 2006 value.

Table 2-1 Existing Traffic Volumes

Road	2006 AADT*	Peak Hour Volume Capacity Ratio	Level of Service
Maitland Road	13,220	0.55	D
Duffie Drive	2,550	0.11	B
Cessnock Road	8,120	0.35	C
Neath Road	710	0.03	A
Leggetts Drive	4,310	0.18	B

* Estimated based on 2004 data and growth rates. See **Section 4.1** for more detail.

2.4 Local Public Transport Network

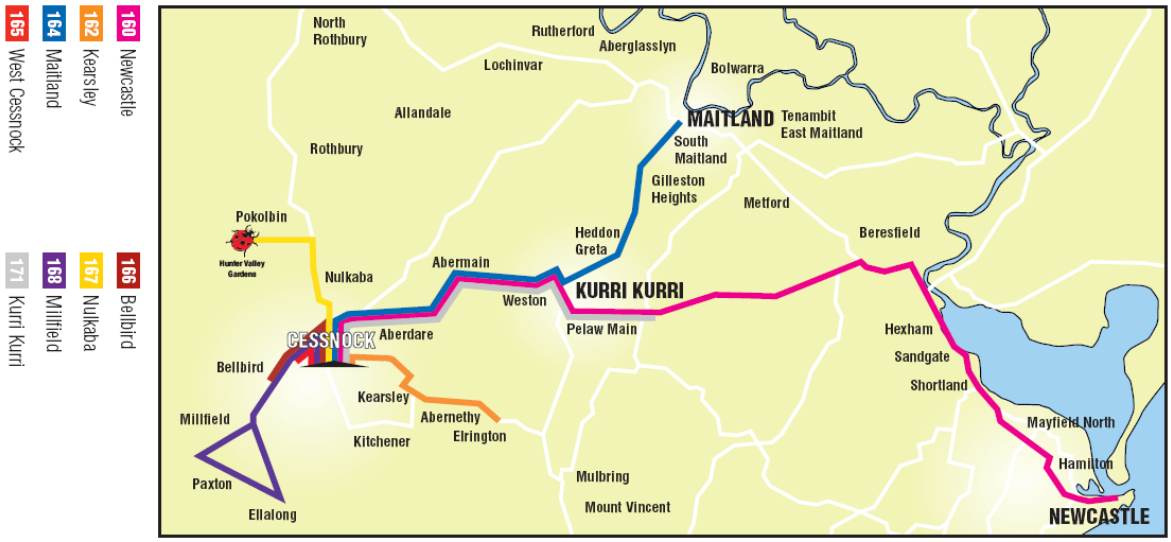
Rover Coaches run a regular bus service through the wider Cessnock region. This is the closest bus service to the area impacted by the HEM proposal. **Figure 2-5** shows the routes of the 8 local services operated by Rover Coaches. The 160 and the 164 services operate between Cessnock and Kurri Kurri (and beyond) using Maitland Road, close to the Neath mine. The 164 service operates 14 times a day and the 160 service operates 5 times a day. The 162 service operates 5 times a day using the major route between Cessnock and Kearsley, which passes close to the Aberdare East mine. Bus timetables are provided in **Appendix A**.

School bus services operate via the following routes:

- Cessnock – Pokolbin – Rothbury
- Cessnock – Talga Road
- Laguna – Wollombi – Cessnock
- Lochinvar – Cessnock Rover Quorrobolong

These school bus services do not operate along routes proposed to be used by HEM.

- **Figure 2-5: Rover Coaches Service Routes**



*** Website sourced:** www.rovercoaches.com.au

2.5 Rail Network

The South Maitland Railway was built in 1907 by the Wickham and Bullock Island Company for the purpose of transporting coal. This railway runs east through Kurri Kurri and west through Cessnock.

Since the abandonment of mining operations at the Southland mine approximately three years ago, no regular train services have been operating, and consequently, its usage is very limited. No regular passenger services operate in the area.

Austar's recent acquisition of the Southland Mine, and the resumption of mining operations have resulted in rail transport recommencing. However, it is anticipated that the frequency of service will not exceed three rail movements per day.

3. Proposed Development

The proposed development involves three derelict mines and the previously approved Hebburn No.3 processing plant, which processes up to 1.2 million-tonnes per annum (Mtpa) of chitter and tailings.

An Environmental Assessment was lodged with the DoP in December 2006. Consequently as a result of public comment the haulage routes from some of the sites required changing. This traffic assessment forms part of a Preferred Project Report responding to public comment and assessing changes to the original project.

3.1 Operation and Internal Traffic Movements

The removal of the coal chitter and tailings from each of the three sites would be undertaken using front end loaders or excavators loading into trucks. Trucks would then haul material along one or a combination of possible haulage routes to the Hebburn No.3 processing plant.

To maintain a sufficient supply of feed material to the Hebburn No.3 Processing Plant, assuming a 10 hours per day and 5 days per week operation, up to 30 laden trucks per hour are required across the three nominated sites, assuming standard 33 tonne truck and dog combinations.

The Hebburn No.3 Processing Plant obtained development consent in 2001 (DA 8/2001/740/1) to extract and process approximately 0.7 million tonnes (Mt) of carbonaceous material from the derelict Hebburn No.2 mine site. Since that time the project was modified to incorporate the processing of smaller carbonaceous emplacements (satellites) in the local area to supplement resources at the Hebburn No.2 site, making a total resource of approximately 2.2Mt (DA8/2001/740/2). From this resource it was envisaged that approximately 1.1Mt of product would be produced and transported to Port Waratah Services Ltd.

The processing of chitter and tailings produce the following:

- Product coal for haulage to Port Waratah and subsequent export; and
- Construction fill material;

3.1.1 Product Coal Haulage

Product coal haulage from the Hebburn No.3 Processing Plant is undertaken by road registered trucks to Port Waratah. Given current yield and resource complications experienced at Hebburn No.3, it is difficult to estimate what impact the processing of the additional tonnages proposed in this application will have on the total product coal generated by the plant. It is however expected that there will be an increase in product coal and construction fill generated at the Hebburn No.3 Processing Plant.

HEM will not seek to increase the rate of haulage from the plant, but rather increase the duration of the modified development consent (DA 8/2001/740/2) beyond the 21-24 months originally planned. Therefore, outbound traffic on the route between Hebburn No. 3 and Port Waratah will not increase as a result of this proposal, and hence this route has not been re-assessed.

3.2 External Road Access

For each derelict mine site a preferred haulage route to the Hebburn No. 3 Processing Plant has been identified. The viability and acceptability of each is discussed in the following sections, with details of the proposed mitigation measures required to provide safe haulage along the proposed routes discussed in **Section 4.3**.

3.2.1 Aberdare East

The preferred route from Aberdare East to Hebburn No. 3 would leave the Aberdare East mine and join Caledonia Street via the southern entry of Government Circuit (opposite Ellalong Street). It would turn left on Caledonia Street and cross the South Maitland Railway at the existing level crossing. Trucks would then turn right off Cessnock Road into the Gordon Williams Memorial Lawn Cemetery access (see **Figure 3-1)**, and then follow the fire trail that parallels the railway running north-east from Aberdare. The haulage route would cross the railway and Neath Road before proceeding via a fire trail through the Werakata National Park to Hebburn Road and the Hebburn No. 3 Processing Plant.

- **Figure 3-1 Existing Access to the Gordon Williams Memorial Lawn Cemetery**



Some upgrade to the Cessnock Road / Cemetery entrance intersection would be required to facilitate the safe turning of trucks at this location. Similarly, at the Caledonia Street / Government Circuit intersection, intersection upgrade would be required to manage safety issues related to the poor sight distance to the west of this intersection.

There are also potential sight-distance issues associated with where the route crosses Neath Road. This is addressed in **Section 3.2.2**, below.

Section 4.2 covers sight distance requirements in more detail.

An alternate route between Aberdare East and the cemetery access was also identified. This route crosses the railway at a new level crossing to meet Cessnock Road near Penniment Street. The route then uses Cessnock Road between Penniment Street and the cemetery access. Although this route is feasible in terms of satisfying sight distance requirements and the condition of the road pavement, it is not recommended for a number of reasons, including:

- The need to get approval for and construct a new railway level crossing;

- The need to construct a new approach to the intersection of Cessnock Road Penniment Street; and
- To avoid trucks making right turns from minor roads onto major roads, which can cause significant disruption to through traffic and is likely to result in long delays for the turning vehicles.

3.2.2 Neath

The route from Neath to Hebburn No. 3 would head west from the Neath mine along an existing fire trail, with a new connection to be made to Tunnel Road. The haulage route would head east from Tunnel Road along Maitland Road, and then south into Duffie Drive. The route then follows the Aberdare Fire Trail south from Duffie Drive to meet the route from Aberdare East to cross the Neath Road and pass through the Werakata National Park.

- **Figure 3-2 Maitland Road / Duffie Drive intersection**



Upgrades are likely to be required at the intersection of Maitland Road and Tunnel Drive, Duffie Drive with the Aberdare Fire Trail, and where the haulage route crosses Neath Road (also required for the Aberdare East haulage route).

On the inbound journey to the processing plant there is unacceptable sight distance to the south at the intersection of the proposed access road and Neath Road as a result of overgrown vegetation (**Figure 3-3**).

Section 4.2 covers sight distance requirements in more detail. Given the low volume of traffic carried by Neath Road, and upon clearance of the obstruction to sight distance, the intersection could operate safely under 'Stop" sign restrictions.

- **Figure 3-3 Poor Sight Distance looking south from the fire track / access road along Neath Road**



3.2.3 Richmond East

The haulage route for the Richmond Main East mine travels along the graded abandoned railway easement through Lot 19 DP1061633 into ALC 4242, into Lot 14 DP716009 running along the northern side of the airstrip to Leggetts Drive approximately 600m south of the HEZ Spine Road. The route then continues on Leggetts Drive, the HEZ Spine Road, Hospital Road, and Hebburn Road to the Processing Plant.

The route utilises the Product Coal Haulage Route (HEZ Spine Road) which crosses over the Richmond Vale Museum's tourist railway. Both approaches to this crossing have stopping bays. The crossing is controlled by flashing lights, bells and boom gates (see **Figure 3-4**).

The intersection of Lot 14 DP716009 (northern side of airstrip) and Leggetts Drive has adequate sight distance to both the south and north (see **Figure 3-5** and **Figure 3-6** respectively).

- **Figure 3-4 Rail Crossing on HEZ Spine Road**



- **Figure 3-5 View south along Leggetts Drive from intersection with Richmond Main East haulage route**



- **Figure 3-6 View north along Leggetts Drive from intersection with Richmond Main East haulage route**



3.3 Staffing

The rehabilitation process will be conducted during a 5 day week and a 10 hour day for up to 36 months.

A minimal staff presence will be in place at the three derelict mine sites. Typically, staffing at each site will consist of an excavator operator together with an offsider or spotter. The remainder of the workforce consists of truck drivers carrying out the haulage operation.

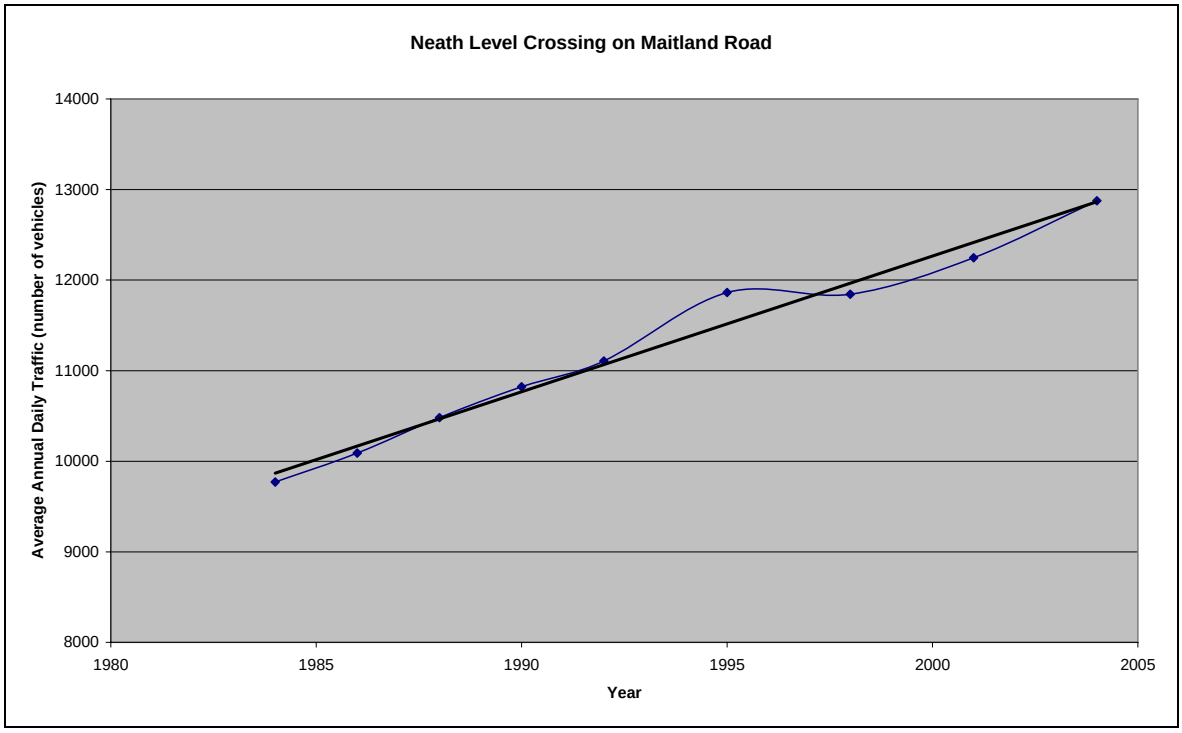
3.3.1 Traffic Generation

Traffic growth since 1984 has been relatively linear without any dramatic spikes, demonstrating steady growth of approximately 2.5% (see **Figure 3-7**).

The impact of traffic generated by staff will be minimal as only a transient operation, as described above, is in place at each of the sites. Given the remoteness of each of the sites, public transport is

unlikely to provide a viable alternative for staff to use to travel to and from work. However, the small number of staff involved will not have any impact on traffic growth in the region.

- **Figure 3-7 Traffic Growth 1984-2004 at Neath Level Crossing on Maitland Road**



4. Operational Traffic Impact Assessment

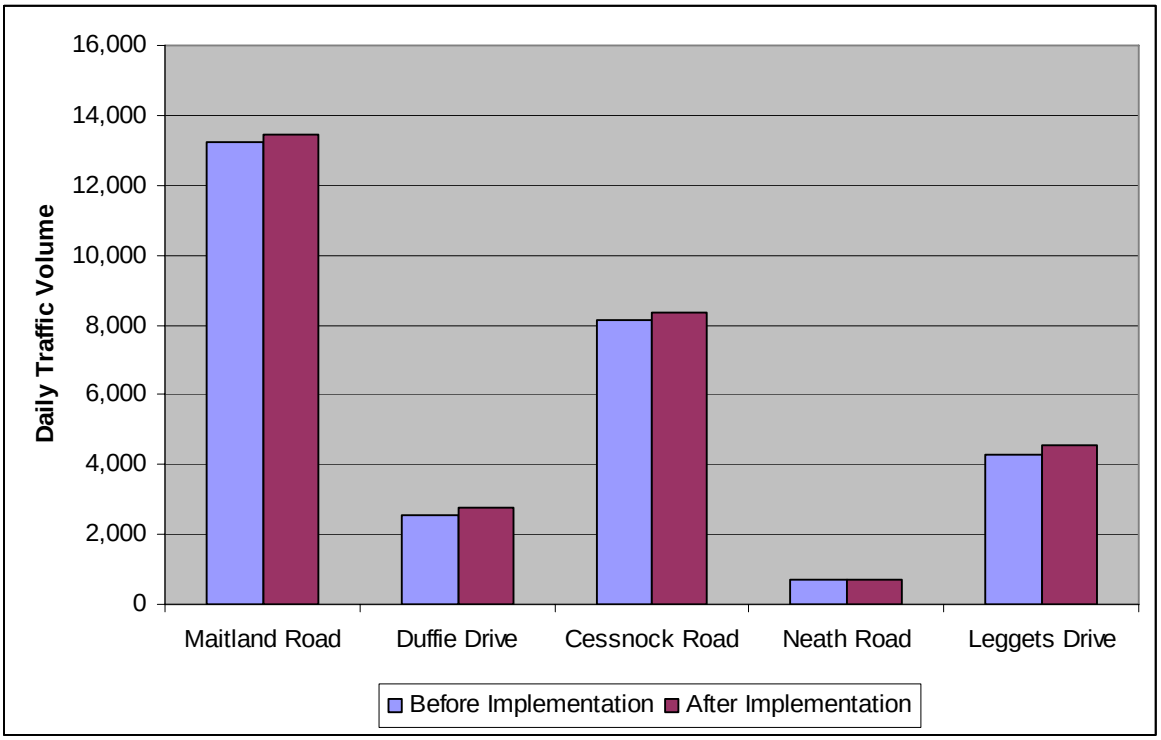
4.1 Road and Intersection Operation

The maximum addition to the traffic network contributed by the proposed Hunter-Enviro Mining operation is 30 laden trucks per hour from the three sites. This would typically equate to approximately 10 laden trucks per hour on average per derelict mine site if all three sites are operating, or a maximum of 18 laden trucks if only one mine site is in operation. This assessment has used a figure of 18 laden trucks as worse case, not-withstanding the project may not reach this rate.

In order to assess the impact on the traffic network, three public roads included in the routes have been examined: Cessnock Road (Aberdare East), Leggetts Drive (Richmond Main East) and Maitland Road (Neath). The maximum additional hourly load on each of the roads would be 18 trucks per direction.

The maximum project duration is 36 months. During this time period, future growth is estimated to be relatively minor and thus comparisons in the present time period are sufficient. RTA and Council traffic volume data from 2004 was increased based on observed and estimated growth rates to estimate a 2006 daily traffic volume. This was compared with the estimated daily volume after project implementation. **Figure 4-1** shows the increase in daily traffic volumes before and after implementation of the project. It is noted that this comparison is against total vehicle numbers including light and heavy vehicles. This comparison is used for estimates of road service impacts.

- **Figure 4-1 Impact of Operational Traffic on Major Roads Before and After Project Implementation**



The Level of Service of these roads before and after project implementation was also considered. Level of Service is dependent on the percentage of time that vehicles are delayed, the average speed, the volume capacity ratio and the percentage of their length with obstructed sight distance.

Table 4-1 shows that the peak hour Level of Service is D or better for all roads, and the proposal results in a negligible increase in volume/capacity ratio. Level of Service remains unchanged.

- **Table 4-1 Before and After Level of Service and Volume Capacity Ratio**

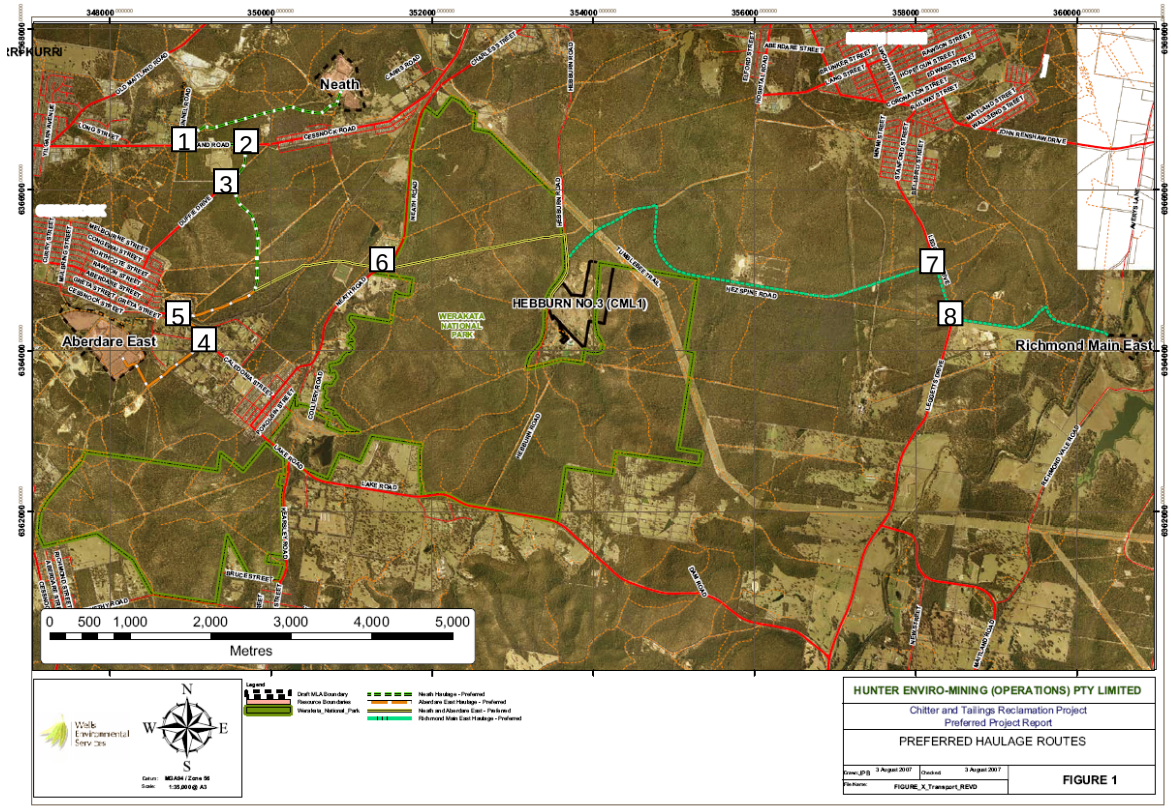
	Before Implementation		After Implementation	
	Volume Capacity Ratio	Level of Service	Volume Capacity Ratio	Level of Service
Neath Road	0.03	A	0.03	A
Duffie Drive	0.11	B	0.12	B
Cessnock Road	0.35	C	0.36	C
Maitland Road	0.55	D	0.56	D
Leggetts Drive	0.18	B	0.19	B

4.2 Sight Distance Requirements

Five key intersections were examined for sight distance requirements. Consideration was given to both the route towards the processing plant (inbound) and the return journey (outbound).

1) Intersection of Maitland Road and Tunnel Road
2) Intersection of Maitland Road and Duffie Drive
3) Intersection of Neath haulage route and Duffie Drive
4) Intersection of Caledonia Street and Government Circuit
5) Intersection of Cessnock Road and cemetery access
6) Intersection of Neath / Aberdare haulage routes and Neath Road
7) Intersection of Leggetts Drive and HEZ Spine Road
8) Intersection of Richmond Main East haulage route and Leggetts Drive

Figure 4-2 Intersection Locations



Using the *Austroads Guide to Traffic Engineering Practice – Part 5 – Intersections at Grade*, there are four sight distance criteria: Approach Sight Distance (ASD), Entering Sight Distance (ESD), Safe Intersection Sight Distance (SISD) and Minimum Gap Sight Distance (MGSD); as well as a Truck Stopping Sight Distance (TSSD), which is applicable to this situation. If provision of the ESD is not practical then every effort must be made to exceed the SISD. The minimum appropriate sight distances for these intersections are shown below in **Table 4-2** and **Table 4.3**. Note that sight distance requirements have not been specified for left hand turns from major roads, as these are priority movements.

- **Table 4-2 Sight Distance Requirements for the inbound route towards Hebburn No. 3**

Reaction Time: 2sec All Roads: 2 Lane 2 Way Inbound Movements	*SIGHT DISTANCE ANALYSIS:* SOURCE: Guide to Traffic Engineering Practice - Part 5: Intersections at Grade, Chapter 6 1 Maitland Road / Tunnel Road	2 Maitland Road / Duffie Drive	4 Caledonia Street / Government Circuit	5 Cessnock Road / Cemetery Access	6 Neath+Aberdare Haulage Routes / Neath Road	8 Richmond Main East Haulage Route / Leggetts Drive
Design Speed (km/hr)	80	80	60	60	80	100
Approach Sight Distance (along approach road) - for passenger car. ASD (m)	105	105	65	65	105	160
Entering Sight Distance (for minor road turning onto a major road) ESD (m). *It is not necessary to reach ESD.*	305	n/a	160	160	305	500
Safe Intersection Sight Distance along major road. SISD (m). *Minimum value - must be achieved.*	170	170	115	115	170	240
Maneouvre Description (route towards Hebburn No. 3)	Left Hand Turn from Tunnel Road (minor road) onto Maitland Road (major road)	Right Hand Turn from Maitland Road (major road) onto Duffie Drive (minor road)	Left Hand Turn from Government Circuit (minor road) onto Caledonia Street (major road)	Right Hand Turn from Cessnock Road (major road) to Cemetery Access (minor road)	Cross Neath Road and continue along haulage routes	Right Hand Turn from haulage route (minor road) onto Leggetts Drive (major road)
Critical acceptance gap time (seconds) (ta)	5	5	5	4	4	5
Minimum Gap Sight Distance along major road. MGSD (m)	115	115	85	70	90	140
Truck Stopping Sight Distance (along approach lane). TSSD (m)	135	135	85	85	135	200

SKM

- **Table 4-3 Sight Distance Requirements the outbound route from Hebburn No. 3**

Reaction Time: 2sec All Roads: 2 Lane 2 Way Outbound Movements	*SIGHT DISTANCE ANALYSIS:* SOURCE: Guide to Traffic Engineering Practice - Part 5: Intersections at Grade, Chapter 6 1 Maitland Road / Tunnel Road	2 Maitland Road / Duffie Drive	3 Neath Haulage Route / Duffie Drive	4 Caledonia Street / Government Circuit	5 Cessnock Road / Cemetery Access	6 Neath+Aberdare Haulage Routes / Neath Road	7 Leggetts Drive / HEZ Spine Road
Design Speed (km/hr)	80	80	100	60	60	80	100
Approach Sight Distance (along approach road) - for passenger car. ASD (m)	105	105	160	65	65	105	160
Entering Sight Distance (for minor road turning onto a major road) ESD (m). *It is not necessary to reach ESD.*	305	305	500	160	160	305	500
Safe Intersection Sight Distance along major road. SISD (m). *Minimum value - must be achieved.*	170	170	240	115	115	170	240
Maneouvre Description (route away from Hebburn No. 3)	Right Hand Turn from Maitland Road (major road) onto Tunnel Road (minor road)	Left Hand Turn from Duffie Drive (minor road) onto Maitland Road (major road)	Right Hand Turn from haulage route (minor road) onto Duffie Drive (major road)	Right Hand Turn from Caledonia Street (major road) to Government Circuit (minor road)	Left Hand Turn from Cemetery Access (minor road) to Cessnock Road (major road)	Cross Neath Road and continue along haulage routes	Right Hand Turn from HEZ Spine Road (minor road) onto Leggets Road (major road)
Critical acceptance gap time (seconds) (ta)	4	5	5	4	5	4	5
Minimum Gap Sight Distance along major road. MGSD (m)	90	115	140	70	85	90	140
Truck Stopping Sight Distance (along approach lane). TSSD (m)	135	135	200	85	85	135	200

4.3 Sight Distance and Intersection Comments

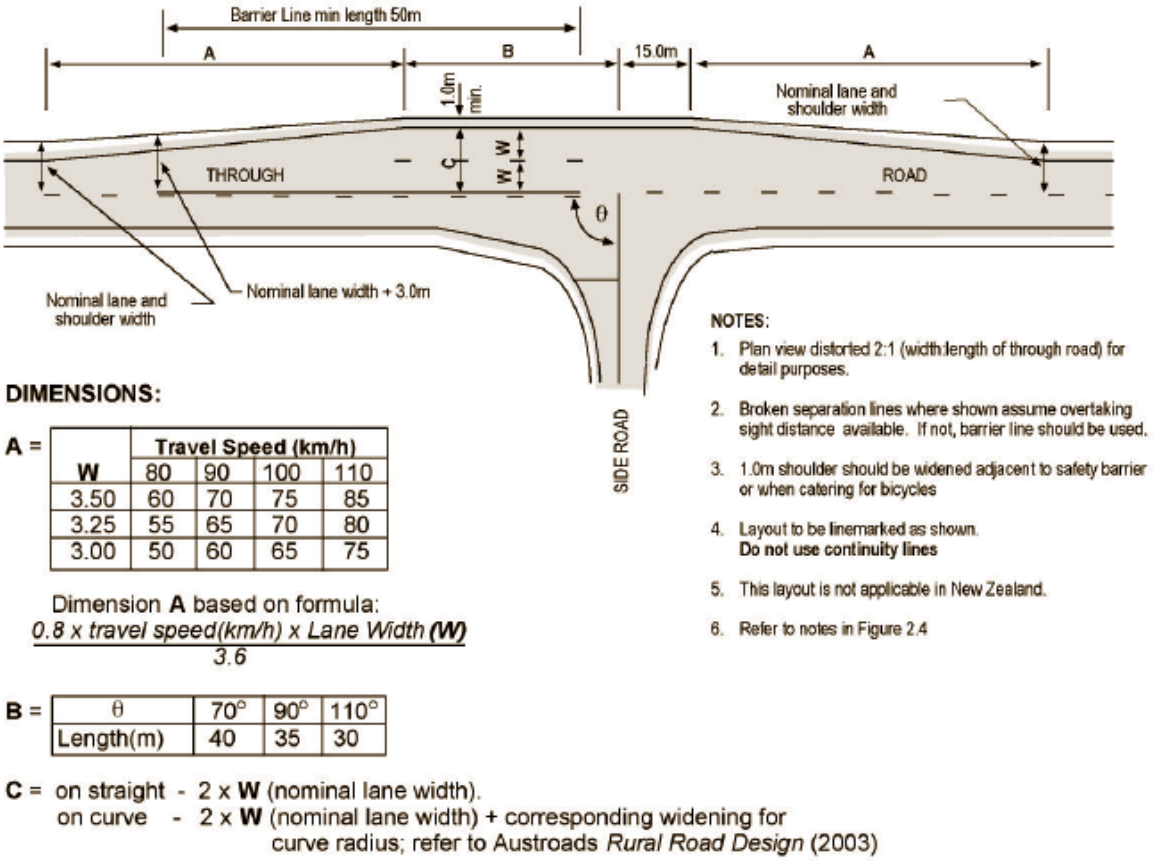
This section reviews the available infrastructure and sight distance at key intersections along the proposed haulage routes, particularly in light of the sight distance criteria outlined in **Section 4.2**. Where appropriate, treatments to improve safety during the haulage process are recommended, with a summary of measures provided in **Section 4.3.9**.

4.3.1 Intersection of Maitland Road and Tunnel Road

This sign controlled "T" intersection currently operates under "Give Way" conditions and primarily caters for local access. Sight distance is good in all directions, in excess of the requirements outlined in **Table 4-2**.

The left turn from Tunnel Road into Maitland Road would be utilised by full trucks travelling from Neath to Hebburn No. 3. Trucks returning to Neath would turn right from Maitland Road into Tunnel Road. To minimise delays to through traffic on Maitland Road, upgrade of this intersection to Type AUR, which would allow through traffic to pass a truck waiting to turn right, is recommended. **Figure 4-3** shows a typical Type AUR treatment.

- **Figure 4-3 Typical Type AUR Right Turn Treatment**



Source: Austroads (2005) Guide to Traffic Engineering Practice, Part 5 Intersections at Grade

4.3.2 Intersection of Maitland Road and Duffie Drive

This intersection provides a Type AUR right turn treatment, with a short length of auxiliary lane allowing through traffic to overtake a vehicle waiting to turn right. Duffie Drive traffic is controlled by a Give-Way sign. This intersection would be used by full trucks travelling from Neath to Hebburn No. 3, which would turn right from Maitland Road into Duffie Drive. Trucks returning to Neath would turn left from Duffie Drive into Maitland Road.

Sight distance from Duffie Drive to the east is approximately 250m. To the west, sight distance exceeds 500m. In both directions the requirements outlined above are satisfied.

Advance warning signs, such as type W5-22 “Trucks Entering”, should be installed on the approach to the Maitland Road / Duffie Drive intersection to advise approaching motorists of the potential for turning trucks. Provision is already made in Maitland Road for eastbound traffic to

pass around a vehicle waiting to turn right into Duffie Drive, and no further treatment is considered necessary.

4.3.3 Intersection of Duffie Drive and Neath Haulage Route

The Neath Haulage Route follows the Aberdare Fire Trail south from Duffie Drive. This is also a power line easement. This intersection would be used by haulage trucks turning left from Duffie Drive into the fire trail on the way to Hebburn No. 3, and turning right from the fire trail into Duffie Drive when returning to Neath.

Duffie Drive has a speed limit of 100 km/h and passes through rolling terrain, which can restrict sight distances. From the fire trail intersection with Duffie Drive, sight distance to the north (right) is limited to approximately 200m, which is less than the minimum Safe Intersection Sight Distance of 240m for a 100km/h road. A reduction in speed limit along Duffie Drive would allow the Safe Intersection Sight Distance requirements to be met. A reduction in the Duffie Drive speed limit is also recommended in the road safety audit undertaken for this project (see **Section 5.1**).

The transition between the fire trail access and Duffie Drive was observed to be in very poor repair, and damaged by recent rain. Works are required to ensure that when used as a haulage route, trucks are not likely to get bogged, and mud transferred onto the road pavement. Sealing of the first 50 or so metres of the fire trail would assist in this regard, and minimise the potential for damage to the pavement of Duffie Drive. Repair of damaged road shoulders would also reduce the potential for damage by trucks turning left off Duffie Drive.

It is further recommended that advance warning signs of type W5-22 “Trucks Entering” be installed on the Duffie Drive approaches to the intersection to advise approaching motorists of the potential for slow moving vehicles ahead.

4.3.4 Intersection of Caledonia Street and Government Circuit

Trucks travelling from Aberdare East would turn left onto Caledonia Street from the southern access to Government Circuit (opposite Ellalong Street). When returning to Aberdare East, trucks would turn right into Government Circuit. This intersection is currently controlled by a give way sign. The speed limit on Caledonia Street is 60km/h.

Sight distance to the east is very good (up to 1km). Thus trucks turning into and out of Government Circuit will easily be able to pick appropriate size gaps, with through-traffic able to respond to a vehicle turning across their path. Sight distance to the west, though, is obstructed by a crest in the road. Due to the nature of the movements being made by trucks at this intersection, the critical sight distance is for eastbound traffic in Caledonia Street being able to see when a truck is waiting to turn right into Government Circuit. Trucks waiting to turn right will be visible to eastbound traffic for sufficient distance, as the rear of the truck will be close to the top of the crest.

None the less, it would be appropriate to provide a type AUR intersection that would allow eastbound traffic on Caledonia Street to drive around a truck waiting to turn right at the intersection. It is also recommended that advance warning signs of type W5-22 "Trucks Entering" be installed on the Caledonia Street approaches to the intersection to advise approaching motorists of the potential for slow moving vehicles ahead.

4.3.5 Intersection of Cessnock Road and Cemetery Access

The haulage route between Aberdare East and Hebburn No. 3 would turn right from Cessnock Road into the access for the Gordon Williams Memorial Lawn Cemetery at Aberdare. This intersection is currently uncontrolled, with the cemetery access effectively a driveway.

The required Safe Intersection Sight Distance of 115m is available in both directions from the cemetery access.

Upgrade of this intersection to a Type AUR is required to avoid the potential for queuing of traffic back across the railway level crossing, and to minimise delays to Cessnock Road traffic. The cemetery access would also need modification to cater for the heavier loads that the haulage trucks would constitute, and to facilitate the tight left turn movement from the fire trail haulage route onto Cessnock Road. Due to the proximity of the railway level crossing to the east of the cemetery access, the installation of "Do Not Queue Across Intersection" signage and/or line marking would allow trucks to turn when vehicles are queued in Cessnock Road.

4.3.6 Neath and Aberdare East Haulage Route / Neath Road

Neath Road is a local road running adjacent to Werakata National Park between Maitland Road in the north and the village of Kearsley. Neath Road has a 5 tonne limit and has an AADT of approximately 700 vehicles per day. Hence there is minimal activity at this intersection.

Sight distance for vehicles travelling east along the access road looking left along Neath Road is limited to 150m due to a slight crest. The sight distance to the left is likely to be greater when taken from the perspective of a truck at 2.4m above ground level. Looking right the sight distance is obscured by trees at 25m. In order to safely cross Neath Road and continue along the access road, the minimum gap sight distance of 125m is required in both directions, as shown in **Table 4-2**.

On the basis of minimum gap sight acceptance, this intersection in its current state is unsuitable without clearance of the vegetation on the southwest corner of the intersection. In terms of Safe Intersection Sight Distance, the installation of advance warning signs on the Neath Road approaches to the proposed intersection will mitigate the deficiencies by providing advice to approaching motorists of the activity ahead.

Travelling west along the access road the sight distance is 150m looking left along Neath Road. Hence, use of this intersection for the return route is suitable with advance warning signs installed on the Neath Road approaches to the intersection.

4.3.7 Intersection of Richmond Main East Haulage Route and Leggetts Drive

Manoeuvres at this intersection are right turns onto Leggetts Drive, and left turns off Leggetts Drive into the access road. Leggetts Drive is an arterial main road with a speed limit of 100km/h. The sight distance in both directions comfortably exceeds the required length for both inbound and outbound movements.

It is recommended that advance warning signs of type W5-22 “Trucks Entering” be installed on the Leggetts Drive approaches to the intersection to advise approaching motorists of the potential for entering trucks.

4.3.8 Intersection of Leggetts Drive and HEZ Spine Road

This is a recently constructed intersection with very good sight distance in all directions. It is proposed to be used by trucks turning left off Leggetts Drive when travelling to Hebburn No. 3, and turning right onto Leggetts Drive when returning to Richmond Main East. Leggetts Drive is an arterial main road with a speed limit of 100km/h.

It is recommended that advance warning signs of type W5-22 “Trucks Entering” should be installed on the Leggetts Drive approaches to the intersection to advise approaching motorists of the potential for entering trucks.

4.3.9 Summary of Mitigation Measures

Table 4-4 outlines the mitigation measures required to offset the traffic impacts of this proposal.

Table 4-4 Mitigation Measures

Location	Description of Works
Maitland Road / Tunnel Road intersection	Upgrade intersection to Type AUR
Duffie Drive / Aberdare Fire Trail intersection	Seal first 50m of fire trail, and transition between fire trail and Duffie Drive
Duffie Drive	600m shoulder repair and sealing (between Maitland Road and haulage route) Reduce speed limit to 80km/h
Caledonia Road / Government Circuit intersection	Upgrade intersection to Type AUR
Cessnock Road / Cemetery Access intersection	Upgrade intersection to Type AUR
Cemetery Access	Upgrade to cater for haulage truck use
Neath Road / Aberdare and Neath Haulage Routes intersection	Clear vegetation to improve sight distance Install advance warning signs on Neath Road
Leggetts Drive / Richmond Main East Haulage Route intersection	Install advance warning signs on Leggetts Drive
Leggetts Drive / HEZ Spine Road intersection	Install advance warning signs on Leggetts Drive

In addition, the installation of shaker grids wherever trucks would be leaving an unsealed fire trail and either crossing or turning onto a sealed public road, would minimise the potential for mud and dirt to be tracked onto the road.

The implementation of these mitigation measures is likely to result in the operation of the haulage routes causing minimal disruption to traffic in the area, and will improve the safety of all road users where haulage routes and general traffic interact.

4.4 Pedestrians

Due to the relatively minor increase in traffic volumes generated by this proposal, there will be no adverse impact on pedestrian amenity within the area of operations.

4.5 School Zones

The proposed haulage routes do not pass through any school zones or past any schools.

4.6 Emergency Vehicles

Due to the relatively minor increase in traffic volumes generated by this proposal, there will be no adverse impact on emergency vehicles within the area of operations.

5. Road Safety Issues

A road safety audit is "... a formal examination of a future road or traffic project or an existing road in which an independent, qualified examiner reports on the project's accident potential and safety performance" (Austroads 2002).

This report details a Stage 5 (Existing Conditions) road safety audit of the routes proposed to be used for haulage as part of the Hunter Enviro-Mining proposal.

This road safety audit focused on providing an independent identification of potential safety hazards, regardless of current practices, standards and operations, to determine the suitability of the proposed haulage routes from the perspective of road safety.

This report also provides recommendations about possible remedial measures in response to identified deficiencies. Any remedial actions recommended for priority treatment are based on current standards and practices. However, it should be noted that it is ultimately the responsibility of the road owner to determine how to respond to each identified safety deficiency.

5.1 Road Safety Audits

Road Safety Audits were undertaken on the following roads:

- Main Road (MR) 195, Leggetts Drive from the Hunter Economic Zone Spine Road to its intersection with Lake Road;
- Duffie Drive, between Maitland Road west of Neath and Aberdare Street, Aberdare;
- Main Road (MR) 588, Maitland Road from Tunnel Road to the Cessnock Pistol Club, Neath; and
- Main Road (MR) 220, Cessnock Road / Caledonia Street, from Ellalong Street to the entrance to the Gordon Williams Memorial Lawn Cemetery, Aberdare.

The audits were carried out during daylight hours on the 7th August, 2006 (Leggetts Drive and Duffie Drive) and 19th June 2007 (Maitland Road and Cessnock Road / Caledonia Street). No night time audits were undertaken as only daytime operations are proposed. The August 2006 audits were carried out by David Lowe (Level 3 Road Safety Auditor, IPWEA) and Patricia Tindall (Level 1 Road Safety Auditor, IPWEA). The June 2007 audits were carried out by Tim Bickerstaff (Level 3 Road Safety Auditor, IPWEA) and Patricia Tindall (Level 1 Road Safety Auditor, IPWEA). All auditors are from Sinclair Knight Merz.

While every care has been taken to identify safety issues on the routes, no guarantee can be made that every safety issue has been identified. Furthermore, even if all the recommendations of this

audit were to be adopted, this would not guarantee that the roads would be made “safe”. Rather, the safety performance of the two roads should be improved.

5.1.1 Key Findings

The main roads which were audited are generally constructed and maintained to a high standard. However, there were two significant areas of concern associated with Duffie Drive:

- Delineation; and
- Road edge formation and shoulder provision.

Delineation is a particular issue at night. The provision of guideposts to mark the edge of the roadway is sporadic along the road, and where high-beam headlights cannot be used (due to the presence of either oncoming or preceding vehicles) there are many instances where the driver is unable to discern the oncoming road alignment at any distance while travelling at speed. In some instances where guide posts have been provided, they have been knocked over, have lost their reflectivity or are obscured by vegetation. Delineation becomes a distinct safety issue on bends and where there is a drop away from the road formation adjacent to the road.

The width of sealed road varies along Duffie Drive. Where recent upgrades have occurred, the pavement is up to 8m wide, with 1m shoulders on either side of two 3m lanes. However, in other locations, the pavement is less than 6m wide, with no shoulders and poor delineation of the road edge. There appear to have been attempts to repair the edge of the pavement in several locations, but often there are cracks that extend towards the centre of the road. The narrowness of the lanes and the absence of a shoulder is a particular safety issue when drivers are faced with oncoming traffic, especially trucks, as they are left with very little margin for error in staying within their lane.

5.1.2 Recommendations

In general, addressing the issues of delineation and edge treatments would likely improve safety on Duffie Drive. Guide posts should be placed along the full length of the road, in order to improve delineation of the roadway in times of darkness. They should be regularly checked for reflectivity, and non-functioning guide posts replaced as part of an ongoing maintenance program. The roadside should also be regularly checked for vegetation that is obstructing guide posts and other road signs. Australian Standard 1742.2 (Manual of Uniform Traffic Control Devices, Section 3.2) details the placement and design of guideposts. Also, the existing speed limit of 100 km/hr appears high for the standard of road. A reduction in the speed limit to 80 km/hr is recommended.

The road pavement edges should be checked regularly and repaired where necessary to maintain a sufficiently wide road pavement (at least 6m to comply with the minimum standard specified by

Council for this type of road) and to provide a smooth transition between the road pavement and gravel shoulder area.

5.2 Speed and Fatigue Management

Speed and fatigue are common factors leading to road crashes in NSW.

Road safety is of paramount concern to the proponent. Therefore, it will be in the interest of the mine operators that their employees drive safely in the performance of their duties and on their travel to and from work. Employees would be given adequate breaks during their shifts, to reduce the possibility of fatigue.

Vehicle speed is the responsibility of the individual driver, and is most often influenced by prevailing traffic and road conditions. The lightly-trafficked nature of many roads surrounding the mine site is such that drivers may feel that they can speed without fear of being caught by police. However, the local roads are generally not of the appropriate geometric standard to allow travelling at more than the stated speed limit, and speeding is likely to significantly increase the chance of a crash.

The mine operators will educate their staff about the dangers of speeding. It may be appropriate to institute a zero-tolerance approach to speeding, whereby if a staff member is caught speeding they are suspended or fined by their employer, in addition to any penalties imposed by police.

5.3 Crash Records

Accident data was obtained for the following roads within the study area:

- Maitland Road between Long Street and Kemp Street, Neath;
- Leggetts Drive between HEZ Spine Road and the Richmond Main East Haulage Route; and
- Cessnock Road between Colliery Street and the railway level crossing.

These segments contain the section of roads would all be used for the proposed haulage routes.

In the 5 years to the start of 2006, there was one crash recorded on the section of Leggetts Drive which would be used by the haulage route. Maitland Road was the scene of 29 crashes over the five-year period, an average of almost 6 per year. More than half of these crashes occurred at the intersection of Maitland Road with Duffie Drive, with conflict between vehicles turning out of Duffie Drive and through traffic on Maitland Road. Three crashes (approximately 1 every 2 years) were recorded on Cessnock Road at Aberdare. Over the analysis period 2000-2005, the annual average number of accidents in which a heavy vehicle was the primary vehicle was compared to the annual average total number of accidents. For Maitland Road, approximately 21% of all

accidents involved a heavy vehicle as the primary vehicle. However, the overall number of accidents per year is relatively small and, therefore, the percentage of heavy vehicle accidents equates to approximately 1 heavy vehicle accident per year. On Cessnock Road, 1 of the three crashes involved a light truck. The only crash on Leggetts Drive was a single car accident.

Therefore, accidents involving heavy vehicles are not disproportionate within the overall population of crashes.

Crash rates (crashes per 100 million vehicle kilometres travelled), which relate the number of crashes to the volume of traffic and length of road, have been calculated for each of these roads. The subject section of Leggets Drive has a crash rate of approximately 19 crashes per 100 million VKT. Maitland Road averaged approximately 56 crashes per 100 million VKT. The rate on Cessnock Road is 23 crashes per 100 million VKT.

The estimated increase in traffic generated by this proposal is relatively small, and will on average have a minimal impact on the number of crashes occurring in the region.

6. Road Condition Report

This pavement inspection report was prepared as a part of the Hunter Enviro-Mining Route and Traffic Impact Assessment Study. It provides a condition assessment of selected roads within the Study area which are considered as route options for haulage of chitter and tailings.

Sinclair Knight Merz carried out visual inspections of the pavement surface on 9 August 2006 and 20 June 2007. The following roads/streets were inspected:

- August 2006
  - Leggetts Drive (between Railway Museum Access Road and HEZ Spine Road);
  - HEZ Spine Road;
  - Caledonia Street (between Allandale Street and railway crossing);
- June 2007
  - Cessnock Road (between railway crossing and Penniment Street);
  - Maitland Road (between Tunnel Road and Cessnock Pistol Club);
  - Tunnel Road; and
  - Duffie Drive (between Maitland Road and Aberdare Fire Trail);

For the purpose of this report, where appropriate, roads were divided into sections with distinctive pavement properties and condition.

The visual inspection involved a broad assessment of pavement condition and identification of various pavement deficiencies visible on the pavement surface. It was focused on the pavement surface distresses such as cracking, local defects, unsuccessful repairs, noticeable rutting and roughness, rather than on the pavement structural deficiencies. It also addresses the condition of shoulders and of visible drainage facilities.

We note that the visual inspection cannot provide sufficient information for the qualification of structural properties of the pavement. Only an adequate pavement structural test can provide such information.

The following sections of the report provide a condition summary and detailed inspection record for individual sections of the selected road network.

6.1 Pavement Condition Summary

The inspected road sections consist of a mix of various road categories (collector, arterial and major) built to different standards in terms of road geometry and pavement properties. Also various

maintenance regimes are applied in accordance with the road category. Generally most inspected sections appear well maintained.

Leggetts Drive (between Railway Museum Access Road and HEZ Spine Road). A short section of the State managed Kurri Kurri-Mulbring Road which was originally constructed for, and continues to be maintained for, heavy traffic loading. The pavement appears in good condition and there are no signs of structural problems.

HEZ Spine Road. A relatively new road in excellent condition.

Cessnock Road (between Penniment Street and railway crossing). A short section of the State managed Branxton – Toronto Road which was originally constructed for, and continues to be maintained for, heavy traffic loading. The pavement appears in good condition and there are no signs of structural problems.

Caledonia Street (between railway crossing and Allandale Street). This section is on State route 82. The pavement is robust and well maintained. During the inspection a slight longitudinal cracking was detected on isolated pavement areas which may require monitoring and crack sealing.

Maitland Road (between Tunnel Road and Cessnock Pistol Club). This section is a part of the Main Road 132. The pavement appears in good condition with some visible longitudinal cracking (sealed) but pavement structural properties appear unaffected.

Tunnel Road. A short, narrow residential street off Maitland Road. The first 200m from Maitland Rd which is proposed for the route is in fair condition

Duffie Drive (between Maitland Road and Aberdare Fire Trail). The condition of pavement, shoulders and drainage on this road is showing signs of structural weakness in some locations.

6.2 Inspection Record[1]

6.2.1 Leggetts Drive (between Railway Museum Access Rd and HEZ Spine Road)

<table>
<tr><td colspan="2">Road/Street:
Leggetts Drive
(between Railway Museum Access Road and HEZ Spine Road)</td><td rowspan="4">  </td></tr>
<tr><td>Length: 750m</td><td>Width: 7m</td></tr>
<tr><td colspan="2">Pavement Type: Flexible, Bitumen seal.</td></tr>
<tr><td colspan="2">Shoulders: Sealed, 2 x 1.5m</td></tr>
<tr><td colspan="2">Drainage: Table drain</td></tr>
<tr><td colspan="2">Comments:
This section is a part of the state managed Main Road 195.
The pavement appears to be in good condition with slight roughness and rutting. No other signs of surface deterioration or structural deficiency were found during the inspection.
Sealed shoulders and table drains appear in good condition.</td><td></td></tr>
</table>

[1] Note: All measures including length and pavement/shoulder widths are estimated.

6.2.2 HEZ Spine Road

Road/Street:

HEZ Spine Road

(between Leggetts Drive and Roundabout)

Length: 4.3km	**Width:** 6.7m

Pavement Type: Flexible, Asphalt.

Shoulders: -

Drainage: Kerb and gutter



Comments:

This is a brand new road in excellent condition.

At the time of the inspection there was landscaping work underway along the section. The drainage system was properly protected with sediment control devices.



6.2.3 Cessnock Road (between Penniment Street and railway crossing)

<table>
<tr><td colspan="2">Road/Street:
Cessnock Road
(between Penniment Street and railway crossing)</td><td rowspan="2">  </td></tr>
<tr><td>Length: 450m</td><td>Width: 7m</td></tr>
<tr><td colspan="2">Pavement Type: Flexible, Bitumen seal.</td><td rowspan="2"></td></tr>
<tr><td colspan="2">Shoulders: Sealed, 2 x 1.5m</td></tr>
<tr><td colspan="2">Drainage: Table drain</td><td rowspan="2"></td></tr>
<tr><td colspan="2">Comments:
This section is a part of the state managed Main Road 220.
Pavement appears to be in good to excellent condition. No signs of surface deterioration or structural issues were detected during the inspection.
Sealed shoulders and table drains appear in good condition.</td></tr>
</table>

6.2.4 Caledonia Street (between railway crossing and Allandale Street)

<table>
<tr><td colspan="2">Road/Street:
Caledonia Street
(between Allandale Street and Railway Crossing)</td><td rowspan="4">  </td></tr>
<tr><td>Length: 1450m</td><td>Width: 7m</td></tr>
<tr><td colspan="2">Pavement Type: Flexible, Asphalt</td></tr>
<tr><td colspan="2">Shoulders: Sealed, 2 x 1.5 to 3m</td></tr>
<tr><td colspan="2">Drainage: Concrete channel</td></tr>
<tr><td colspan="2">Comments:
This section of the State managed route number 82 passes through suburb of Kearsle.
Pavement surface appears in good condition. Slight longitudinal cracking occurs along the section. The riding quality is good. No signs of structural deficiency were found during the inspection.
Sealed shoulders are in good condition as well as adjoining concrete channel.
Monitoring of longitudinal cracks and crack sealing should be considered.</td><td></td></tr>
</table>

6.2.5 Maitland Road (between Tunnel Rd and Cessnock Pistol Club)

Road/Street: Maitland Road (between Tunnel Road and Cessnock Pistol Club)	
Length: 970m **Width:** 7m	
Pavement Type: Flexible, Bitumen seal.	
Shoulders: Sealed, 2x1.5m	
Drainage: Table drain, Kerb and gutter	
Comments: This is a section of State managed Main Road 588. Pavement appears to be in good condition. Occasional longitudinal cracking was recorded during inspection. They are well repaired (sealed). Other signs of past maintenance include two large heavy patches. Sealed shoulders as well as drainage are in good condition.	

6.2.6 Tunnel Road

Road/Street:

Tunnel Road

(off Maitland Rd)

Length: 200m	**Width:** 4.5-6m

Pavement Type: Flexible, bitumen seal

Shoulders: - Only at the intersection area

Drainage: Table drain



Comments:

A narrow residential street.

Pavement is in fair condition, relatively rough with visible surface distresses including potholes and edge breaks.

Drainage requires improvements.

6.2.7 Duffie Drive (between Maitland Rd and Fire Trial)

<table>
<tr><td colspan="2">Road/Street:
Duffie Drive
(between Maitland Rd and Fire Trial)</td><td rowspan="4">  </td></tr>
<tr><td>Length: 510m</td><td>Width: 6.7m</td></tr>
<tr><td colspan="2">Pavement Type: Flexible, bitumen seal.</td></tr>
<tr><td colspan="2">Shoulders: Sealed, 2x0.5m</td></tr>
<tr><td colspan="2">Drainage: Table drain</td></tr>
<tr><td colspan="2">Comments:
This section is in relatively good condition but shows signs of ageing.
Moderate roughness and occasional depressions indicate local structural issues in the pavement.
In most cases the sealed shoulders are in good condition, but there are occasional edge breaks associated with the drainage issues.</td><td></td></tr>
</table>

7. Railway Level Crossing Assessment

The South Maitland Railway was built in 1907 by the Wickham and Bullock Island Company for the purpose of transporting coal. This railway runs east through Kurri Kurri and west through Cessnock.

The proposed haulage routes would use the existing level crossing on the HEZ Spine Road (Richmond Main East haulage route). Additional new crossing would be required between Aberdare East mine and Cessnock Road, and on the fire trail used by the Neath and Aberdare East haulage routes, west of Neath Road.

7.1 Existing Train Operation

Since the abandonment of mining operations at the Southland mine approximately two years ago, no regular train services have been operating, and consequently, its usage is very limited. No regular passenger services operate in the area. An exception to this is the infrequent use of the line by the Richmond Vale Railway Museum. Passenger trains carry visiting tourists between Richmond main and Pelaw main collieries (www. amol.org.au), operating from 10am on the first three Sundays of each month, as well as at other times when hired for functions and special events (www.richmondvalerailwaymuseum.org, 2004).

7.1.1 Potential Train Operation

Austar's recent acquisition of the Southland Mine, and the resumption of mining operations, has resulted in rail movements recommencing. However, it is anticipated that the frequency of service will not exceed three rail coal shipments per day.

7.1.2 Crossing Protection and Operation

The existing level crossing on the HEZ Spine Road was visually inspected as part of the road safety audit carried out on the 7th August 2006. This crossing is over a single bi-directional track. At the time of the inspection, this crossing had passive Level 2 protection. This has since been upgraded to Active Level 3B, with lights, bells and boom gates. **Appendix B** gives the detailed requirements for each level of protection.

7.1.3 Crossing Condition / Maintenance

The crossing is in fair condition.

7.2 Conclusions

The configuration and operation of the rail level crossing of the HEZ Spine Road is not anticipated to have any adverse impact on the proposed haulage routes, and no impact on the railway is anticipated from the haulage routes.

8. Conclusions

Hunter Enviro-Mining have nominated preferred routes to be used for haulage of material from derelict mines at Aberdare East, Neath and Richmond Main East to the Hebburn No. 3 processing plant. These routes use a combination of both public roads and fire trails. The use of fire trails significantly reduces environmental and community impacts from the movement of trucks involved in the haulage of the material. The fire trails would be upgraded by HEM with access only required for the duration of the project, resulting in significant benefits beyond the life of the project for the local community, the National Parks and Wildlife Service and emergency services, particularly the Rural Fire Service.

The HEM proposal will have only a small impact on the local road network. The proposal would not result in any roads or intersections exceeding their nominal capacity. Some upgrade works are required at specific intersections to improve safety and facilitate the movement of haulage trucks.

Sight distances at critical intersections have been reviewed in regard to the appropriate RTA and Austroads Standards, and in most cases were found to be adequate. It is recommended that warning signs be installed on all approaches to the various access points to the road network to advise approaching motorists of the increased truck activity (Type W5-22). Sight distance requirements where the Neath haulage route meets Duffie Drive would be satisfied if the speed limit of Duffie Drive were reduced. A reduction in the Duffie Drive speed limit is also recommended to improve the general safety performance of the road, along with minor remediation works and on-going maintenance to improve delineation, road edge formation and shoulder provision.

The inspected road sections consist of a mix of various road categories (collector, arterial and major) built to different standards in terms of road geometry and pavement properties. Generally most inspected sections appear well maintained. On-going monitoring of pavement condition is required on Duffie Drive, Maitland Road and Tunnel Drive.

Appendix A Bus Timetables

Route 162: Cessnock to Kearsley - Weekdays						Saturday	
Cessnock City Centre	730	900	1130	215	415	1100	1200
South Cessnock, McFarlane Street		905		220			
Aberdare, Northcote Street		910	1135	225	420	1005	1205
Kearsley Auto Port		**920**	**1145**	**235**	**425**	**1015**	**1215**
Abernethy, Ferguson Street	740	925		240	430	1020	1220
Kearsley Auto Port	**745**	**930**	**1145**	**245**	**435**	**1025**	**1225**
Aberdare, Northcote Street		935	1150	250	440	1030	1230
South Cessnock, McFarlane Street		940		255			
Cessnock City Centre	800	945	1200	300	445	1040	1240

Route 164: Cessnock to Maitland - Weekdays														
Cessnock, Rover Depot	625	725	755	855	955	1055	1155	1255	155	225	325	355	466	555
Cessnock, City Centre	**630**	**730**	**800**	**900**	**1000**	**1100**	**1200**	**100**	**200**	**230**	**330**	**H400**	**500**	**600**
Neath	635	735	805	905	1005	1105	1205	105	205	235	335	405	505	605
Abermain Police Station	637	737	807	907	1007	1107	1207	107	207	237	337	407	507	607
Weston CBD	645	745	815	915	1015	1115	1215	115	215	245	345	415	515	615
Kurri Hotel	**650**	**750**	**820**	**920**	**1020**	**1120**	**1220**	**120**	**220**	**250**	**350**	**420**	**520**	**620**
Heddon Greta	655	755	825	925	1025	1125	1225	125	225	255	355	425	525	625
Gilleston Heights	700	800	830	930	1030	1130	1230	130	230	300	400	430	530	630
Maitland Station	705	805	835	935	1035	1135	1235	135	235	305	405	435	535	635
Train Departs Maitland	**710**	**834**	**854**	**947**	**1046**	**1147**	**1246**	**147**	**247**	**338**	**438**	**506**	**545**	**649**
Train Arrives Newcastle	**751**	**915**	**935**	**1028**	**1127**	**1228**	**127**	**221**	**328**	**419**	**519**	**540**	**620**	**730**
Maitland Post Office	710	810	840	940	1040	1140	1240	140	240	310	410	440	540	640

Route 160: Cessnock to Newcastle - Weekdays						Saturday	
Hunter Valley Gardens					345		345
Cessnock Corrective Centre							345
Cessnock, Vincent Street	**700**	**S730**	**900**	**200**	**400**	**715**	**400**
Neath	708	**738**	908	208	408	723	408
Abermain Police Station	712	**742**	912	212	412	727	412
Weston CBD	715	**745**	915	215	415	730	415
Kurri Kurri	720	**750**	920	220	420	735	420
Sandgate	755	**820**	955	245	455	800	455
Newcastle University		**830**	100				
Mayfield	800			250	455	805	500
Newcastle Coach Terminal	**815**		**1015**	**300**	**515**	**815**	**515**
Train Departs Newcastle	**W823**		**1028**	**328**	**520**	**830**	**520**
Train Arrives Sydney	**1110**		**110**	**609**	**810**	**1109**	**809**

Cessnock City Council: www.cessnock.nsw.gov.au

Appendix B Protection Levels for Railway Level Crossings

Protection Levels in accordance with ARTC XDS 01 (RIC TS 27 000 1 01 SP) Issue 1 Revision 2 (Mar 05)

Public and Private Vehicle Crossings

Level 1A
Control: Passive
Protection: Give Way Signs
Category: Minimum Treatment
This is the minimum treatment to be adopted at road Level Crossings.
Level 1 B
Control: Passive
Protection: Give Way Signs + Approach Warning Signs
Category: Standard Treatment
This is the treatment to be adopted at road Level Crossings when Level 1A is inadequate and a higher level of protection is not warranted.
Level 2
Control: Passive
Protection: Stop Signs
This is the treatment to be adopted at road Level Crossings when there are inadequate sight distances for Level 1 control and active control Level 3 or 4 is not warranted. Vehicles are required to stop. This is the minimum treatment to be adopted at Service Level Crossings, where it is to be used in conjunction with an "Authorised Vehicles Only" sign.
Level 3A
Control: Active
Protection: Flashing Lights + Bells
This is the minimum treatment to be adopted at road Public Level Crossings when passive protection is inadequate.
Level 3B
Control: Active
Protection: Flashing Lights + Bells + Boom Barriers
This is the treatment to be adopted at road Public Level Crossings when Level 3A protection is inadequate. Installation of half-boom barriers in conjunction with flashing lights and bells should particularly be considered at Level Crossings that pass over more than one track.
Level 3C
Control: Active
Protection: Special Warning Lights
This configuration is not approved for Public Level Crossings. It only applies to Private Level Crossings and each installation is subject to approval by ARTC's General Manager ISP or nominated representative.
Level 4
Control: Active
Protection: Level Crossing Gates
These are gates across the railway line that are manually opened for the passage of each train.
Level 5A
Control: Active
Protection: Manual Control
The Level Crossing is manually controlled by a handsignaller with a hand held STOP banner (R6-7 or R6-8) or red flag (e. g. at a Level Crossing with inoperative flashing lights or gates).
Level 5B
Control: Active
Protection: Special Control

This configuration is not approved for Public or Private Level Crossings. This is a generic level that is applied to Service Level Crossings when Level 2 protection is inadequate. It can include, but is not limited to:

- Temporary speed restrictions
- Signals
- Access to train running information at the crossing
- Direct communication with trains

Worksite protection

Hunter Enviro-Mining (Operations) Pty Limited

Preferred Project Report

Chitter & Tailings Reclamation Project

Appendix 8

Ecological Assessment

October 2007

Ecological Impact Assessment

Neath - Aberdare to Hebburn No. 3 Transport Corridors

Neath, Aberdare East, Richmond Main East Chitter Recovery Project

Neath Road, Cessnock

14 September 2007

Ecological Impact Assessment

Neath - Aberdare to Hebburn No. 3 Transport Corridors

Neath, Aberdare East, Richmond Main East Chitter Recovery Project

Neath Road, Cessnock

14 September 2007

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Signature: Date:



14 September 2007

Mark Aitkens BSc (Env. Biol.)

Principal – Ecovision Consulting

Table of Contents

1.0 INTRODUCTION....1
1.1 The Project....1
1.2 Site Description....1
1.3 Legislative Framework....1
1.4 Project Tasks....1
1.5 Report Structure....1
1.6 Limitations....2
2.0 APPLICABLE LEGISLATION AND GUIDELINES....3
2.1 State Legislative Framework....3
2.2 Commonwealth Legislative Framework....4
2.3 Survey Guidelines....4
2.4 Relevant Matters....4
3.0 SURVEY AND ASSESSMENT METHODOLOGY....6
3.1 Desktop Analysis....6
3.2 Impact Analysis....6
3.3 Preliminary Risk Analysis....6
3.4 Subject Species....7
3.5 Field Survey....8
4.0 LOCAL ENVIRONMENT....9
4.1 General Site Characteristics....9
4.2 Biological Characteristics....9
4.3 Potential Subject Species....13
4.4 Vegetation Remnants....16
4.5 Wildlife Connectivity....17
4.6 Current Impacts Affecting the Site....17
5.0 IMPACT ANALYSIS....18
5.1 Quantification of Impacts....18
5.2 Original Proposed Routes....18
5.3 Preliminary Risk Analysis....22
6.0 FIELD SURVEY....28
6.1 Flora....28
6.2 Fauna....29
7.0 DATA INTERPRETATION....32
7.1 Vegetation Formations....32
8.0 MATTERS OF ECOLOGICAL SIGNIFICANCE....33
8.1 Subject Species....33
8.2 SEPP 44 – Koala Habitat Protection....34
9.0 RECOMMENDED MITIGATION STRATEGY....35
10.0 IMPACT ASSESSMENT....36
10.1 EP&A Act 1979....36
10.2 EPBC Act....38
10.3 SEPP 44 – Koala Habitat Protection....39
11.0 CONCLUSIONS....40
12.0 REFERENCES....41

FIGURES

Figure 1: Location of the Site and Study Area
Figure 2: Proposed Development
Figure 3: Native Vegetation Cover of the Study Area
Figure 4: Threatened Flora of the Study Area
Figure 5: Threatened Fauna of the Study Area
Figure 6: Alternative Routes
Figure 7: Flora Survey Locations
Figure 8: Vegetation of the Site

TABLES

Table 1: Report Structure
Table 2: Likelihood Scale
Table 3: Consequence Scale
Table 4: Preliminary Risk Matrix
Table 5: Biophysical Characteristics of the Site
Table 6: Mitchell Landscapes of the Study Area
Table 7: Predominant Vegetation Formations within the Locality
Table 8: Vegetation Communities of the Study Area
Table 9: Potential Subject Species – Flora
Table 10: Potential Subject Species - Fauna
Table 11: Vegetation Remnants within the Central Hunter Foothills Mitchell Landscape
Table 12: Current Site Impacts
Table 13: Preliminary Risk Analysis
Table 14: Proposed Field Survey Approach
Table 15: Vegetation Statistics of the Site
Table 16: Comparison between Native Vegetation of the Site and Study Area
Table 17: Assessment of Significance – Threatened Species, EPs and EECs
Table 18: NES Matters

APPENDICES

Appendix 1: EPBC Act Protected Matters Report
Appendix 2: Potential Subject Species Habitat Descriptions
Appendix 3: Flora and Fauna Species Lists

DEFINITIONS AND ABBREVIATIONS

Terms used within this report are defined as follows:

DEC	Department of Environment and Conservation (Now DECC)
DECC	Department of Environment and Climate Change
Disturbed Vegetation	A mappable area containing a variable floristic assemblage of native and exotic plant species that is not reflective of naturally occurring described native vegetation communities.
CEEC	A critically endangered ecological community within the meaning of the definitions contained within the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999.*
Core habitat	Land containing resources capable of supporting both breeding and foraging activity.
EEC	An endangered ecological community within the meaning of the definitions contained within the *NSW Threatened Species Conservation Act 1995* or Commonwealth *Environment Protection and Biodiversity Conservation Act 1999.*
EIA	Ecological Impact Assessment
EP	An endangered population within the meaning of the definitions contained within the *NSW Threatened Species Conservation Act 1995* or Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*
GIS	Geographical Information System. Software enabling spatial database analysis.
Intact Vegetation	Refers to areas of native vegetation that are relatively continuous, relatively weed-free, contain natural habitat features, and which appear to function as a native ecological community. The term may be applied to areas of vegetation which have been previously disturbed and/or cleared, but have regenerated and recovered to the extent that natural functions have been restored, and the vegetation would be expected to progress unassisted towards a stable state.
Native Vegetation	A mappable area containing a structurally and floristically stable assemblage of plant species dominated by native flora species (i.e. greater than 50% native plant cover).
Potential subject species	Flora and fauna species identified within the study area through database searches, literature reviews and GIS analysis.
Region	Area defined by the
Secondary habitat	Land containing resources capable of supporting breeding or foraging activity but not both (refer to core habitat).
Study area, locality area, locality	Land contained within a 10 km radius of the site, which has been used to analyse database and vegetation mapping. Results used as a basis for comparision with the sites ecological values to assess project impacts.
Site	Land being the subject of this Ecological Imapct Assessment, which is marked with a blue outline on each figure.
Subject species	Species known to occur or having potential core or secondary habitat within the site, with development impacts potetnailly having an influence on these species.
Threatened Biodiversity	Species, polulation ot communities listed as endangered or vulnerable within the meaning of the *NSW Threatened Species Conservation Act 1995* and/or the Commonwealth *Environment Protection & Biodiversity Conservation Act 1999.*

EXECUTIVE SUMMARY

This Ecological Impact Assessment (EIA) has been prepared in support of a Preferred Project Report for the rehabilitation of chitter and tailings sites in the Cessnock locality. This report assesses the flora and fauna impacts associated with the changes to the originally proposed haulage routes presented in the Environemtnal Assessment Report. The original haulage routes and the chitter and tailings reclamation areas were assessed within Appendix 7 of the Environmental Assessment Report (December 2006).

Field survey sampling the ecological values of bushland adjacent to proposed transport corridors linking Neath and Aberdare chitter depostis with Hebburn No. 3, nominally being centred around Neath Road Cessnock(the site), was completed to examine the likely impacts on native flora and fauna species, specifically threatened species, endangered populations (EPs), endangered ecological communities (EECs) and their habitats (collectively referred to as *threatened biodiversity*). Threatened biodiversity listings considered include those listed on the *Threatened Species Conservation Act 1995* (TSC Act), *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) and State Environment Planning Policy – Koala Habitat (SEPP 44).

Methods

This assessment was prepared using results from desktop and field surveys based on the Department of Environment Conservation's (DECs) working draft *Threatened Biodiversity Survey and Assessment: Guidelines for Developments and Activities* (DEC, 2004). Data collected during field surveys was used to quantify the sites ecological values against those contained within 10 km of the site (i.e. study area), relavent Mitchell Landscapes (Mitchell, 2002) and vegetation types (NPWS, 2003) to assist the completion of a threatened biodiversity impact assessment.

Surveys were conducted on 13 July 2007 targeting threatened biodiversity likely to occur within the locality, a list determined by a 10 km radial search of DECs Wildlife Atlas database (DEC, 2007), EPBC Act Protected Matters Search (DEWC, 2007), spatial analysis of Wildlife Atlas database records against relevant Mitchell Landscapes/ vegetation types and review of relevant literature. Flora surveys involved systematic (i.e. quadrat) and non-systematic (targeted) techniques to sample the sites floristic species richness and diversity. Fauna surveys involved diurnal sampling regimes including targeted surveys.

Results - Flora

The Wildlife Atlas database search identified 584 species within the study area consisting of 467 natives and 117 exotics. Spatial database analysis and relevant litereature indicate the potential occurrence of 19 threatened flora species and/or their habitats within the study area (DEC, 2007). The site survey identified 118 plant species, consisting of 100 natives and 18 exotics, within three vegetation formations.

The primary native vegetation formation of the site, which is typically found throughout the midslopes and ridges, is generally of forest structure consisting of Spotted Gum (*Corymbia maculata*) and Broad-leaved Ironbark (*Eucalyptus fibrosa*). The understorey stratum is predominantly shrubby beneath the Spotted Gum (*Corymbia maculata*) and Broad-leaved Ironbark (*Eucalyptus fibrosa*) canopy. Conversely, the Parramatta Redgum (*Eucaluptus parramattensis subsp. decadens*) dominated woodland formation consists of a shrubby understorey including species such as *Banksia spinulosa, Isopogon anemonifolius* and *Melaleuca thymifolia*.

The vegetation cover that immediately adjoins the proposed transport corridors (i.e. 5m shoulder) is largely characterised by derived grasslands consisting of cosmopolitan native and exotic plant species such as Couch (*Cynodon dactylon*), Rats Tail (*Sporobolus creber*), Cats Ear (*Hypochaeris radicata**) and *Aristida vagans*.

Results - Fauna

The Wildlife Atlas database search identified 320 species within the study area consisting of 302 natives and 18 exotics. Spatial database analysis and review of relevant literature indicate the potential for 53 threatened fauna species or their habitats within the study area (DEC, 2007).

The fauna survey of the site identified 38 species comprising of 29 avian, 6 mammal, 3 reptile and 0 amphibian species. Potential secondary habitat for threatened species exists throughout the derived grasslands of the site, particularly for species capable of utilising seed and invertebrate resources such as the Speckled Warbler and threatened bats. The potential threatened biodveirsity values of the site are considered moderate particularly given the proximity of these transport corridors to large undeveloped parcels of native vegetation.

Biodiversity Analysis

The sites ecological value was classified using key indicators of ecological health such as native/exotic species richness, tree hollow type and density and vegetation structural condition. In general, the sites ecological value was classified as follows:

> *Derived Grassland – Moderate ecological condition (i.e. Moderate native flora species richness, Moderate abundance of exotic plant species. Simplified fauna habitats (i.e. absence of tree canopy, tree hollows and shrub canopy and fallen timber). Moderate potential for foraging threatened fauna species populations).*
>
> *Forest – High ecological condition (i.e. mostly native trees, shrubs, grasses and herbs, few exotics. Contains complex fauna habitat features (i.e. sparse tree hollows, fallen timber, diverse array of grass seed). High potential for foraging and breeding threatened fauna species populations, particularly mobile species such as microchiropteran bats and birds).*

Areas of derived grasslands have transitional ecological values ranging between moderate and high. These areas are considered potentially important for threatened species of the study area such as woodland birds and threatened plants that occupy disturbed habitats.

Threatened Biodiversity

Database, literature and site survey results identified 34 'Subject Species' for consideration in this impact assessment. Habitats contained within the site predominantly suit threatened species of dry sclerophyll woodland and forest environs, with survey identifying Parramatta Redgum (*Eucalyptus parramattensis ssp. decadens*) and *Grevillea parviflora ssp. parviflora* within areas potentially exposed to indirect impacts.

There is a moderate likelihood of threatened biodiversity occuring throughout the adjoining forest areas especially for threatened species such as the Speckled Warbler and Grey-crowned Babbler. Various EECs also occur within the study area including Lower Hunter Spotted Gum Ironbark Forest, Kurri Sands Swamp Woodland and Hunter Lowlands Redgum Forest. The assessment has assumed that these and other threatened forest species (e.g. microchiropteran bats) will occupy the site during various parts of their life cycles.

Impact Assessment Review

The proposed transport corridor is part of a Part 3A Major Project under the *Environmental Planning and Assessment Act 1979* (EPA Act). The impact footprint arising from the establishment and usage of the revised transport routes, as implied in the preferred project report, includes an area directly impacted by vehicle movements (i.e. 5-10 m wide tar/ all-weather surface) and areas of indirect impact such as the adjoining shoulder (i.e. max 5 m either side). Indirect impacts include road noise, dust and hydrological changes. Unmitigated, these works could potentially affect threatened biodiversity and their habtiats.

The existing tar sealed pavement utilised in the proposed transport corridors accounts for approximately 2.2 ha. In addition to this it is estimated that an area of approximately 8.2 ha will be involved in the establishment of the road surface along an existing bush track alignment that is currently cleared of native vegetation (i.e. potential permanent impact). Approximately 0.17 ha of derived grassland and forest vegetation (i.e. LHSGIF) will be cleared at Tunnel Road and 0.1 ha of woodland (i.e. KSSW) at Richmond Main East. An additional 7.5 ha of native vegetation that adjoins the bushland tracks may potentially be subject to semipermanent habitat modification through management and usage regimes (i.e. forest, woodland and derived grasslands). It is estimated that the establishment of the proposed transport corridors will potentially modify 43 % of the sites total area (i.e. approximately 7.8 ha impacted compared to 18.0 ha of bushland tracks, existing tar sealed road and adjoining 5 m shoulder).

Proposed Mitigation Strategy

The following mitigation strategies are recommended to be included in the site Environmental Management Plan (EMP) to minimise the direct and indirect impacts of the proposed transport corridors on the natural environment:

- Restrict vehicle movements to daylight periods, which is to allow for a 30 minute shoulder after sunrise and before sunset to minimise impacts on activite fauna populations;
- Restricted road construction to existing cleared tracks, with traffic to be managed via the use of passing bays instead of clearing;
- Track construction, upgrade and maintenance is to occur wholly within a 10 m wide corridor; and
- Trees are to be retained, where possible, within the landscape where vegetation clearing is required (i.e. at Tunnel Road, Neath Road and Richmond Main East).

Further, it is recommended that consideration be given to the protection of native vegetation through ongoing targeted weed management works along the proposed transport corridor, particularly within areas classified as National Park. Weed control works should be implemented prior to construction/ track upgrade works to minimise the occurrence or intensification of weed populations.

Vegetation losses associated with the haulage route will be adequately offset in the long term through the rehabilitation of chitter and tailing reclamation areas as details in the original Environmental Assessment Report (December 2006).

EPA Act

The impact assessment prepared in accordance with the Assessment of Significance concluded no significant impact on threatened species, EPs, EECs or their habitats assuming the implementation of the proposed mitigation strategy.

SEPP 44 – Koala Habitat Protection

SEPP 44 applies to the Cessnock City Council local government area (LGA) and is therefore relevant to the site. Surveys identified the tree canopy to not constitute 'potential' koala habitat (i.e. preferred foraging species less than 15% total cover). No evidence of koalas or koala activity was detected within the site during the survey period. No further management is required for this species under SEPP 44.

EPBC Act

Matters of national environmental significance (NES) occurring within the locality were considered in the review of impacts to determine whether further environmental investigation is warranted. Assuming the implementation of the proposed mitigation strategy, it has been demonstrated that most of the sites native vegetation cover and fauna habitats will not be adversely impacted by future development. Accordingly, it is considered that a referral to the Department of Environment and Water Conservation (DEWC) is not required, as the development of the site will have a low impact on relevant EPBC Act listed matters.

Conclusions

The Section 5A assessment prepared for this development considered the magnitude of the developments impact relative to the local environment and concluded that the future development of the site is generally in keeping with the principles of ecologically sustainable development (i.e. low net impact). No significant impacts are expected on core Koala habitat (i.e. SEPP44) or matters of NES (i.e. EPBC Act). The proposed transport corridors will not have a significant adverse impact on threatened biodiversity assuming implementation of the proposed mitigation strategy.

1.0 INTRODUCTION

This Ecological Impact Assessment (EIA) was prepared to assess various transport corridors between Hebburn No. 3 and Neath / Aberdare chitter deposits (the site). The location of the site is illustrated in **Figure 1**. An assessment of the chitter and tailings reclamation areas is presented within Appendix 7 of the Environmental Assessment Report 2006. An understanding of the project, site description and assessment tasks for this assessment is provided in the following sections.

1.1 The Project

1.1.1 Background

The proposed development is consistent with the current land use zone gazetted under the Cessnock City Council local environment plan, is a Part 3A development under the *Environmental Planning and Assessment Act 1979* (EP&A Act 1979), consequently triggering assessment under this act. As the proposed development is to occur within an area that coincides with native vegetation and fauna habitats, matters such as threatened species and their habitats are required to be considered prior to issueing development consent. The purpose of this report is to provide the Department of Planning with sufficient information aiding the determination of the proposed development application.

1.1.2 The Proposal

The proposed transport corridors will enable the movement of trucks laiden with chitter and tailings material to travel from nominated sites at Neath, Aberdare East and Richmond Main East to Hebburn No. 3 for processing. **Figure 2** shows the layout of the proposed development presented for assessment.

1.2 Site Description

The site is located within the Cessnock locality in Cessnock City Council local government area. The area of the site is approximately 18.0 ha (i.e. nominally a 20 m wide road corridor of 10.65 km length) consisting of cleared lands (i.e. 10 m wide bushland tracks and tar sealed roads), native vegetation cover and derived grasslands (i.e. 5 m road shoulder each side).

1.3 Legislative Framework

The legislative framework considered in this EIA includes Section 5A of the EP&A Act 1979, various threatened biodiversity listings under the *Threatened Species Conservation Act, 1995* (TSC Act 1995) and *Environment Protection and Biodiversity Act 1999* (EPBC Act 1999).

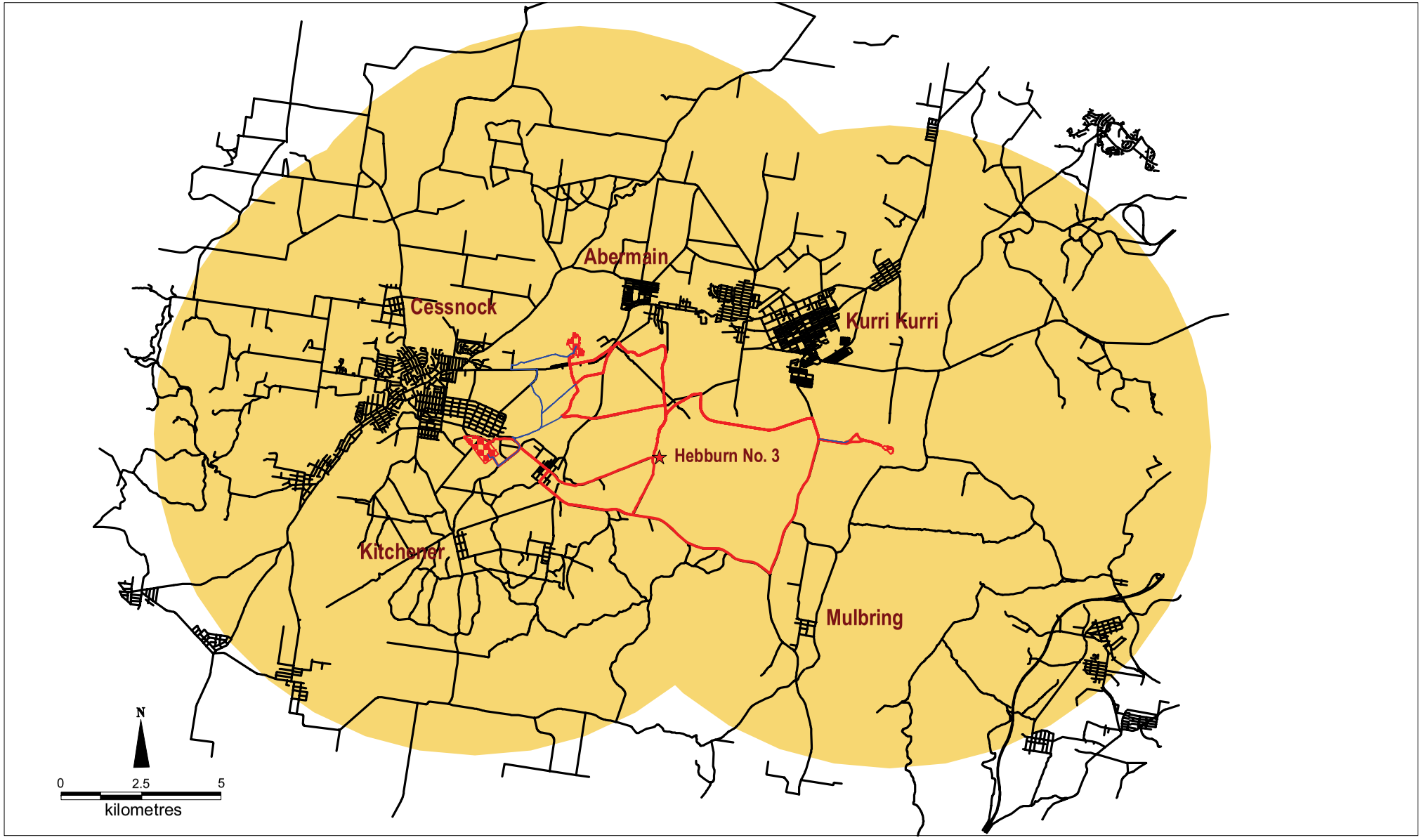
1.4 Project Tasks

The principal tasks undertaken as part of the EIA were:

- Identify the flora and fauna communities present within the site;
- Complete targeted surveys and habitat assessments for threatened species, endangered populations (EPs) and endangered ecological communities (EECs) of the locality;
- Qualify the ecological values of the site;
- Consider the implications of development on the site ecological values, including any bush fire hazard management strategies;
- Consider and recommend mitigation works, where necessary;
- Prepare an impact assessment in accordance with Section 5A of the EP&A Act 1979 after considering the proposed mitigation package; and
- Review the impact of the development against NES matters listed on the EPBC Act 1999.

1.5 Report Structure

The EIA has been structured in accordance with the following table:



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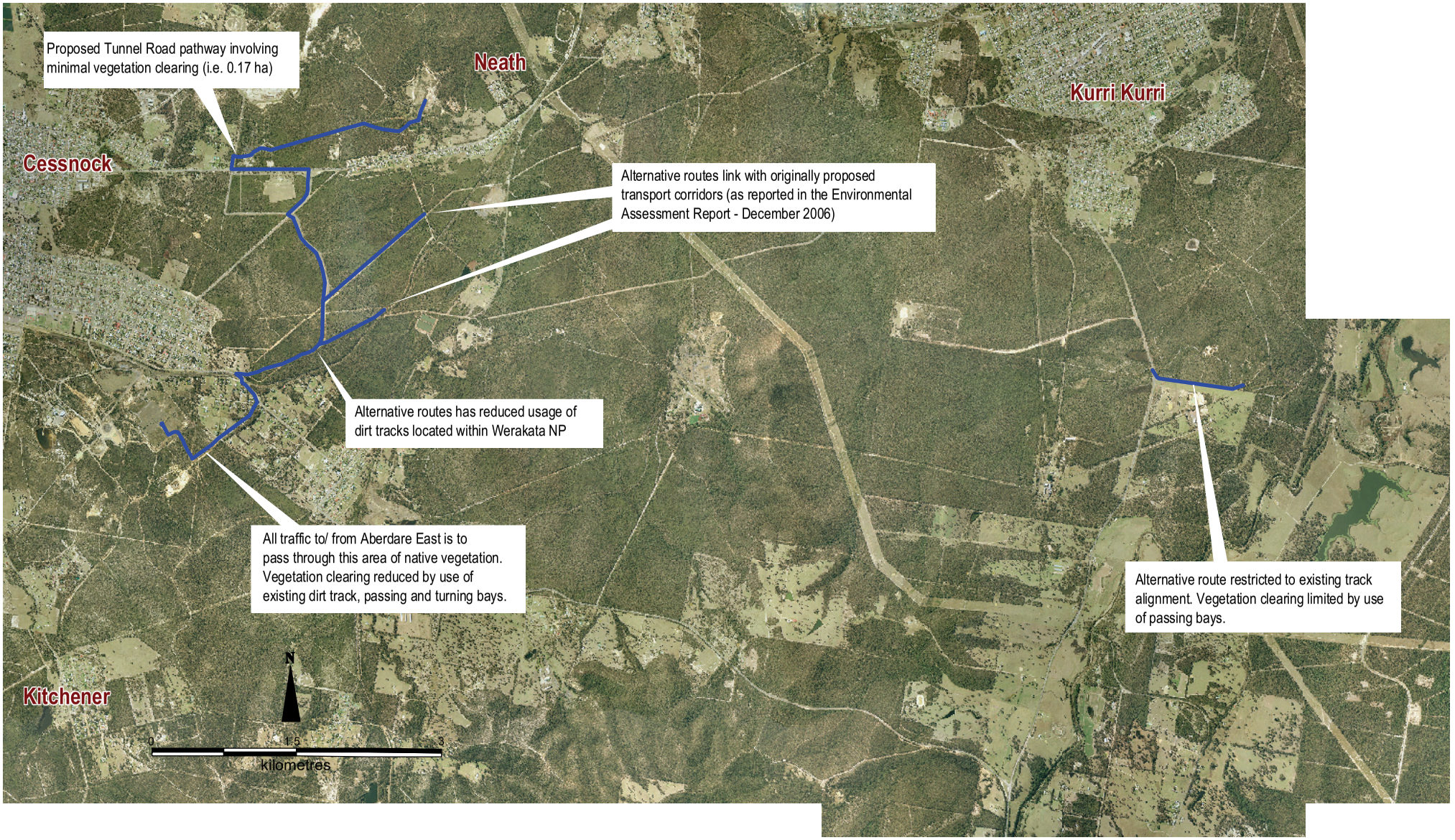
Figure 1

The Location of the Study Area and Site

Legend

- Original Routes
- Assessed Routes
- Road Network
- Emplacements
- Study Area

Plan: E:\Mapping\2007\F1132\Figure_1
Date: 14 September 2007
Drafted by: Mark Aitkens
Base Layers: Resource boundaries and transport routes supplied by Wells Environmental Services



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Figure 2

Proposed Alternative Routes

Plan: E:\Mapping\2007\F1132\Figure_2
Date: 1 September 2007
Drafted by: Mark Aitkens
Base Layers: Revised transpot routes supplied by Wells Environmental Services Imagery supplied by Plateau Imagery (under licence)

Legend

Assessed Routes

Table 1: Report Structure

Section	Component	Content
2	Applicable Legislation	Relevant legislation
3	Survey Methodology	Details survey approach
4	Local Environment	Broad discussion of local environment and relevant threats
5	Impact Analysis	A review of the development and its impacts
6	Survey Results	Discussion of sites ecological character
7	Data Interpretation	A review of the sites biodiversity values against regional vegetation mapping and wildlife records.
8	Ecological Significance	Discussion of threatened species, EPs, EECs and sites significance
9	Proposed Mitigation	Identifies extent of mitigation works to compensate for the developments impacts
10	Impact Assessment	Reviews the developments impact against relevant legislation and the proposed mitigation package
11	Conclusions	Summary
12	References	Resources used to prepare EIA

1.6 Limitations

This EIA has quantified the biological character of the site through literature reviews, database searches, field survey and data interpretation. Substantial reliance has been placed on the accuracy of regional databases (i.e. Wildlife Atlas database and Lower Hunter Valley vegetation mapping), with efforts to minimise the influence of erroneous data considered during data interpretation (i.e exclusion of inaccurate data). Field surveys were designed to maximise data capture of locally occurring threatened species and their habitats relevant to the impacts of the development in addition to supplementing any perceived data gaps in the regional datasets.

The field survey and assessment components of this investigation have been undertaken in a manner that reflects the impacts of the proposed development in the context of the locality. Modifications to field survey design have been introduced, where necessary, to reflect the nature of the development impacts on the receiving environment. For instance, nocturnal fauna surveys may be modified or eliminated from the survey design where it can be suitably demonstrated that direct and/or indirect development related impacts would have no measurable affect on corresponding site and/or local habitat features.

An understanding of temporal variation resulting from seasonal change, which has not been sampled through site investigations, is based on the experience of the principal investigator and information contained within existing databases and vegetation mapping. Irreconcilable limitations placed on this report by data gaps and/or inaccuracies in these databases/ vegetation maps have been identified and quantified where relevant for consideration by the determining authority. Targeted surveys for cryptic and/or seasonal species such as ground orchids may be recommended as a consequence to ensure scientific certainty is established in the assessment process.

Report Validity

The contents of this report are limited by the relevant legislation, associated regulations and guidelines used in its compilation. Government and/ or government authorities periodically review this underlying framework where it may be amended or altered to reflect changes in government policy. Hence, any amendments to the assessment framework that arise after the published date of this report may potentially invalidate the stated conclusions. Accordingly, no warranty is placed on the contents of this report where it can be demonstrated that the assessment framework has been amended or changed subsequent to the reports' published date.

2.0 APPLICABLE LEGISLATION AND GUIDELINES

This section provides an overview of relevant State and Commonwealth legislation and guidelines concerning the assessment of flora and fauna matters.

2.1 State Legislative Framework

Development in NSW is subject to various planning instruments that regulate the use of lands containing vegetation and threatened species. The following are relevant to the development.

2.1.1 Environmental Planning and Assessment Act, 1979

Under the EP&A Act where development is on land that is, or is part of, critical habitat, or where development or an activity is likely to significantly affect threatened species, EPs or EECs and their habitats, the application for development consent or for approval to carry out the activity must be accompanied by a species impact statement (SIS). This document is to be prepared in accordance with the requirements of the *Threatened Species Conservation Act 1995* (TSC Act).

Section 5A of the EP&A Act sets out the matters that must be taken into account in deciding whether there is likely to be a significant effect on threatened species, EPs, EECs and their habitats. This assessment is often referred to as the "Assessment of Significance". The Assessment of Significance takes into account the biological issues in isolation of social and economic outcomes. A SIS integrates the social and economic significance of the development or activity into the assessment process.

2.1.2 Threatened Species Conservation Act, 1995

In addition to prescribing the requirements for preparation of a SIS, the TSC Act contains schedules listing endangered species, EPs and EECs, as well as vulnerable species and key threatening processes. It also provides for the keeping of a register of critical habitat, the granting of licences authorising actions leading to the harm of any threatened species, EP or EEC, the picking of any plant that is or is part of any threatened species, EP or EEC or damage to critical habitat or habitat of a threatened species, EP or EEC.

2.1.3 Native Vegetation Conservation Act 2003

The objects of this Act are:

(a) To provide for, encourage and promote the management of native vegetation on a regional basis in the social, economic and environmental interests of the State, and

(b) To prevent broadscale clearing unless it improves or maintains environmental outcomes,

(c) To protect native vegetation of high conservation value having regard to its contribution to such matters as water quality, biodiversity, or the prevention of salinity or land degradation,

(d) To improve the condition of existing native vegetation, particularly where it has high conservation value, and

(e) To encourage the revegetation of land, and the rehabilitation of land, with appropriate native vegetation.

in accordance with the principles of ecologically sustainable development, which can be faclilitated via a Property Vegetation Plan. A property vegetation plan submitted by a landholder may make provision for native vegetation management on the land to which it applies, including the following:

(a) Proposals for clearing native vegetation on the land,

(b) The identification of native vegetation on the land as regrowth;

(c) Proposals relating to the thinning of native vegetation in the central area of the State that has regrown between 1 January 1983 and 1 January 1990,

(d) Proposals to enable landholders to obtain financial incentives for the management of natural resources, being proposals relating to the carrying out or funding of native vegetation management activities by catchment management authorities or other bodies,

(e) Proposals relating to the continuation of existing farming or other rural practices,

(f) Provisions excluding clearing for routine agricultural management or other activities from being permitted clearing,

(g) Such other provisions as are prescribed by the regulations.

In the case of protecting biodiversity, it is considered that the most appropriate consideration would be point (d). Not withstanding the above as the project is a Part 3A State Significant Project the provisions of the Native Vegetation Act do not apply.

2.1.4 State Environmental Planning Policy No. 44 – Koala Habitat Protection

This State Environmental Planning Policy (SEPP) encourages the conservation and management of koala habitats in certain local government areas. This policy applies to lands located within Cessnock City Council LGA.

2.2 Commonwealth Legislative Framework

2.2.1 Environment Protection and Biodiversity Conservation Act, 1999

The *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) prohibits actions that are likely to have a significant impact on matters of national environmental significance (NES matters) without certain procedures first being followed. Matters of National Environmental Significance protected by the EPBC Act include, but are not restricted to:

- Declared World Heritage properties;
- Ramsar wetlands;
- Listed threatened species and communities;
- Listed migratory species;
- Nuclear actions; and
- Actions in a Commonwealth marine area.

It is an offence to carry out an action that will or is likely to have a significant impact on NES matters without first obtaining an approval from the Commonwealth Environment Minister except where an exemption in the EPBC Act applies. A person who is proposing to carry out an action that may have a significant impact on one of the above NES matters (and which is not the subject of an exception) is required to refer the proposed action to the Commonwealth Environment Minister. The Minister will determine as to whether the project is a "controlled action" (i.e. an action that requires the approval of, or the environmental assessment nominated by, the Environment Minister).

2.3 Survey Guidelines

Survey design was structured around relevant industry standards, this currently being the Working Draft Guidelines *Threatened Biodiversity Survey and Assessment: Guidelines for Developments and Activities*' (DEC 2004). As it is a guideline, various modifications to the survey protocols were applied where justification permits.

2.4 Relevant Matters

This EIA will consider the direct and indirect impacts of the transport corridor. Field surveys will be designed to capture sufficient data for the completion of an impact assessment for relevant local threatened biodiversity in accordance with the expected impact regime.

The impact assessment was completed in accordance with Section 5A of the EPA Act 1979 despite the development being a Part 3A Major Project, which is exempt from this section of the EPA Act 1979 (i.e. no

potential trigger for a SIS under the TSC Act). Recommendations for further environment assessment (i.e. referral to DEWC) will be provided in this report should it be predicted that the proposed development is likely to have a significant impact on matters of NES.

3.0 SURVEY AND ASSESSMENT METHODOLOGY

3.1 Desktop Analysis

3.1.1 Database Searches

DECs Wildlife Atlas database records contained within a 10 km radius of the site were analysed to identify the threatened biodiversity of the study area (DEC, 2007). Similarly, a 10 km point search of the EPBC Act 1999 online 'Protected Matters Database' (i.e. DEWC, 2007) was also generated to identify relevant matters of NES. These searches have resulted in a list of threatened biodiversity collectively referred to as 'Potential Subject Species'. The results summary of this search is provided in **Appendix 1**.

3.1.2 Literature Review

A review of recent flora and fauna reports of the locality was completed to compliment the database searches, assist the classification of the sites biological values and 'Subject Species'. Data and literature reviewed in addition to standard biodiversity references include:

- Vegetation mapping prepared by the Hunter Central River Catchment Management Authority titled *Vegetation of the Central Hunter Valley, New South Wales*; (NPWS, 2003);
- NPWS (2003). Vegetation Extant Mapping of the Lower Hunter and Central Coast Region;
- NPWS (2000). *Werakata National Park: Vegetation Survey for Fire Management*;
- HLA (2001). *Flora and Fauna Report - Proposed Chitter Reprocessing at Hebburn No. 3 Colliery, Cessnock LGA.* Report Prepared for Hunter Enviro-Mining Pty Ltd, Waitara.
- HLA (2003a). *Flora and Fauna Report – Proposed chitter collection from various locations within the Cessnock to Kurri Kurri locality.* Report prepared for Hunter-Enviro Mining (Operations) Pty Ltd.
- HLA (2003b). *Threatened Species Assessment – Chitter collection from various sites within the Cessnock to Kurri Kurri locality.* Report prepared for Hunter-Enviro Mining (Operations) Pty Ltd.
- Ecovision Consulting (2005). *Recovery of Emplaced carbonaceous materials from abandoned coal mine surface facilities within the Cessnock locality.* Referral to the Department of Environment and Heritage, Canberra.
- NSW ecosystems study: background and methodology (Mitchell, 2002); and
- Mitchell Landscapes with per cent cleared estimates, listed by CMA (http://www.nationalparks.nsw.gov.au/npws.nsf/Content/BioMetric_tool).

Threatened biodiversity identified by these sources that were not identified by database searches may also be considered 'Potential Subject Species' (e.g. species that do not have known database records within study area but are known to occur within landscapes and/or vegetation types of the study area).

3.2 Impact Analysis

The likely impacts associated with the proposed development were spatially and temporally quantified to assist the establishment of assessment assumptions, hence facilitate the completion of the impact assessment. Impacts were quantified using area statements and terms such as 'direct', 'indirect', 'temporary' and 'permanent', with the overall classification of these impacts termed 'Impact Intensity'. 'Impact Intensity' or 'Likelihood' is defined as follows in **Table 2**.

Table 2: Likelihood Scale

Likelihood Label	Description
A	Impact on core habitat (i.e. breeding and foraging habitat)
B	Impact on secondary habitat (i.e. breeding or foraging only)
C	Impact on habitats other than core/ secondary habitat.

3.3 Preliminary Risk Analysis

In terms of this assessment, 'Risk' is defined as the relationship between 'Impact Intensity' (i.e. temporal and spatial extent of direct and indirect impacts) and 'Impact Consequence' (i.e. range from 'no impact' to 'local extinction'). Consequence is defined as follows in **Table 3**.

Table 3: Consequence Scale

Consequence Label	Predicted Event	Description
5	Local Extinction	Development impacts result in loss and/or modification of known habitat that leads to the local extinction of a viable local population within the study area.
4	Local extinction within 10 years	Development impacts result in a cumulative loss and/or modification of known or potential habitat that threatens the short term viability of a local population within the study area.
3	Local extinction within 50 years	Development impacts result in a cumulative loss and/or modification of known or potential habitat that threatens the medium term viability of a local population within the study area.
2	Threatened biodiversity decline	Development impacts result in a cumulative loss and/or modification of known or potential habitat that threatens the long term viability of a local population within study area.
1	Minimal impact	Development results in no measureable loss and/or modification of known and/or potential threatened biodiversity values.

The preliminary risk analysis was completed for each 'Potential Subject Species' prior to the undertaking of site surveys and impact assessment to identify threatened biodiversity at greatest risk of being impacted by the proposed development. The level of risk has been derived from the 'likelihood – consequence' risk matrix shown in **Table 4**.

Table 4: Preliminary Risk Matrix

Likelihood	Consequence Label				
Label	1	2	3	4	5
A	Low	Medium	High	Extreme	Extreme
B	Low	Low	Medium	High	Extreme
C	Low	Low	Low	Medium	High

The preliminary risk analysis has consequently provided the basis for justifying the scope and extent of field survey methodology. The risk scores identified in **Table 4** have the following implications in terms of survey methodology:

- Extreme – Detailed systematic survey methods including seasonal sampling;
- High – Detailed systematic survey methods considering seasonal sampling;
- Medium – Targeted systematic sampling, for at least one season;
- Low – Minimum survey methods, sampling intensity and replication.

3.4 Subject Species

The results of the preliminary risk analysis were combined with an individual landscape based analysis of each 'Potential Subject Species' to formulate a 'Subject Species' list. Landscape analysis included the use of spatial datasets such as regional vegetation mapping, Mitchell Landscapes and the Wildlife Atlas Database to determine potential occurrence within the site. Other factors were also integrated into the assessment such as natural distributions, specific habitat requirements (e.g. aquatic environs, seasonal nectar, tree hollows etc), geological preferences (i.e. tertiary sandstones, Permian conglomerates etc) and geographical preferences (i.e. ridgetops, coastal headlands, midslopes etc). The analysis pemitted the identification of 'Subject Species', with species not considered 'Subject Species' being eliminated from the impact assessment.

3.5 Field Survey

The field survey was conducted in accordance with DECs working draft *Threatened Biodiversity Survey and Assessment: Guidelines for Developments and Activities* (DEC 2004), as modified by the preliminary risk assessment. The details of the survey extent are as follows.

3.5.1 Flora Survey Methods

An investigation of the sites floristic content and spatial distribution was completed via a sampling regime involving systematic and opportunistic survey methods defined as follows:

Systematic: Observations collected within predefined sample areas (i.e. quadrats) through a stratified random sampling regime restricted to landscapes with relatively homogenous aspect, slope, soil type/ geology, vegetation cover and topographic position. Sample locations were were predominantly defined through image analysis (i.e. satellite and/or aerial imagery). Sample replicates were used to assist the identification of characteristic species, with increased replicate samples obtained from native vegetation types with large aerial extent. Edges or boundaries between homogenous landscapes were not sampled due to potential edge effects.

Opportunistic: Observations collected from heterogenous landscapes such as disturbed areas or edges/ boundaries between homogenous landscapes. Opportunisitc observations are generally biased by the observer's position within the landscape and the perception of species importance (*i.e.* observer bias). Opportunistic observations often represent the result of targeted surveys for threatened and/or seasonal species such as ground orchids. While these observations do not provide meaningful input in defining homogenous vegetation units, they are useful in ascertaining floristic variability, particularly in disturbed areas or ecotones (i.e. edges).

The combination of these two sampling methods provides opportunity to define the floristic character of the site vegetation cover and the extent of floristic diversity

Minimum Sampling

A minimum of three systematic samples (*ie* quadrat or transect) was placed within each landscape unit. Non-systematic survey methods (*ie* biodiversity searches) were generally restricted to areas linking systematic survey sites and/or areas designed to target cryptic, seasonal and/or threatened biodiversity.

3.5.2 Fauna Survey Methods

An investigation of the sites fauna composition was completed using systematic and opportunisitic diurnal survey methods complimenting the flora survey. Systematic surveys involved timed observation points covering an area of at least 1 ha within grassy woodlands and 1000 m^2 in shrubbier landscapes.

4.0 LOCAL ENVIRONMENT

4.1 General Site Characteristics

Table 5 describes the general biophysical characteristics of the site.

Table 5: Biophysical Characteristics of the Site

Attribute	Comment
Landforms	midslopes and ridges.
Geology	Both the midslopes and ridges consist primarily of Permian aged sedimentary deposits including sandstone, mudstone, siltstone, shale and conglomerate with tuff, limestone and outcropping coal.
Mitchell Landscapes	Central Hunter Footslopes (dominant) and Newcastle Coastal Ramp (residual).
Vegetation Cover	Site vegetation consists of native forest/ woodland and derived grassland formations. The forest/ woodland vegetation formations are largely restricted to the sites Lower Hunter Spotted Gum Ironbark Forest vegetation type, with the derived grasslands predominantly located throughout cleared areas that immediately adjoin track margins.

4.2 Biological Characteristics

4.2.1 Mitchell Landscapes

The site contains both the Central Hunter Footslopes and Newcastle Coastal Ramp Mitchell Landscapes (Mitchell, 2002) within the Hunter Central Rivers catchment area. The Central Hunter Footslopes Mitchell Landscape is an overcleared landscape (i.e. 79% of pre-European vegetation cover removed from landscape) that is generally characterised by scattered vegetation remnants amidst rural (e.g. livestock grazing and viticulture) and mining land uses. Details of locally occurring Mitchell Landscapes in order of relevance to the site are listed in **Table 6**.

Table 6: Mitchell Landscapes of the Study Area

Landscape	Portion in Study Area (ha/%)	Percent Cleared
Central Hunter Foothills	26049 (8.2%)	79%
Newcastle Coastal Ramp	21293 (13.6%)	57%
Lower Hunter Channels and Floodplains	1266 (4.3%)	93%
Watagan Ranges	6198 (5.4%)	11%
Central Hunter Alluvial Plains	2107 (7%)	91%

Keith (2004) vegetation classes commonly contained within the Central Hunter Footslopes Mitchell Landscape include Hunter Macley Dry Sclerophyll Forest and Sydney Sand Flats Dry Sclerophyll Forest. Details of these vegetation classes are provided in **Table 7**.

Table 7: Predominant Vegetation Formations within the Locality

Vegetation Classes (Keith, 2004)	Native plant species richness	Native overstorey cover	Native mid Storey Cover %	Native Groundcover (grasses) %	Native Groundcover (shrubs) %	Number of Trees with Hollows
Hunter-Macleay Dry Sclerophyll Forests	38	10 - 40	4 - 40	30 - 60	3 - 15	1.2
Sydney Sand Flats Dry Sclerophyll Forests	26	35 - 40	10 - 50	4 - 15	5 - 30	0.8

4.2.2 Flora

Vegetation Communities

Regional vegetation mapping covering the Cessnock locality indicates vegetation cover largely characterised by open woodland, shrublands and grassy woodland vegetation types on the valley floor

and shrubby woodlands and open forest on stepper slopes and ridgelines (NPWS, 2003). Vegetation communities occurring within the study area are shown in **Figure 3** with **Table 8** identifying the coverage of these vegetation types.

Table 8: Vegetation Communities of the Study Area

Vegetation Community	Area (ha)	Proportion of Total Area (%)
Lower Hunter Spotted Gum - Ironbark Forest	20534.36	64.46
Hunter Lowland Redgum Forest	3935.26	54.71
Kurri Sand Swamp Woodland	2447.99	100.00
Central Hunter Riparian Forest	533.207	56.94
Alluvial Tall Moist Forest	1692.24	26.22
Coastal Foothills Spotted Gum - Ironbark Forest	2492.24	11.81
Coastal Plains Smooth-barked Apple Woodland	3681.81	10.24
Hunter Valley Moist Forest	219.618	4.04
Freshwater Wetland Complex	104.012	2.67
Coastal Narrabeen Moist Forest	234.785	0.75
Coastal Wet Gully Forest	106.728	0.73
Hunter Range Grey Gum Forest	60.378	0.13
Coastal Warm Temperate- Subtropical Rainforest	24.991	0.86
Swamp Oak Rushland Forest	16.075	0.62
Coastal Ranges Open Forest	15.429	0.08
Hunter Valley Dry Rainforest	6.597	0.56
Riparian Melaleuca Swamp Woodland	1.208	0.03
Sheltered Rough Barked Apple Forest	0.871	0.02

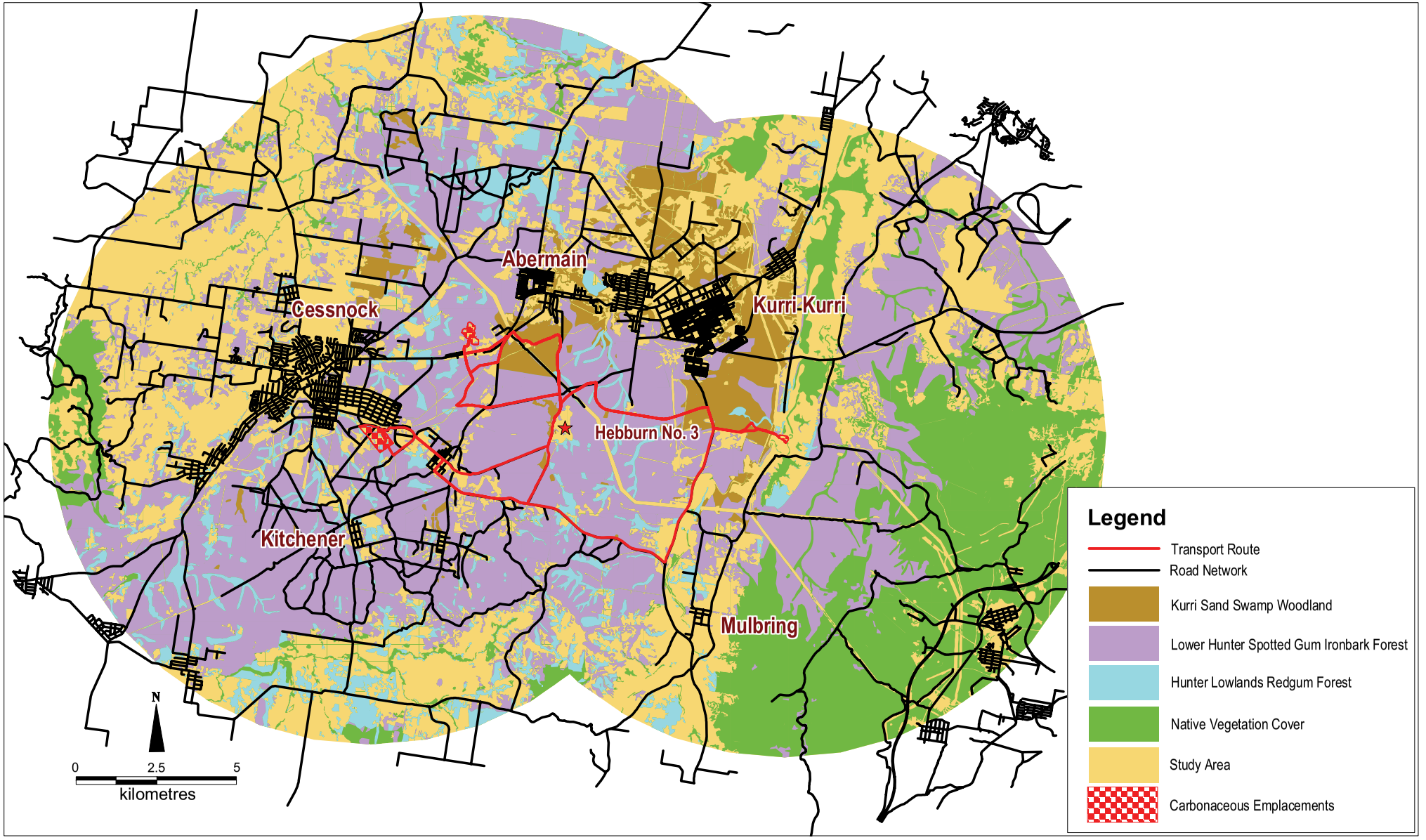
Native vegetation of the locality has been classified into at least five flora communities (NPWS, 2003; HLA, 2001a; HLA, 2001b; HLA, 2002a; HLA, 2002b; HLA, 2003; NSW Scientific Committee, 2002). Flora communities known to occur within the Cessnock – Kurri Kurri locality include the following:

- Coastal Foothills Spotted Gum – Ironbark Forest;
- Lower Hunter Spotted Gum – Ironbark Forest;
- Kurri Sands Swamp Woodland;
- Hunter Lowlands Red Gum Forest; and
- Hunter Valley Moist Forest.

These flora communities are predominantly restricted to the Lower Hunter, where they form a mosaic of small, medium and large sized remnants amidst rural residential developments, agricultural land and coal mining leases. Connectivity between remnants varies in accordance with the intensity of these land uses.

Threatened species are also present within the general locality (DEC, 2006; HLA, 2001a; HLA, 2001b; NSW Scientific Committee, 2002; HLA, 2003a; HLA 2003b). The following species are known to be present within the general locality:

- *Acacia bynoeana;*
- *Cryptostylis hunteriana;*
- *Grevillea parviflora subsp. parviflora;*
- *Eucalyptus glaucina;*
- *Eucalyptus parramattensis ssp. decadens;*
- *Persoonia pauciflora;*



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Figure 3

Distribution of ESUs throughout the Study Area (NPWS, 2003)

Plan: E:\Mapping\HEM\Figure_4_1
Date: 29 September 2006
Drafted by: Mark Aitkens
Base Layers: Resource boundaries and transport routes supplied by Wells Environmental Services
Vegetation mapping suppied by the LHCCREMS (NPWS, 2003)

- *Rutidosis heterogama; and*
- *Tetratheca juncea.*

Kurri Sand Swamp Woodland, Hunter Lowlands Red Gum Forest, Lower Hunter Spotted Gum Ironbark Forest and Quorrobolong Scribbly Gum Woodland are EEC's with known occurrences within the general locality (DEC, 2006; HLA, 2001a; HLA, 2003a).

Floristic Diversity

Approximately 584 flora species of mostly native origin (i.e. 467 natives and 117 exotics) have been identified within the study area (DEC, 2007), with 7 being listed threatened species. Furthermore, Lower Hunter Spotted Gum Ironbark Forest is known to contain 8 threatened flora species throughout its mapped distribution (NPWS, 2003; DEC, 2007).

4.2.3 Fauna

Wildlife Atlas Database records indicate historical observations of at least 320 fauna species within the study area consisting of 302 native and 18 exotic species, with at least 35 being listed threatened species. Furthermore, Lower Hunter Spotted Gum Ironbark Forest is known to contain 36 threatened species throughout its mapped distribution (DEC, 2007 ; NPWS, 2003).

A range of broad fauna habitat classes has been identified throughout the locality that provides opportunity for a range of faunal activity such as seasonal foraging and breeding. These classes are listed as follows:

- Woodland and open forest tree canopy dominated by Eucalypt species of dry sclerophyll environs;
- Open to dense shrublands dominated mostly by species of dry to moist sclerophyll environs belonging to the families Myrtaceae and Fabaceae;
- Sparse to open groundcovers dominated by grasses and woody herbs of dry to moist environs;
- Semi-permanent to ephemeral open/closed depressions dominated by a mix of native and exotic sedges and herbs; and
- Exotic grasses and herbs of disturbed cleared environs.

Microhabitat features characterising these general habitat classes are listed as follows:

- Tree branches;
- Pollen and nectar producing plants, principally Teatree, Melaleuca and Eucalypts;
- Sparse to moderate distribution of fallen timber and bark;
- Scattered tree hollows;
- Isolated accumulations of waste including household items, corrugated iron and masonry; and
- Ephemeral to semi-permanent pools of water.

Notably absent from the locality are wet sclerophyll forests and surface rock formations, which represent important discrete habitat values for selected fauna species.

Presented below is a description of the local fauna habitats in terms of common local faunal assemblages.

Reptilian Habitat

Many reptile species of the Sydney Basin Bioregion are reliant on ground shelters for protection against predators and climatic extremes. Reptiles commonly use rock outcrops or loose surface rock as a shelter resource, which is largely absent from the local area due primarily to the unfavourable geological setting (i.e. Permian formation). The absence of these habitat features disadvantages many small shelter dependent reptiles such as the Striped Skink (*Ctenotus robustus*), Copper-tailed Skink (*Ctenotus taeniolatus*) and Yellow-faced Whip Snake (Demansia psammophis). However, the presence of scattered household / building waste and fallen timber has partially compensated for the absence of this habitat

feature, with isolated populations often found beneath scattered debris. Common species that utilise leaf litter and fallen timber are more common throughout the locality and include species such as Sun Skink (*Lampropholis delicata*) and Three-toed Skink (*Saophis equalis*).

In contrast, arboreal species such as the Barred Skink (*Eulamprus tenuis*) and Wall Skink (*Cryptoblephrus virgatus*) are expected to occur throughout the locality due to the presence of suitable shelter sites that are assocaited with roughbarked trees (i.e. ironbarks) and tree hollows. Termite nests elevated with the tree canopy also provides habitat for these species and the common Goanna (Vanarus varius), which may utilise this habitat feature for breeding purposes. Tree snakes are likely to be restricted to thick vegetation located along moist creeklines, which also provides potential habitat for the Eastern Water Skink (*Eulamprus quoyii*).

Amphibian habitat

The locality is typically characterised by dry terrestrial environs, which generally diminishes the abundance or density of amphibian populations. Species locally suited to these dry terrestrial environs include burrowing amphibians such as the Banjo Frog (*Limnodynastes dumerilii ssp. grayi*), Smooth Toadlet (*Uperoleia laevigata*) and Brown Toadlet (*Psuedophryne bibronii*). 'Tree' dwelling species are also common throughout the locality, particularly in areas where a permanent water supply exists (i.e. farm dams). The Perons Tree Frog (*L. peronii*) is perhaps the most common arboreal amphibian species of the locality.

Avifauna habitat

Foraging resources for nectivores are abundant during the summer/ autumn period in the form of Melaleucas, Teatree, Eucalyptus and Angophora. Honeyeaters and small shrubland-heath avifauna species such as thornbills and wrens are regularly observed throughout open forests and woodlands with a moderately dense shrub understorey. Species principally observed within these habitats including Whistlers, Noisy Friar Birds, Pied Butcherbird and Noisy Miner.

The low density of hollow bearing trees substantially limits the extent of avifauna activity to generalists capable of occupying a variety of habitats. Species dependant on trees with hollows for breeding events will be restricted to relatively undisturbed multiaged vegetation. Common hollow dependant species found within the locality include the Kookaburra and White-throated Treecreeper. Owls and various large parrots/ cockatoos will exhibit a patchy local distribution governed by the presence of large tree hollows, a habitat feature that has been adversely influenced by past mining activities.

Specialist foraging resources for the Glossy-black Cockatoo, such as sheoaks (i.e. Allocasuarina torulosa, A. distyla or A. littoralis), are of limited occurrence within the locality indicating limited support foraging or breeding populations of this threatened species. Conversely, the locality appears to represent an important place for honeyeaters (e.g. Regent Honeyeater and Black-chinned Honeyeater) and the Swift Parrot (*Lathamus discolor*). Foraging activity by these species is generally associated with nectar flows from Spotted Gum (*Corymbia maculata*) and sugary secretions from leaf insects (i.e. lerps).

Mammal Habitat

Mammalian habitat of the site can be separated into three distinct types, these being:

- Woodlands and forest;
- Shrubland; and
- Open grasslands.

The first two habitat types consist of natural vegetation of varying structural complexity and floristic diversity. While both these habitat zones have been disturbed by utility installations and past mining activities, they do provide foraging grounds for common ground-dwelling species. Generalists are likely to be the principal occupants of these habitat types, such as the Bush Rat (*Rattus fuscipes*), Black Rat (*R. rattus*) and Brown Antechinus (*Antechinus stuartii*). Habitat features such as scrap metal, scattered wood,

exotic grasses, shrubs and herbs and various other discarded items also provide important shelter habitat for common rodents.

Medium sized mammals such as the European Fox (*Vulpes vulpes*) and Swamp Wallaby (*Wallabia bicolour*) also utilise these habitats. Rabbits (*Oryctolagus cuniculus*) are also common throughout the locality, particularly along disturbed vegetation boundaries that adjoin cleared grasslands. The Long-nosed Bandicoot (*P. nasuta*) is also known to occupy these disturbed boundaries in addition to forests and woodlands with dense shrub understorey.

The woodland and forest habitats also provide foraging grounds for arboreal species such as microchiropteran bats and possums. Foraging habitat within the tree canopy is suitable for two regionally common arboreal species being the Sugar Glider (*Petaurus breviceps*) and Ringtail Possum (*Pseudocheirus peregrinus*).

4.3 Potential Subject Species

4.3.1 Flora

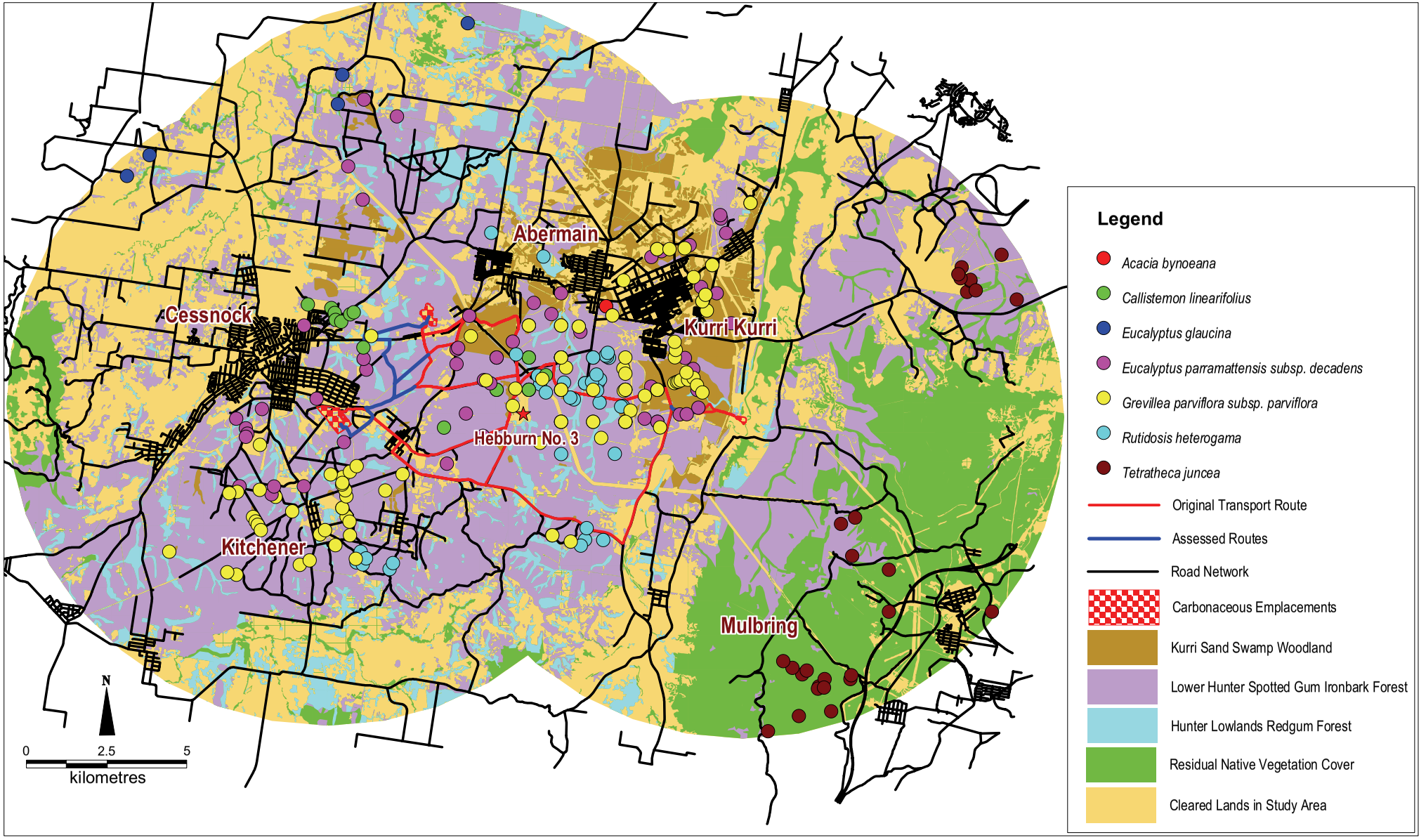
Database searches identified 17 threatened flora species within the study area (DEC, 2007 ; EPBC Protected Matters Report, 2007). A spatial analysis of database records against the Central Hunter Foothills Mitchell Landscape and Central Hunter Box – Ironbark Woodland vegetation type (NPWS, 2003) identified a further 14 threatened flora for consideration. **Table 9** lists the database and spatial query results, with the distribution of locally occurring threatened species shown in **Figure 4**.

Table 9: Potential Subject Species – Flora

Common Name	Scientific Name	TSC Act	EPBC Act	Database Records			Potential Subject Species
				Study Area	Mitchell Landscape	Veg Type	
Bynoe's Wattle	*Acacia bynoeana*	E1	V	5	3	3	Yes
Parramatta Redgum	*Eucalyptus parramattensis subsp. decadens*	V	V	62	26	26	Yes
Narrow-leaved Bottlebrush	*Callistemon linearifolius*	V		21	11	15	Yes
Slaty Redgum	*Eucalyptus glaucina*	V	V	6	19	1	Yes
Small-flowered Grevillea	*Grevillea parviflora subsp. parviflora*	V	V	94	38	59	Yes
	Rutidosis heterogama	V	V	45	9	38	Yes
Black-eyed Susan	*Tetratheca juncea*	V	V	23	0	7	Yes
Rough-barked Apple	*Angophora inopina*	V	V	0	0	0	No
Leafless Tongue Orchid	*Cryptostylis hunteriana*	V	V	0	0	0	No
Pokolbin Mallee	*Eucalyptus pumila*	E1		0	2	0	No
North Rothbury Geebung	*Persoonia pauciflora*	E1	E	0	48	38	No
Tiger Orchid	*Cymbidium canaliculatum*	E2		0	2	0	Yes
	Pterostylis gibbosa	E1		0	4	0	Yes

4.3.2 Fauna

Database searches identified 21 threatened flora species within the study area (DEC, 2007 ; EPBC Protected Matters Report, 2007). A spatial analysis of database records against the Central Hunter Foothills Mitchell Landscape and Central Hunter Box – Ironbark Woodland vegetation type (NPWS, 2003) identified a further 18 threatened fauna for consideration. **Table 10** lists the database and spatial query results, with the distribution of locally occurring threatened species shown in **Figure 5**.

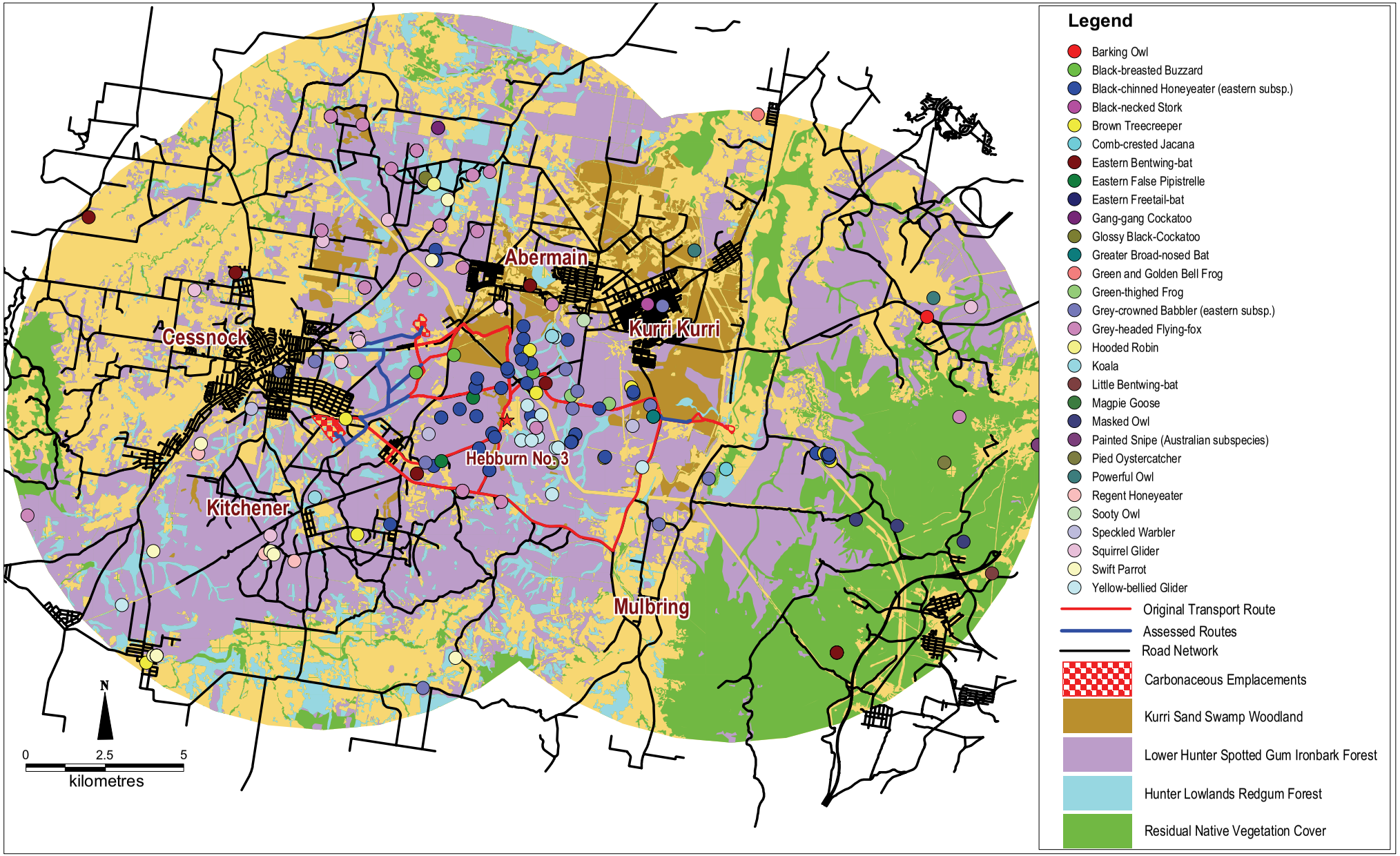


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Figure 4

Threatened Flora of the Study Area (DEC, 2006)

Plan: E:\Mapping\HEM\Figure_4
Date: 3 September 2007
Drafted by: Mark Aitkens
Base Layers: Resource boundaries and transport routes supplied by Wells Environmental Services
Threatened Species (DEC, 2006)



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Figure 5

Threatened Fauna of the Study Area (DEC, 2006)

Plan: E:\Mapping\HEM\Figure_5
Date: 3 September 2007
Drafted by: Mark Aitkens
Base Layers: Resource boundaries and transport routes supplied by Wells Environmental Services
Threatened Species (DEC, 2006)

Table 10: Potential Subject Species - Fauna

Common Name	Scientific Name	TSC Act	EPBC Act	Database Records			Potential Subject Species
				Study Area	Mitchell Landscape	Veg Type	
Stuttering Frog	*Mixophyes balbus*	E1	V	0	0	0	No
Giant Barred Frog	*Mixophyes iteratus*	E1	E	0	3	0	No
Green and Golden Bell Frog	*Litoria aurea*	E1	V	1	7	0	No
Green-thighed Frog	*Litoria brevipalmata*	V		2	0	2	No
Littlejohn's Tree Frog	*Litoria littlejohni*	V	V	0	0	0	No
Blue-billed Duck	*Oxyura australis*	V		0	0	1	No
Freckled Duck	*Stictonetta naevosa*	V		0	0	4	No
Jabiru	*Ephippiorhynchus asiaticus*	E1		4	1	1	No
Red Goshawk	*Erythrotriorchis radiatus*	E1		1	3	0	Yes
Black-breasted Buzzard	*Hamirostra melanosternon*	V		3	1	2	Yes
Osprey	*Pandion haliaetus*	V		0	0	1	No
Australian Painted Snipe	*Rostratula benghalensis*	E1	V	2	0	1	No
Comb-crested Jacana	*Irediparra gallinacea*	V		21	0	2	No
Wompoo Fruit-Dove	*Ptilinopus magnificus*	V		1	0	0	No
Superb Fruit-Dove	*Ptilinopus superbus*	V		0	0	1	No
Gang-gang Cockatoo	*Callocephalon fimbriatum*	V		13	4	8	Yes
Glossy Black-Cockatoo	*Calyptorhynchus lathami*	V		15	14	18	Yes
Swift Parrot	*Lathamus discolor*	E1	E	56	15	30	Yes
Turquoise Parrot	*Neophema pulchella*	V		8	1	4	No
Barking Owl	*Ninox connivens*	V		2	4	2	No
Powerful Owl	*Ninox strenua*	V		10	3	10	Yes
Masked Owl	*Tyto novaehollandiae*	V		7	6	4	Yes
Sooty Owl	*Tyto tenebricosa*	V		1	0	0	Yes
Brown Treecreeper	*Climacteris picumnus*	V		51	54	44	Yes
Speckled Warbler	*Pyrrholaemus sagittatus*	V		11	67	9	Yes
Black-chinned Honeyeater	*Melithreptus gularis gularis*	V		53	17	49	Yes
Regent Honeyeater	*Xanthomyza phrygia*	E1	E	19	27	13	Yes
Painted Honeyeater	*Grantiella picta*	V		0	7	0	Yes
Hooded Robin	*Melanodryas cucullata*	V		2	31	0	Yes
Grey-crowned Babbler	*Pomatostomus temporalis temporalis*	V		33	109	33	Yes
Diamond Firetail	*Stagonopleura guttata*	V		1	42	1	Yes
Spotted-tailed Quoll	*Dasyurus maculatus*	V	E	0	16	1	Yes
Koala	*Phascolarctos cinereus*	V		5	10	45	Yes
Yellow-bellied Glider	*Petaurus australis*	V		23	4	14	Yes
Squirrel Glider	*Petaurus norfolcensis*	V		26	33	24	Yes
Brush-tailed Rock-wallaby	*Petrogale penicillata*	E1	V	0	12	0	Yes
Grey-headed Flying Fox	*Pteropus poliocephalus*	V	V	34	31	23	Yes
Yellow-bellied Sheathtail-bat	*Saccolaimus flaviventris*	V		0	0	2	Yes
Eastern Freetail Bat	*Mormopterus norfolkensis*	V		11	23	10	Yes
Eastern False Pipistrelle	*Falsistrellus tasmaniensis*	V		3	2	4	Yes
Little Bentwing Bat	*Miniopterus australis*	V		5	0	6	Yes
Eastern Bentwing Bat	*Miniopterus schreibersii*	V		12	0	13	Yes
Large-footed Myotis	*Myotis adversus*	V		1	3	2	No
Greater Broad-nosed Bat	*Scoteanax rueppellii*	V		3	2	3	Yes

Common Name	Scientific Name	TSC Act	EPBC Act	Database Records			Potential Subject Species
				Study Area	Mitchell Landscape	Veg Type	
Large-eared Pied Bat	*Chalinolobus dwyeri*	V	V	0	0	0	No
Eastern Cave Bat	*Vespadelus troughtoni*	V	V	0	3	0	No
Hastings River Mouse	*Pseudomys oralis*	E1		0	0	0	No

Table 10 identifies 15% of the threatened fauna species occurring within the study area as also occurring within Lower Hunter Spotted Gum Ironbark Forest and Central Hunter Footslopes Mitchell landscape. These findings are generally consistent with conclusions from local studies conducted within this vegetation type.

4.3.3 Ecological Communities

Three communities listed as endangered occur within the locality, these being Lower Hunter Spotted Gum – Ironbark Forest, Kurri Sands Swamp Woodland and Hunter Lowlands Redgum Forest (i.e. TSC Act). Descriptions are as follows:

Lower Hunter Spotted Gum Ironbark Forest EEC

Lower Hunter Spotted Gum – Ironbark Forest in the Sydney Basin Bioregion is the name given to the ecological community that occurs principally on Permian geology in the central to lower Hunter Valley. This community occurs on Permian substrates and is typically dominated by Spotted Gum (*Corymbia maculata*) and Broad-leaved Ironbark (*Eucalyptus fibrosa*) with the occasional presence of Grey Gum (*E. punctata*) and Narrow-leaved Ironbark (*E. crebra*) as minor associates.

The understorey is characterised by the tall shrub, *Acacia parvipinnula,* and by the prickly shrubs, *Daviesia ulicifolia, Bursaria spinosa, Melaleuca nodosa* and *Lissanthe strigosa*. Other shrubs include *Persoonia linearis, Maytenus silvestris* and *Breynia oblongifolia*. The ground layer is diverse; frequent species include *Cheilanthes sieberi, Cymbopogon refractus, Dianella revoluta, Entolasia stricta, Glycine clandestina, Lepidosperma laterale, Lomandra multiflora, Microlaena stipoides, Pomax umbellata, Pratia purpurascens, Themeda australis* and *Phyllanthus hirtellus* (NSW Scientific Committee 2005). In an undisturbed condition the structure of the community is typically open forest. If thinning has occurred, it may take the form of woodland or a dense thicket of saplings, depending on post-disturbance regeneration.

Threatened species recorded within this community include *Callistemon linearifolius*, *Grevillea parviflora* subsp. *parviflora*, *Persoonia pauciflora, Rutidosis heterogama,* Swift Parrot (*Lathamus discolor*), Turquoise Parrot (*Neophema pulchella*(, Glossy Black Cockatoo (*Calyptorhynchus lathami*), Regent Honeyeater (*Xanthomyza phygria*), Black-chinned Honeyeater (*Melithreptus gularis gularis),* Brown Treecreeper (*Climacteris picumnus victoriae*), Powerful Owl (*Ninox strenua*), Koala (*Phascolarctos cinereus*), Yellow-bellied Glider (*Petaurus australis*), Squirrel Glider (*Petaurus norfolcensis*), Common Bent-wing Bat (*Miniopterus schreibersii*) and Eastern Free-tail Bat (*Mormopterus norfolkensis*) (NSW Scientific Committee, 2005).

Approximately 1600 hectares of Lower Hunter Spotted Gum – Ironbark Forest in the Sydney Basin Bioregion occurs within Werakata National Park. This represents less than 2.5% of the community's modelled pre-1750 distribution, which is distributed among several separate patches and is predominantly young regrowth forest. Of an estimated 2800 ha of the community currently within State Forests, approximately 1770 ha is excluded from timber harvesting in Forest Management Zone reserves, although these areas may be subject to development of service easements, transport infrastructure and mineral exploration. Within the Hunter Employment Zone (HEZ), 460 ha of Lower Hunter Spotted Gum – Ironbark Forest is estimated to occur within zone 7(b) 'Environmental Protection'. However, 7(b) zoning does not exclude development for rural properties (buildings, roads, fences, bush fire hazard reduction) and coal mining (NSW Scientific Committee, 2005).

Kurri Sand Swamp Woodland

Kurri Sand Swamp Woodland is the name given to the ecological community that occurs on soils developed over poorly-drained Tertiary sand deposits that blanket Permian sediments around Kurri Kurri. All sites are within the Sydney Basin Bioregion. Kurri Sand Swamp Woodland is a low open-woodland to low woodland and open scrub characterised by *Eucalyptus parramattensis* subsp. *decadens*, *Angophora bakeri* and occasionally *Eucalyptus signata* and *Eucalyptus sparsifolia*. The shrubby stratum is typified by *Melaleuca nodosa, Banksia spinulosa, Dillwynia retorta, Jacksonia scoparia, Hakea dactyloides, Acacia ulicifolia* and *Lambertia formosa* and merges into the ground layer. The ground layer has grasses and low shrubs such as *Entolasia stricta, Pimelea linifolia, Lissanthe strigosa* and *Melaleuca thymifolia*. A considerable number of ground orchid species have been recorded in the area.

Kurri Sand Swamp Woodland has been fragmented and is subject to weed invasion and ongoing disturbances. Threats include increased urbanisation, transport and utility corridors, industrial development, changes to drainage conditions, weed invasion, rubbish dumping and inappropriate fire regimes. Its presence within conservation reserves is limited to Werakata National Park, which contains approximately 275 ha or 11% of the current mapped area (NPWS, 2003).

Hunter Lowlands Redgum Forest

Hunter Lowland Redgum Forest has been recorded from the local government areas of Maitland, Cessnock and Port Stephens (in the Sydney Basin Bioregion) and Muswellbrook and Singleton (in the NSW North Coast Bioregion). This community is generally an open forest with the most common canopy trees species being Forest Redgum (*E. tereticornis*) and Grey Gum (*E. punctata*). Other canopy species such as Spotted Gum (*C. maculata*), Narrow-leaved Ironbark (*E. crebra*) and Grey Box (*E. moluccana*) may occur as associates in the local area. The mid stratum is characterised as open with sparse shrubs of *Breynia oblongifolia, Leucopogon juniperinus, Daviesia ulicifolia* and *Jacksonia scoparia*. There is consistently a ground layer of grasses and herbs, characterised by *Microlaena stipoides* var. *stipoides, Cymbopogon refractus, Echinopogon caespitosus var. caespitosus, Cheilanthes sieberi* subsp. *sieberi* and *Pratia purpurascens*.

Modelling included in NSW NPWS (2000) shows that much of the pre-1750 extent of the community has been cleared. Only about 27% (less than 500 ha) of the original distribution survives and this is highly fragmented. Currently only a small area (306 ha) of Hunter Lowland Redgum Forest in the Sydney Basin and NSW North Coast Bioregions is included in NPWS estate, this being Wereketa National Park. The majority of the remainder of the community is not on public land (NSW Scientific Committee, 2001).

4.4 Vegetation Remnants

The local area is predominantly characterised by rural landuses supporting livestock grazing and vineyard development throughout an extensively cleared valley floor landscape. Recent native vegetation cover mapping for the lower Hunter Valley (NPWS, 2003) indicates the study area to contain approximately 36,103 ha of native vegetation cover or 62.5% of the pre-European extent. At least 86% of this vegetation cover is contained within medium to large sized remnants (i.e. remnants greater than 40 ha in area) with 3,185 ha or 9% contained within Werekata National Park.

Approximately 1,409 vegetation remnants occur within the study area, with remnant size ranging from 0.1 to 4,648 ha (NPWS, 2003). The average remnant size is approximately 25.3 ha, with 1,305 of the vegetation remnants in the study area having an aerial extent less than the average. **Table 11** tabulates these results.

Table 11: Vegetation Remnants within the Central Hunter Foothills Mitchell Landscape

Remnant Size Class (ha)	Total Area (ha)/ Average Area (ha)	Number of Remnants
<10	2,201 (1.8)	1,202
10-40	2,693 (20.7)	130
40-100	1,922 (60.1)	32
>100	29,288 (650.8)	45
Total	*36,103*	*1,409*

4.5 Wildlife Connectivity

Land uses throughout the Central Hunter Foothills Mitchell Landscape are predominantly agricultural and mining focused, with both having an influence on the biological character of the Cessnock local area. Approximatly 37.5% of native vegetation occurring within the locality has been displaced/ cleared by activities such as urban development, mining, livestock grazing and cropping.

Connectivity between vegetation remnants varies with anthropogenic (human) land use intensity, with the majority of local bushland remnants being connected by virtue of historical landuses (e.g. mining) and National Park declarations. Vegetation connectivity is largely intact throughout the locality, indicating the area to be important for biodiversity life cycles. The limited development of the locality has consequently resulted in an abundant occurrence of core and secondary habitats for many declining and threatened species.

4.6 Current Impacts Affecting the Site

The site has experienced impacts from human activity, with existing impacts affecting the ecological character of the site discussed in **Table 12**.

Table 12: Current Site Impacts

Impact	Area of Impact (%)	Notes
Cleared lands	57	The site is predominantly cleared of its native vegetation cover, with most of the transport corridors being existing hardstand (tar sealed) or dirt tracks along electricity easements.
Modified Native Vegetation	43	The majority of lands adjoining the bushland dirt tracks consist of modified grasslands derived from naturally occuring forests and woodlands of the locality. These linear grasslands are generally restricted to the width of the electricity easements, these being between 20-30 m wide.
Fire	100	There is evidence of frequent bush fire activity throughout the site.
Agriculture	0	There is no evidence of agricultural activity within or immediately adjoining the transport corridor.
Exotic flora and fauna	20	Elevated densities of exotic flora are predominantly restricted to the derived grasslands, particularly along the tar sealed sections of the site. Isolated elevated exotic plant densities also occur near gates, drainage line crossings and locations where there is evidence of illegal rubbish dumping.

5.0 IMPACT ANALYSIS

The proposed transport corridors are generally restricted to terrain with no vegetation cover (i.e. tar sealed roads and bushland tracks) and modified vegetation cover (i.e. energy easements and bushland track shoulder where natural soils and ground stratum native plants still occur). This approach has adopted to minimise the impact on native vegetation cover and threatened species habitats.

At the planning focus meeting for this project, the DoP, DEC and DNR have identified key issues for consideration in the Environmental Assessment Report, these being:

- Impacts on threatened biodiversity;
- Reduction of wildlife connectivity;
- Amenity of Werakata National Park;
- Impacts on watercourses; and
- Interactions with groundwater dependant ecosystems.

Impacts on threatened biodiversity are most likely to occur during the construction of the transport corridor (i.e. direct impact) or as a consequence of vehicle movements along bush land tracks (i.e. indirect impact). More specifically, issues of concern include:

- Threatened pant removal along tracks;
- Increased road mortality of local fauna (e.g. arboreal fauna); and
- Reduced wildlife connectivity, hence increased propensity for predation.

5.1 Quantification of Impacts

The impact footprint arising from the establishment and usage of the revised transport routes, as implied in the preferred project report, includes an area directly impacted by vehicle movements (i.e. 5-10 m wide tar/ all-weather surface) and areas of indirect impact such as the adjoining shoulder (i.e. max 5 m either side). Indirect impacts include road noise, dust and hydrological changes. Unmitigated, these works could potentially affect threatened biodiversity and their habtiats.

The existing tar sealed pavement utilised in the proposed transport corridors accounts for approximately 2.2 ha. In addition to this it is estimated that an area of approximately 8.2 ha will be involved in the establishment of the road surface along an existing bush track alignment that is currently cleared of native vegetation (i.e. potential permanent impact). Approximately 0.17 ha of derived grassland and forest vegetation (i.e. LHSGIF) will be cleared at Tunnel Road and 0.1 ha of woodland (i.e. KSSW) at Richmond Main East. An additional 7.5 ha of native vegetation that adjoins the bushland tracks may potentially be subject to semipermanent habitat modification through management and usage regimes (i.e. forest, woodland and derived grasslands). It is estimated that the establishment of the proposed transport corridors will potentially modify 43 % of the sites total area (i.e. approximately 7.8 ha impacted compared to 18.0 ha of bushland tracks, existing tar sealed road and adjoining 5 m shoulder).

5.2 Original Proposed Routes

The initial EIA, as presented in the Environmental Assessment Report (2006), identified a number of potential impacts on threatened biodiversity. An extract of the impact analysis is as follows:

“Two threatened plant species (i.e. Grevillea parviflora spp. parviflora and Parramatta Redgum (Eucalyptus parramattensis ssp. decadens)) and two endangered ecological communities (i.e. Lower Hunter Spotted Gum Ironbark Forest and Kurri Sand Swamp Woodland) have been identified as being directly impacted by the proposed development. The likely extent of this impact is as follows:

- *Forty-nine Grevillea parviflora ssp. parviflora from roadside environments;*
- *Ten Parramatta Redgum (Eucalyptus parramattensis ssp. decadens) at Aberdare East;*
- *Thirteen Parramatta Redgum (Eucalyptus parramattensis ssp. decadens) at Richmond Main East;*

- *1.9 ha of Lower Hunter Spotted Gum Ironbark Forest EEC along the bushland tracks; and*
- *1.0 ha of Kurri Sand Swamp Woodland EEC along the bushland tracks.*

Native vegetation erroneously mapped within the disturbance footprints of Aberdare East, Neath and Richmond Main East (NPWS, 2003) has been classed as ESU 100 'Disturbed Vegetation' in lieu of site based field survey and map verification. Hence impacts on EECs are less than indicated by NPWS (2003) mapping. **Figure 7.1** identifies the location of field verified threatened biodiversity locations. A discussion of the subject sites with known impacts is provided in the following sections."

5.2.1 Revised Impact Analysis

A revised impact analysis is provided as follows with reference to the subject species specified in the original EIA contained within the Environmental Assessment Report December 2006):

Grevillea parviflora ssp. parviflora

1) How is the proposal likely to affect the lifecycle of a threatened species and/or population?

This species is well distributed throughout the study area and is located within areas that would not experience impacts from mining operations, including Werakata National Park. A reduction of the local population's size and distribution would temporarily impact the lifecycle of this species. However, given the capability of this species to recolonise disturbed lands, it is considered that the future rehabilitated landscape may offer a substantially greater range of potential habitats for this species, with the proposal unlikely to have a significantly impact.

2) How is the proposal likely to affect the habitat of a threatened species, population or ecological community?

Clearing	The revised route proposes a considerably lower direct impact (i.e. reduced quantity of vegetation clearing). Direct impacts will be restricted to the clearing of approximately 0.1 ha of KSSW along the proposed Richmond Main East route. Potential indirect habitat impacts will be restricted to 0.04 % (i.e. approximately 1.0 ha of the 2 448 ha mapped extent within the study area).
Dust	Increased levels of dust would occur near trackside specimens. Reduced photosynthesis may decrease plant vigour and reproduction success. Impact is short term, reversible and negligible.
Noise	N/A
Water Quality	The project will remove polluting materials that leach salt and acid generating chemicals, thereby improving the water quality of the local area. Soil erosion and sedimentation will be controlled by a management plan to reduce detrimental impacts arising from track construction and chitter removal.

3) Does the proposal affect any threatened species or populations that are at the limit of its known distribution?

Grevillea parviflora ssp. parviflora is at its limit of distribution in the Cessnock locality (i.e. northern limit of distribution). Large populations of this species occur within Werakata National Park.

4) How is the proposal likely to affect current disturbance regimes?

Current disturbance regimes include unmanaged track usage, illegal rubbish dumping and frequent fire regimes. The proposal would reduce existing disturbances (i.e. illegal rubbish dumping and frequent fire regimes) through the increased presence of project staff using the tracks hence discouraging public access. Usage of gates to national parks may reduce unauthorised access in the long term. No negative impacts on current disturbance regimes are considered likely.

5) How is the proposal likely to affect habitat connectivity?

It is considered that the proposal would not further diminish habitat connectivity or the viability of local populations.

6) How is the proposal likely to affect critical habitat?

No critical habitat relevant to this species is declared under the TSC Act.

Eucalyptus parramattensis ssp. decadens

1) How is the proposal likely to affect the lifecycle of a threatened species and/or population?

This species clearly exhibits a sympatric distribution with Kurri Sand Swamp Woodland, with the majority of local records within this vegetation community. It is likely that residential and rural developments have been the main causal factors behind the decline of this species. The original project proposed a loss of up to 23 specimens from a large local population exceeding 1000 individuals, with many being located within Werakata National Park. The preferred project will result in a significantly lower loss (i.e. reduced by at least 11 individuals at Richmond Main East).

The integration of this species into rehabilitation works is seen as a practical and achievable method of compensating for the loss of individual specimens. Replanting of Parramatta Redgum (Eucalyptus parramattensis ssp. decadens) in the Aberdare East site is considered a realistic option given local soil and surrounding habitat values. The lifecycle of this species will not be adversely impacted by the proposed development.

2) How is the proposal likely to affect the habitat of a threatened species, population or ecological community?

Clearing	The revised route proposes a considerably lower direct impact (i.e. reduced quantity of vegetation clearing). Direct impacts will be restricted to the clearing of approximately 0.1 ha of KSSW along the proposed Richmond Main East route. Potential indirect habitat impacts will be restricted to 0.04 % (i.e. approximately 1.0 ha of the 2 448 ha mapped extent within the study area). Direct loss of known plants reduced to 12 specimens. Some branch trimming required along Richmond Main East route to clear a 4m high passageway for B- doubles.
Dust	Increased levels of dust would occur near remaining specimens. Reduced photosynthesis may decrease plant vigour and reproduction success. Impact is short term, reversible and negligible.
Noise	N/A
Water Quality	The project will remove polluting materials that leach salt and acid generating chemicals, thereby improving the water quality of the local area. Soil erosion and sedimentation will be controlled by a management plan to reduce or eliminate detrimental impacts arising from track construction and chitter removal. The impact is permanent.

3) Does the proposal affect any threatened species or populations that are at the limit of its known distribution?

Parramatta Redgum (*Eucalyptus parramattensis ssp. decadens*) is near its limit of distribution within the study area. The project will not adversely affect the ongoing population viability of this species at its limit of distribution.

4) How is the proposal likely to affect current disturbance regimes?

Current disturbance regimes affecting known habitat are restricted to unmanaged track usage, illegal rubbish dumping and frequent fire regimes. The proposal would reduce existing disturbances (i.e. illegal rubbish dumping and frequent fire regimes) through the increased presence of project staff using the tracks hence discouraging public access. Usage of gates to national parks may reduce unauthorised access in the long term, hence reduce the incidence of rubbish dumping and fire. No negative impacts on current disturbance regimes are considered likely.

5) How is the proposal likely to affect habitat connectivity?

It is considered that the proposal would not further diminish habitat connectivity or the viability of local populations.

6) How is the proposal likely to affect critical habitat?

No critical habitat relevant to this species is declared under the TSC Act.

Kurri Sands Swamp Woodland

1) How is the proposal likely to affect the lifecycle of a threatened species and/or population?

NA

2) How is the proposal likely to affect the habitat of a threatened species, population or ecological community?

Clearing	The revised route proposes a considerably lower direct impact (i.e. reduced quantity of vegetation clearing). Direct impacts will be restricted to the clearing of approximately 0.1 ha of KSSW along the proposed Richmond Main East route. Potential indirect habitat impacts will be restricted to 0.04 % (i.e. approximately 1.0 ha of the 2 448 ha mapped extent within the study area).
Dust	Increased levels of dust would occur near remaining specimens. Reduced photosynthesis may decrease plant vigour and reproduction success. Impact is short term, reversible and negligible.
Noise	N/A
Water Quality	The project will remove polluting materials that leach salt and acid generating chemicals, thereby improving the water quality of the local area. Soil erosion and sedimentation will be controlled by a management plan to reduce or eliminate detrimental impacts arising from track construction and chitter removal. The impact is permanent.
Road kill	N/A

3) Does the proposal affect any threatened species or populations that are at the limit of its known distribution?

NA

4) How is the proposal likely to affect current disturbance regimes?

In the short term, the proposal would reduce current disturbance regimes by maintaining vegetation cover and act to introduce access controls that will reduce random impacts by the public. The rehabilitation of up to 8 ha of Kurri Sand Swamp Woodland EEC vegetation within Aberdare East will enhance the quality and extent of Kurri Sand Swamp Woodland. .

5) How is the proposal likely to affect habitat connectivity?

It is considered that the proposal would not further diminish habitat connectivity.

6) How is the proposal likely to affect critical habitat?

No critical habitat relevant to this ecological community is declared under the TSC Act.

Lower Hunter Spotted Gum – Ironbark Forest

1) How is the proposal likely to affect the lifecycle of a threatened species and/or population?

NA

2) How is the proposal likely to affect the habitat of a threatened species, population or ecological community?

Clearing	The revised route proposes a lower direct loss of this EEC. Potential habitat losses will be restricted to 0.17 ha at Tunnel Road compared with the 20 657 ha mapped within the study area. Impact permanent. Indirect impacts restricted to 6.5 ha along track margins.
Dust	Increased levels of dust would occur near remaining specimens. Reduced photosynthesis may decrease plant vigour and reproduction success. Impact is short term, reversible and negligible.
Noise	N/A
Water Quality	The project will remove polluting materials that leach salt and acid generating chemicals, thereby improving the water quality of the local area. Soil erosion and sedimentation will be controlled by a management plan to reduce or eliminate detrimental impacts arising from track construction and chitter removal. The impact is permanent.
Road kill	N/A

3) Does the proposal affect any threatened species or populations that are at the limit of its known distribution?

N/A

4) How is the proposal likely to affect current disturbance regimes?

In the short term, the proposal would exacerbate disturbance regimes common to the locality such as vegetation clearing. However, the rehabilitation of up to 16.5ha of Lower Hunter Spotted Gum Ironbark Forest EEC vegetation at Neath will sufficiently offset this loss

5) How is the proposal likely to affect habitat connectivity?

Vegetation and habitat clearing will result in the minor adjustment of this EEC within the locality. The extent of clearing works will be relatively minor and isolated, thereby having a negligible impact on local habitat connectivity. It is considered that the proposal would not further diminish habitat connectivity.

6) How is the proposal likely to affect critical habitat?

No critical habitat relevant to this ecological community is declared under the TSC Act.

5.3 Preliminary Risk Analysis

A preliminary risk analysis was completed to determine the likely level of threat posed by the proposed development against 'Potential Subject Species' (i.e. Table 9 and Table 10). The results of this analysis were used to identify 'Subject Species', requirements for risk minimisation strategies (e.g. mitigation) and scope/ extent of field survey methodology required to facilitate the impact assessment. The preliminary risk analysis is provided in Table **13**, with 'Subject Species' determination aided by the general likely habitats of the study area discussed in **Section 4.0** and species specific habitat information contained within **Appendix 2**.

Table 13: Preliminary Risk Analysis

Common Name	Scientific Name	Potential Site Occurrence and Habitat Value	Likelihood	Consequence	Preliminary Risk Analysis	Subject Species
Bynoe's Wattle	*Acacia bynoeana*	High/ Core	A	5	Extreme	Yes
Parramatta Redgum	*Eucalyptus parramattensis*	High/ Core	A	4	Extreme	Yes
Narrow-leaved Bottlebrush	*Callistemon linearifolius*	High/ Core	A	4	Extreme	Yes
Slaty Redgum	*Eucalyptus glaucina*	High/ Core	A	4	Extreme	Yes
Small-flowered Grevillea	*Grevillea parviflora*	High/ Core	A	4	Extreme	Yes
	Rutidosis heterogama	High/ Core	A	4	Extreme	Yes
Black-eyed Susan	*Tetratheca juncea*	Moderate/ Core	A	4	Extreme	Yes
Rough-barked Apple	*Angophora inopina*	None	C	1	Low	No
Leafless Tongue Orchid	*Cryptostylis hunteriana*	None	C	1	Low	No
Pokolbin Mallee	*Eucalyptus pumila*	None	C	1	Low	No
North Rothbury Geebung	*Persoonia pauciflora*	None	C	2	Low	No
Tiger Orchid	*Cymbidium canaliculatum*	Low/ Core	A	3	High	Yes
	Pterostylis gibbosa	Low/ Core	A	3	High	Yes
Stuttering Frog	*Mixophyes balbus*	None	C	1	Low	No
Giant Barred Frog	*Mixophyes iteratus*	None	C	1	Low	No
Green and Golden Bell Frog	*Litoria aurea*	None	C	3	Low	No
Green-thighed Frog	*Litoria brevipalmata*	None	C	2	Low	No
Littlejohn's Tree Frog	*Litoria littlejohni*	None	C	1	Low	No
Blue-billed Duck	*Oxyura australis*	None	C	1	Low	No
Freckled Duck	*Stictonetta naevosa*	None	C	1	Low	No
Jabiru	*Ephippiorhynchus asiaticus*	None	C	3	Low	No
Red Goshawk	*Erythrotriorchis radiatus*	Moderate/ Infrequent Vagrant	C	2	Low	No
Black-breasted Buzzard	*Hamirostra melanosternon*	High/ Infrequent Vagrant	C	2	Low	No
Osprey	*Pandion haliaetus*	None	C	1	Low	No
Australian Painted Snipe	*Rostratula benghalensis*	None	C	3	Low	No
Comb-crested Jacana	*Irediparra gallinacea*	None	C	2	Low	No
Wompoo Fruit-Dove	*Ptilinopus magnificus*	None	C	1	Low	No
Superb Fruit-Dove	*Ptilinopus superbus*	None	C	1	Low	No
Gang-gang Cockatoo	*Callocephalon fimbriatum*	High/ Foraging*	B	3	Medium	Yes
Glossy Black-Cockatoo	*Calyptorhynchus lathami*	High/ Core	A	4	Extreme	Yes

Common Name	Scientific Name	Potential Site Occurrence and Habitat Value	Likelihood	Consequence	Preliminary Risk Analysis	Subject Species
Swift Parrot	*Lathamus discolor*	High/ Foraging*	B	4	High	Yes
Turquoise Parrot	*Neophema pulchella*	None	C	2	Low	No
Barking Owl	*Ninox connivens*	None	C	2	Low	No
Powerful Owl	*Ninox strenua*	High/ Core	A	4	Extreme	Yes
Masked Owl	*Tyto novaehollandiae*	High/ Core	A	4	Extreme	Yes
Sooty Owl	*Tyto tenebricosa*	Low/ Core	A	3	High	Yes
Brown Treecreeper	*Climacteris picumnus*	High/ Core	A	4	Extreme	Yes
Speckled Warbler	*Pyrrholaemus sagittatus*	High/ Core	A	4	Extreme	Yes
Black-chinned Honeyeater	*Melithreptus gularis gularis*	High/ Core	A	4	Extreme	Yes
Regent Honeyeater	*Xanthomyza phrygia*	High/ Foraging	B	4	High	Yes
Painted Honeyeater	*Grantiella picta*	Low/ Core	A	2	Medium	Yes
Hooded Robin	*Melanodryas cucullata*	High/ Core	A	4	Extreme	Yes
Grey-crowned Babbler	*Pomatostomus temporalis*	High/ Core	A	4	Extreme	Yes
Diamond Firetail	*Stagonopleura guttata*	High/ Foraging	B	3	Medium	Yes
Spotted-tailed Quoll	*Dasyurus maculatus*	High/ Core	A	3	High	Yes
Koala	*Phascolarctos cinereus*	High/ Core	A	4	Extreme	Yes
Yellow-bellied Glider	*Petaurus australis*	High/ Core	A	4	Extreme	Yes
Squirrel Glider	*Petaurus norfolcensis*	High/ Core	A	4	Extreme	Yes
Brush-tailed Rock-wallaby	*Petrogale penicillata*	Low/ Foraging	B	2	Low	No
Grey-headed Flying Fox	*Pteropus poliocephalus*	High/ Core	A	4	Extreme	Yes
Yellow-bellied Sheathtail-bat	*Saccolaimus flaviventris*	Low/ Core	A	3	High	Yes
Eastern Freetail Bat	*Mormopterus norfolkensis*	High/ Core	A	4	Extreme	Yes
Eastern False Pipistrelle	*Falsistrellus tasmaniensis*	High/ Core	A	4	Extreme	Yes
Little Bentwing Bat	*Miniopterus australis*	Moderate/ Foraging	B	3	Medium	Yes
Eastern Bentwing Bat	*Miniopterus schreibersii*	Moderate/ Foraging	B	3	Medium	Yes
Large-footed Myotis	*Myotis adversus*	None	C	2	Low	No
Greater Broad-nosed Bat	*Scoteanax rueppellii*	High/ Core	A	4	Extreme	Yes
Large-eared Pied Bat	*Chalinolobus dwyeri*	None	C	1	Low	No
Eastern Cave Bat	*Vespadelus troughtoni*	None	C	1	Low	No
Hastings River Mouse	*Pseudomys oralis*	None	C	1	Low	No

5.3.1 Risk Minimisation Strategies

It is estimated that the proposed development, as depicted in **Figure 2**, may potentially have a maximum direct impact footprint of 0.17 ha. Furthermore, indirect impacts such as vehicle movements (i.e. noise, road kill, dust) could potentially affect an additional 7.5 ha of adjoining habitats. In the absence of specific mitigation strategies, the proposed transport corridor may potentially affect 7.7 ha of local native vegetation cover and habitat.

The preliminary risk analysis assigned varying levels of risk to each 'Potential Subject Species'. However, through the use of targeted mitigation, the risk of adverse impacts on local biodiversity can be substantially reduced. In the case of this development, risk minimisation strategies may include a selection of the following mitigation actions:

- Complete intensive targeted surveys throughout the site to measure the extent of known habitat for threatened biodiversity, particularly those identified as 'Subject Species'; and
- Ensure construction and operational activities are restricted to areas of low ecological value (e.g. existing cleared bush track alignment, areas containing no trees with hollows); and
- Utilise passing bays for through areas of elevated biodiversity values; and
- Consider the use of revegetation works to offset biodiversity losses.

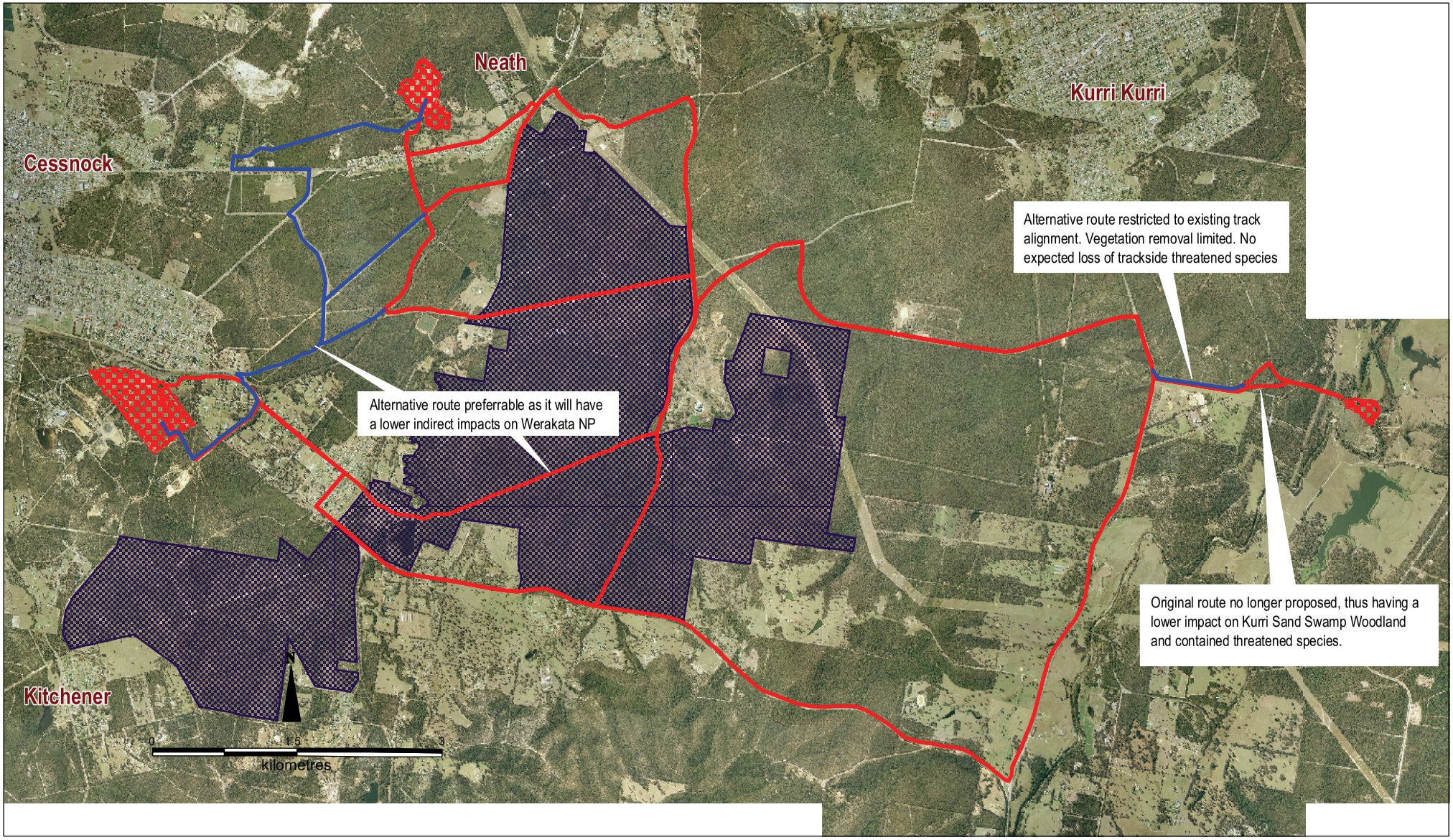
Impact areas arising from the proposed transport corridor are illustrated in **Figure 6**, with recommended mitigaton approaches also indicated to provide greater certainty over the location and extent of development impacts.

5.3.2 Field Survey Approach

Field survey for 'Subject Species' of the site has been determined on the basis of the preliminary risk analysis, which indicated a full survey methodology involving the consideration of seasonal studies for many species (i.e. high – extreme risk). However, assuming the majority implementation of the above risk minimisation strategies, as indicated in **Figure 6**, it is considered that the scope and extent of field survey methods can be reduced without affecting the validity of the assessment. A modified preliminary risk analysis and associated proposed field survey approach is provided in Table **14**.

Table 14: Proposed Field Survey Approach

Species	Modified Preliminary Risk Analysis	Proposed Field Survey
Acacia bynoeana	Extreme	Detailed seasonal systematic survey methods
Eucalyptus parramattensis	High	Detailed systematic survey methods considering seasonality
Callistemon linearifolius	High	Detailed systematic survey methods considering seasonality
Eucalyptus glaucina	High	Detailed systematic survey methods considering seasonality
Grevillea parviflora	High	Detailed systematic survey methods considering seasonality
Rutidosis heterogama	High	Detailed systematic survey methods considering seasonality
Tetratheca juncea	High	Detailed systematic survey methods considering seasonality
Angophora inopina	Low	No specific survey recommendations
Cryptostylis hunteriana	Low	No specific survey recommendations
Eucalyptus pumila	Low	No specific survey recommendations
Persoonia pauciflora	Low	No specific survey recommendations
Cymbidium canaliculatum	Medium	Targeted systematic sampling for at least one season
Pterostylis gibbosa	Medium	Targeted systematic sampling for at least one season
Mixophyes balbus	Low	No specific survey recommendations
Mixophyes iteratus	Low	No specific survey recommendations
Green and Golden Bell Frog	Low	No specific survey recommendations
Green-thighed Frog	Low	No specific survey recommendations
Littlejohn's Tree Frog	Low	No specific survey recommendations



ECOVISION CONSULTING

Figure 6

Alternative Routes

Plan: E:\Mapping\2007\F1132\Figure_6
Date: 1 September 2007
Drafted by: Mark Aitkens
Base Layers: Resource boundaries and transpot routes supplied by Wells Environmental Services Imagery supplied by Plateau Imagery (under licence)

Legend

- Emplacements
- National Park
- Original Transport Route
- Alternative Routes

Species	Modified Preliminary Risk Analysis	Proposed Field Survey
Blue-billed Duck	Low	No specific survey recommendations
Freckled Duck	Low	No specific survey recommendations
Jabiru	Low	No specific survey recommendations
Red Goshawk	Low	Minimum survey methods, sampling intensity and replication
Black-breasted Buzzard	Low	Minimum survey methods, sampling intensity and replication
Osprey	Low	No specific survey recommendations
Australian Painted Snipe	Low	No specific survey recommendations
Comb-crested Jacana	Low	No specific survey recommendations
Wompoo Fruit-Dove	Low	No specific survey recommendations
Superb Fruit-Dove	Low	No specific survey recommendations
Gang-gang Cockatoo	Low	Minimum survey methods, sampling intensity and replication
Glossy Black-Cockatoo	Low	Minimum survey methods, sampling intensity and replication
Swift Parrot	High	Detailed systematic survey methods considering seasonality
Turquoise Parrot	Low	No specific survey recommendations
Barking Owl	Low	No specific survey recommendations
Powerful Owl	Low	Minimum survey methods, sampling intensity and replication
Masked Owl	Low	Minimum survey methods, sampling intensity and replication
Sooty Owl	Low	Minimum survey methods, sampling intensity and replication
Brown Treecreeper	High	Detailed systematic survey methods considering seasonality
Speckled Warbler	High	Detailed systematic survey methods considering seasonality
Black-chinned Honeyeater	High	Detailed systematic survey methods considering seasonality
Regent Honeyeater	High	Detailed systematic survey methods considering seasonality
Painted Honeyeater	Low	Minimum survey methods, sampling intensity and replication
Hooded Robin	High	Detailed systematic survey methods considering seasonality
Grey-crowned Babbler	High	Detailed systematic survey methods considering seasonality
Diamond Firetail	Medium	Targeted systematic sampling for at least one season
Spotted-tailed Quoll	Low	Minimum survey methods, sampling intensity and replication
Koala	Low	Minimum survey methods, sampling intensity and replication
Yellow-bellied Glider	Low	Minimum survey methods, sampling intensity and replication
Squirrel Glider	Low	Minimum survey methods, sampling intensity and replication
Brush-tailed Rock-wallaby	Low	Minimum survey methods, sampling intensity and replication
Grey-headed Flying Fox	High	Detailed systematic survey methods considering seasonality
Yellow-bellied Sheathtail-bat	Low	Minimum survey methods, sampling intensity and replication
Eastern Freetail Bat	Low	Minimum survey methods, sampling intensity and replication
Eastern False Pipistrelle	Low	Minimum survey methods, sampling intensity and replication
Little Bentwing Bat	Low	Minimum survey methods, sampling intensity and replication
Eastern Bentwing Bat	Low	Minimum survey methods, sampling intensity and replication
Large-footed Myotis	Low	No specific survey recommendations
Greater Broad-nosed Bat	Low	Minimum survey methods, sampling intensity and replication
Large-eared Pied Bat	Low	No specific survey recommendations
Eastern Cave Bat	Low	No specific survey recommendations
Hastings River Mouse	Low	No specific survey recommendations

5.3.3 Survey and Assessment Assumptions

The following assumptions underpin the above recommended field survey approach.

- Transport corridors will be mostly restricted to existing bush tracks and tar sealed roads to minimise vegetation clearing;

- Vegetaton clearing required at Tunnel Road will be restricted to a minimum (i.e. track width to be no greater than 5 m as indicated in Figure 6). No trees are to be removed at this location. This also applies to bush tracks utilised between Leggets Lane and Richmond Main east where Kurri Sand Swamp Woodland, Parramatta Redgum and *Grevillea parviflora* ssp. *parviflora* are known to occur along the track margin;
- Vehicle movements through the national park will be restricted to existing bushland tracks during daylight hours, specifically being the daylight period between 30 minutes after sunrise and 30 minutes before sunset;
- Habitat features facilitating the availability of core habitat (e.g. trees with hollows) will be retained within the site;
- Targeted surveys along the entire length of the bushland tracks are to be completed for threatened plant species that are known to occupy disturbed trackside environments, with the results of these surveys designed to identify exclusion zones for track construction, modification and operational purposes; and
- Weed management is to occur prior to road construction and during the operational period.

It is considered that this approach is sufficiently robust to support an impact assessment (i.e. “Assessment of Significance”) for nominated ‘Subject Species’.

6.0 FIELD SURVEY

The site was investigated on 13 July 2007 by Mark Aitkens (NPWS Licence Number S10015) to identify the sites ecological values with a particular focus on targeted surveys for threatened biodiversity and their habitats such as the nominated 'Subject Species'.

6.1 Flora

6.1.1 Survey Extent

Detailed systematic flora surveys were restricted to the lands enclosed within the sites boundaries. Flora surveys were completed using 9 quadrat sample sites, with each quadrat sampling 400 m^2 (20 m X 20 m). Biodiversity searches of ecotones and disturbed boundaries were also completed throughout the remaining parts of the site to compliment the quadrat sampling methods. Survey locations were randomly selected within representative vegetation types defined through an analysis of recent imagery of the site. **Figure 7** identifies the flora survey locations.

6.1.2 Vegetation of the Site

The flora survey identified 118 species, consisting of 100 natives and 18 exotics, with 73 species located within a forest vegetation formation, 21 species in the Woodland vegetation formation and 68 species located within the derived grassland vegetation formation. The spatial distribution of these vegetation formations is illustrated in **Figure 8**. A summary description of these vegetation formations is provided in **Table 15**, with a flora species list provided in **Appendix 3**.

Table 15: Vegetation Statistics of the Site

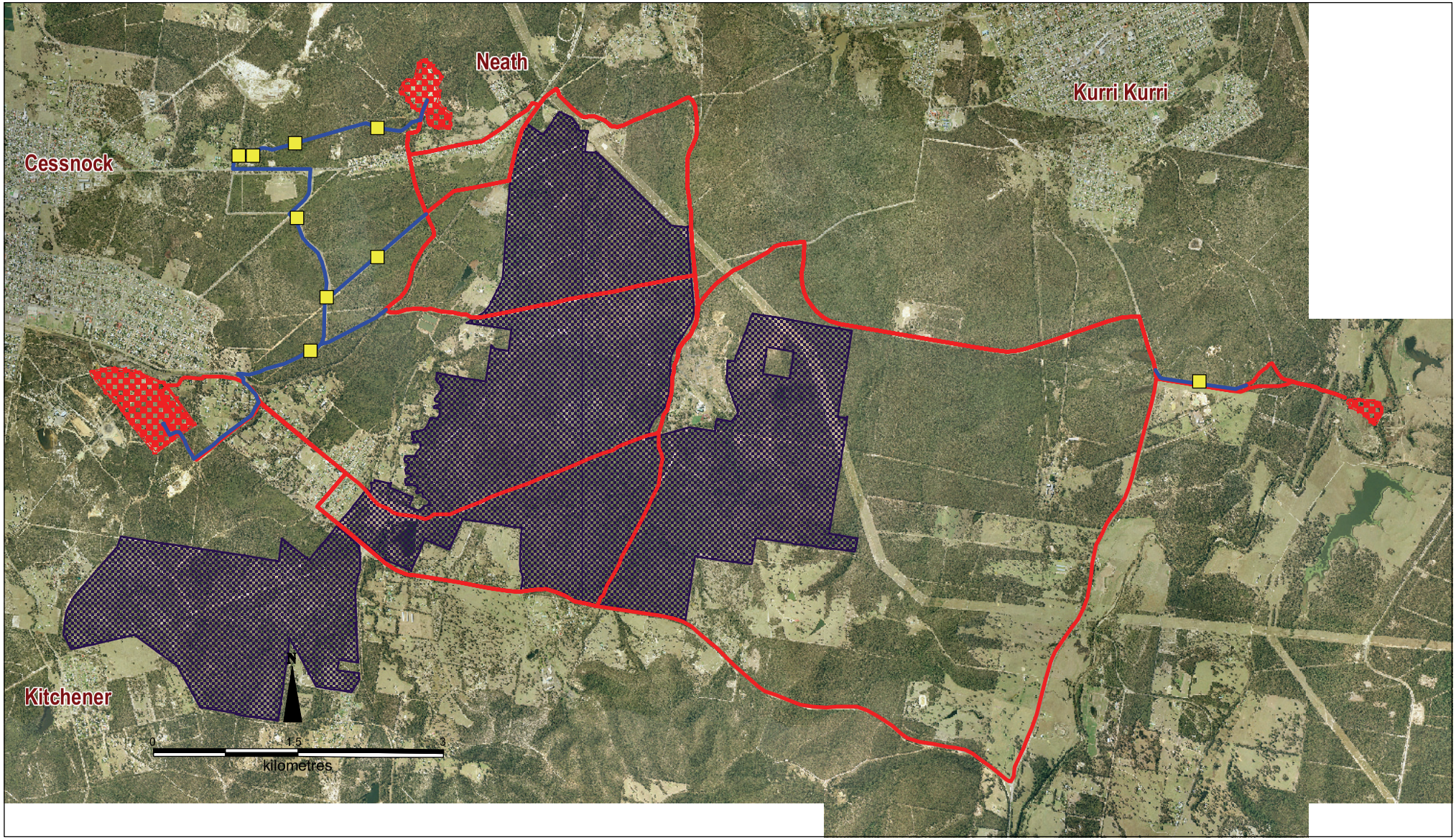
Vegetation Formation	Native plant species richness	Native overstorey cover%	Native mid Storey Cover %	Native Groundcover %	Number of Trees with Hollows
Derived Grassland	48	0	12.5	55	0
Woodland	20	10	25	30	0
Forest	55	23.75	21.25	22.5	0

An analysis of the field results indicates forest vegetation formation to be generally consistent with the Hunter Macley Dry Sclerophyll Forest vegetation class (Keith, 2004). Elements of the Sydney Sand Flats Dry Sclerophyll Forest are also apparent in the woodland formation. A comparision between the sites forest vegetation formation and regional vegetation mapping would indicate the sites vegetation cover as similar to the "Lower Hunter Spotted Gum Ironbark Forest" vegetation type (NPWS, 2003). Similar comparisons would indicate the woodland vegetation formation to be consistent with the "Kurri Sand Swamp Woodland" vegetation type (NPWS, 2003). Data interpretations presented within this report will be founded on these vegetation classifications.

6.1.3 General Observations

The forest vegetation formation is dominated by the canopy species Spotted Gum (*Corymbia maculata*) and Broad-leaved Ironbark (*Eucalyptus fibrosa*). The understorey of this vegetation formation is generally shrubby containing species such as *Melaleuca nodosa, Bursaria spinosa, Acacia falcata* and X. Vegetation formations derived from human activity also occur adjacent to the forest formation (i.e. derived grasslands), with trees being largely absent from this formation. Cosmipolitain natives and exotic species characterise this vegetation formation such as Couch (*Cynodon dactylon*), Rats Tail (*Sporobolus creber*), Cats Ear (*Hypochaeris radicata**) and *Aristida vagans*.

A shrubby woodland vegetation formation also occurs within the site and is dominated by a tree canopy consisting of Parramatta Redgum (*Eucaluptus parramattensis subsp. decadens*), with an understorey consisting of shrubs shrubs such as *Banksia spinulosa, Isopogon anemonifolius* and *Melaleuca thymifolia*.



ECOVISION CONSULTING

Figure 7

Flora Survey Locations

Plan: E:\Mapping\2007\F1132\Figure_7
Date: 1 September 2007
Drafted by: Mark Aitkens
Base Layers: Resource boundaries and transpot routes supplied by Wells Environmental Services Imagery supplied by Plateau Imagery (under licence)

Legend

- Emplacements
- National Park
- Quadrat
- Original Transport Route
- Assessed Routes



ECOVISION CONSULTING

Figure 8

Vegetation of the Site

Plan: E:\Mapping\2007\F1132\Figure_8
Date: 1 September 2007
Drafted by: Mark Aitkens
Base Layers: Resource boundaries and transpot routes supplied by Wells Environmental Services Imagery supplied by Plateau Imagery (under licence)

Legend

- Kurri Sand Swamp Woodland
- Lower Hunter Spotted Gum Ironbark Forest

Exotic Species

Exotic species were infrequently observed throughout the site, with the majority of observations restricted to the derived grassland vegetation formation. Exotic species regularly observed include such as Ribwort (*Plantago lanceolata**) and Fireweed (*Senecio madagascariensis*).

6.2 Fauna

6.2.1 Survey Extent

Systematic targeted sampling techniques were employed during the diurnal survey period such as visual/audible observations (timed quadrats), scat/physical searches and habitat evaluation. The diurnal surveys were completed simultaneously with the flora survey with the location of field survey shown in **Figure 7**. Spotlighting, call playback, Elliott trapping and microchiropteran bat recordings were not incorporated into the survey design as the extent of intact native vegetation cover (i.e. surrogate for native habitat) will have limited overlap with the proposed transport corridor (i.e. refer to 'Subject Species' preliminary risk assessment).

6.2.2 Fauna Observations

The fauna survey of the site identified 29 avian species, 6 mammals, 3 reptiles and 0 amphibian species, representing approximately 11% of all fauna species recorded within the study area (i.e. 320 species: DEC (2007)). The species observed during the survey are listed in **Appendix 3**. Commentary on the nature of these observations is provided as follows:

Avifauna

Species observed during the survey are characteristic of both forest and woodland environments. Species regularly observed within both these vegetation structures throughout the locality include the Crested Pigeon (*Geophaps lopotes*) and Black-faced Cuckoo-shrike (*Coracina novaehollandiae*). Ecological generalists such as the Eastern Rosella (*Platycerus eximius*) were observed flying throughout the vegetated margins of the site where it adjoins forested areas. Smaller honeyeaters such as the White-plumed Honeyeater (*L. pencilliatus*) and and Rainbow Lorikeet (*Trichoglossus haematodus*) were also observed foraging on Spotted Gum (*C. maculata*) blossom. Other commonly observed generalists that frequent the site include the Noisy Miner (*Manorina melanocephala*), Pied Butcherbird (*Cracticus nigrogularis*) and Magpie (*Gymnorhyna tibicen*). There were no observations of threatened woodland birds throughout the site despite the presence of potential habitat along the interface between derived grasslands and forest/ woodland environments.

Mammals

A scat search conducted throughout the subject site failed to identify any conclusive evidence of Eastern Grey Kangaroo (*Macropus gigantea*) or Red-necked Wallaby (*M. rufogriseus*) activity. These two species are common to the Hunter Valley, with the presence of the latter species indicative of the moderate to high value wildlife connectivity and large remnant size within the area. Tree scratches were observed on selected Spotted Gum (*Corymbia maculata*), which are considered indicative of Brush-tailed Possum (*Trichosaurus vulpecular*) activity.

While no microchiropteran bat surveys was completed within the site, it is considered that there is potential for at least six species to occur as foraging populations throughout the site such as the Chocolate Wattled Bat (*Chalinolobus darlingtonii*), Freetail Bat (*Mormopterus sp. 2*), Eastern Freetail Bat (*M. norfolkensis*), Eastern False Pipistrelle (*Falsistrellus tasmaniensis*), White-striped Free-tail Bat (*Tadarida australis*) and Little Forest Bat (*Vespadelus vulturnus*). It is possible that these species are roosting within offsite vegetation with no roost potential within the impact area (i.e. absence of tree hollows).

Introduced mammal species were not observed during the survey period. However, there are known occurrences of the European Fox (Vulpes vulpes*) and Rabbit (Oryctolagus cuniculus*) within the locality given their strong association with agricultural landscapes.

Reptiles

The forested areas of the site are mostly suited to reptilian species of large home ranges that have varied non-specific dietary requirements. Species such as the Goanna (*Varanus various*) and Bearded Dragon (*Pogona barbata*) are well adapted to these conditions.

The field survey identified few specialised shelters within the subject site such as rock outcrops or surface rock, hence substantially limiting the potential presence of small reptiles reliant on this habitat feature. Species dependent on rock shelters such as the Striped Skink (*Ctenotus robustus*), Copper-tailed Skink (*Ctenotus taeniolatus*) or Yellow-faced Whip Snake (*Demansia psammophis*) are likely to be absent from the site. Conversely, the accumulation of leaf litter throughout the open forests of the study area provides sufficient habitat values for smaller ground dwelling species such as the common Sun Skink (*L. delicata*), which was observed during the survey period.

Amphibian Habitat

The study area is predominantly characterised by dry terrestrial environs, which is not conducive to amphibian activity. However, derived grasslands located adjacent to creeklines may provide potential core habitat for small burrowing species (e.g. *Uperoleia* spp.) and secondary habitats for larger ground species (i.e. Brown Stripped Marsh Frog).

6.2.3 Habitat Values

The field survey identified the following fauna habitats that generally provide limited fauna activity such as foraging and movement. These habitat categories are as follows:

- Grasses and herbs;
- Fallen timber;
- A nectar producing tree canopy dominated by the winter flowering Spotted Gum and summer flowering Broad-leaved Ironbark.

Expected and potential fauna utilisation of these habitats is discussed as follows by fauna class.

Avifauna

Nectar supplies are principally restricted to the Eucalypt tree canopy, this being the winter-spring flowering canopy species. For this reason, it is expected that the majority of bird activity within the site will be associated with seasonally migrating nectivores. Honeyeaters and insectivorous species of woodland environs are likely to be the principal foragers throughout the sites vegetation cover.

Common sedentary avifauna species that will frequent the woodlands throughout the year will consist primarily of generalists such as the Noisy Miner (*Manorina melanocephala*) and Crested Pigeon (*Geophaps lopotes*). Avian species common to wide-open spaces such as the grasslands are expected to rarely frequent habitats within the site due to the effect of the tree canopy cover on understorey foraging resources.

The absence of tree hollows from the site limits the capacity for breeding activity by owls and parrots. Species reliant on this habitat feature are likely to restrict their onsite activity primarily to foraging only. Further, the likelihood of owls opportunistically foraging throughout the site as part of a larger home range is considered remote due to the likely absence of suitable foraging resources (e.g. small ground mammals).

Pioneer species capable of utilising the margins of regenerating woodlands, such as the Grey-crowned Babbler (*P. temporalis*), are known to inhabit the margins of native vegetation cover located within the site. Local populations of this and other declining woodland species may periodically occur as breeding populations within the site given the extent of native vegetation cover and availability of foraging resources.

Mammals

The extent of native vegetation cover in the western parts of the site favours foraging activity by arboreal mammals such as microchiropteran bats and possums. However, the absence/ low abundance of tree hollows substantially reduces the roosting potential, hence indicating a low abundance of arboreal species.

The sites grasslands provide suitable habitat values for medium to large sized mobile native mammals such as the Short-beaked Echidna (*Tachyglossus aculeatus*), Wombat (*Vombatus ursinus*) and Eastern Grey Kangaroo (*Macropus gigantea*). However, the majority of ground mammal activity will be restricted to the margins of existing native vegetation cover.

Habitats adjoining the site are likely to support exotic fauna populations including the European Fox (*V. vulpes*) and Rabbit (*O. cuniculus*) given the disturbed nature of the locality and presence of cleared pastures. Occasional utilisation of the site by these species is expected.

Reptiles

The vegetation of the site is mostly suited to reptilian species of large home ranges that have varied non-specific dietary requirements. Species such as the Goanna (*V. varia*) and Bearded Dragon (*Pogona barbata*) are well adapted to these conditions. Conversely, arboreal reptiles such as the Barred-side Skink (*Eulamprus tenuis*), which utilise trees hollow hollows and cracks for shelter, are unlikely to occur within the cleared parts of the site.

Amphibians

The absence of tree hollows and aquatic habitats substantially limits the availability of amphibian species. However, tree frog species such as the Perons Tree Frog (*Litoria peronii*) and Green Tree Frog (*Litoria caerulea*) may periodically occur within derived grasslands, with more permanent habtiat utilisation within the adjoining forests and woodlands. These species are likely inhabitants of the terrestrial environments contained within the site, with breeding activity likely within semi-permanent and permanent water structures located elsewhere within the locality.

7.0 DATA INTERPRETATION

7.1 Vegetation Formations

The site contains native vegetation and fauna habitats that have mapped representations within the study area (NPWS, 2003), hence enabling a comparision between local and regional wildlife data. **Table 16** summarises the similarities between sites vegetation cover and regional vegetation mapping.

Table 16: Comparison between Native Vegetation of the Site and Study Area

Site Vegetation Formation	Potential Vegetation Equivalent (NPWS, 2003)	Floristic Similarities with equivalent vegetation	Vegetation Type
Forest	LHSGIF	16 positive (61%) 5 uninformative (10%)	LHSGIF
Woodland	KSSW	7 positive (50%) 1 uninformative (4%)	KSSW
Derived Grassland	LHSGIF	13 positive (50%) 1 uninformative (2%)	LHSGIF

Approximately 61% of the “positive” native flora species contained within Lower Hunter Spotted Gum Ironbark Forest also occur within the forest vegetation formation (NPWS, 2003). A similar number of “positive” Lower Hunter Spotted Gum Ironbark Forest species also occur within the derived grassland formation (i.e. 50% positive species). The comparision between the woodland vegetation formation and Kurri Sand Swamp Woodland is equally compelling with 50% positive species being in common. Based on this analysis it is considered that the sites forest and derived grassland is comparatively similar to Lower Hunter Spotted Gum Ironbark Forest and the woodland vegetation formation is comparatively similar to Kurri Sand Swamp Woodland.

8.0 MATTERS OF ECOLOGICAL SIGNIFICANCE

8.1 Subject Species

8.1.1 Threatened Species

Database searches (DEC, 2007 ; EPBC Act Protected Matters Report, 2007), spatial analysis of relevant Mitchell Landscapes/ vegetation types, site habitat features and the preliminary risk analysis collectively identified 34 "Subject Species" and three EECs. Targeted site surveys identified known habitat for threatened flora (i.e. *Eucalyptus parramattensis* subsp. *decadens* and *Grevillea parviflora* subsp. *parviflora*), two EECs (i.e. Lower Hunter Spotted Gum Ironbark Forest and Kurri Sand Swamp Woodland) and confirmed potential core/ secondary habitat for the remaining 'Subject Species'. The location of the EECs within the site is shown in **Figure 8,** with the location of *Eucalyptus parramattensis* subsp. *decadens* and *Grevillea parviflora* subsp. *parviflora* having scattered occurrences throughout the mapped extent of Kurri Sand Swamp Woodland.

Potential Habitat

Threatened owls, such as the Powerful Owl (*N. strenua*) may potenially use the forest for foraging and/or breeding purposes, due to the presence of a large intact connected vegetation remnants throughout the study area (i.e. likely roost and foraging habtiat) and presence of ground and arboreal fauna (i.e. foraging resources). Similarly, the Glossy Black Cockatoo (*Calyptorhynchus lathami*) is also likely to utilise forests adjoining the site, particularly due to the presence of Sheoak foraging resources. These species will be considered subject species where their habitats overlap with areas of potential development.

Habitat values for nectar seeking species such as the Swift Parrot (*L. discolor*) and Regent Honeyeater (*X. phrygia*) is abundant throughout the study area (i.e. winter flowering Spotted Gum (*C. maculata*)). Breeding habitat is not considered to occur within the site for these species. These species will be further considered in this report as potential foragers of the site.

Woodlands within the site represent potential core habitat for woodland bird species such as the Speckled Warbler (*P. sagittatus*) and Grey-crowned Babbler (*P. temporalis*). The Speckled Warbler (*P. sagittatus*), which require shrubbery for shelter and nesting is a likely inhabitant of the site, particularly the Kurri Sand Swamp Woodland. The Grey-crowned Babbler (*P. temporalis*) occupies sites with complex understorey structure including dense shrubbery combined with open areas. Whilst the latter habitat value is limited throughout the study area, adjoining offsite habitat resources may provide sufficient local values to promote site occupation.

The site contains high quality potential foraging habitat for the threatened mammal species identified in this report as Subject Species. Species requiring caves for roosts are likely to be present within the site as foraging populations (i.e. Large-eared Pied Bat (*C. dwyeri*) and Eastern Bent-wing Bat (*M. schriebersii*)). Similarly, species requiring large areas of undisturbed vegetation as part of their natural home ranges will also potentially use the site (i.e. Spotted-tailed Quoll (*D. maculatus*)) given the presence of large native vegetation remnants and low development activity/ proximity of human disturbances. These and other nominated 'Subject Species' will be further considered in this report.

Known Habitat

The site contains known habitat values for the threatened species *Eucalyptus parramattensis* subsp. *decadens* and *Grevillea parviflora* subsp. *parviflora*. It is considered that the site represent cores habitat for these listed threatened biodiversity.

8.1.2 EPs

Three EPs may potentially occur within the study area, these being Hunter Catchment populations of the Tiger Orhid (*Cymbidium canalicultum*), Weeping Myall (*Acacia pendula*) and River Redgum (*Eucalyptus camaldulensis*). Targeted biodiversity surveys confirmed the absence of these species from the site.

8.1.3 EECs

Located within a 10 km radius of the site are known occurrences of Lower Hunter Spotted Gum Ironbark Forest and Kurri Sand Swamp Woodland, which are listed as EECs on the TSC Act. Targeted surveys confirmed the presence of these EECs within the site and/or adjoining lands, thereby warranting further analysis of this matter in this report.

8.1.4 Matters of NES (EPBC Act 1999)

The site is not located in a:

- Declared world heritage property;
- Ramsar wetland;
- Commonwealth marine area; or
- Represent a nuclear action.

Threatened Species, EPs and EECs

Seventeen threatened species and one critically endangered ecological community (CEEC) and/or their habitats listed on the EPBC Act have been reported as occurring within the study area (EPBC Act Protected Matters Report, 2007). White Box Yellow Box Blakely's Redgum Woodland and Derived Grasslands CEEC is not located within or adjacent to the site and will consequently be excluded from this asessment. Several listed threatened flora and fauna species are considered to have potential habitat within the site, these being Large-eared Pied Bat (*C. dwyeri*), Spotted-tailed Quoll (*D. maculatus*), Brush-tailed Rock Wallaby (*P. penicilliata*) and Grey-headed Flying Fox (*P. poliocephalus*). These species will also be considered in this report.

Migratory Species

Migratory species listed within the schedules of the EPBC Act are unlikely to occur in the site. No migratory species or areas of substantive habitat for those species (as listed in Appendix 1) were observed during the site survey. The development of the cleared grassland environments is unlikely to have an adverse impact on listed migratory species.

8.1.5 Critical Habitat

No mapped critical habitat occurs as defined by listing on the TSC Act and/or EPBC Act occur within or adjacent to the site.

8.2 SEPP 44 – Koala Habitat Protection

Surveys for Koala trees and activity was undertaken to determine the likelihood of potential or core Koala habitat occurring within the site. Preferred Koala foraging tree species (i.e. *E. punctata*) has a scattered occurance throughout the site with total coverage less than 15%. Accordingly, the site does not constitute 'Potential Koala Habitat' and therefore cannot be considered 'Core Koala Habitat'.

9.0 RECOMMENDED MITIGATION STRATEGY

The following mitigation strategies are recommended for incorporatation into the Environmental Management Plan for the associated Part 3A Major Project:

- Restrict vehicle movements to daylight periods, which is to allow for a 30 minute shoulder after sunrise and before sunset to minimise impacts on activite fauna populations;
- Restricted road construction to existing cleared tracks, with traffic to be managed via the use of passing bays instead of clearing;
- Track construction, upgrade and maintenance is to occur wholly within a 10 m wide corridor; and
- Trees are to be retained, where possible, within the landscape where vegetation clearing is required (i.e. at Tunnel Road, Neath Road and Richmond Main East).

Further, it is recommended that consideration be given to the protection of native vegetation through ongoing targeted weed management works along the proposed transport corridor, particularly within areas classified as National Park. Weed control works should be implemented prior to construction/ track upgrade works to minimise the occurrence or intensification of weed populations. Vegetation losses associated with the haulage route will be adequately offset in the long term through the rehabilitation of chitter and tailing reclamation areas as details in the original Environmental Assessment Report (December 2006).

The conclusions of the impact assessment rely on the implementation of these mitigation strategies, with limited uptake of these mitigation measures potentially invalidating the assessment conclusions.

10.0 IMPACT ASSESSMENT

The proposed development may potentially impact threatened biodiversity and their habitats. An 'Assessment of Significance' was prepared under Section 5A of the EPA Act 1979 to determine the extent of this impact with weight given to the proposed mitigation strategies.

10.1 EP&A Act 1979

The "Assessment of Significance" presented below in **Table 17** has assessed the 'Subject Species' nominated in **Table 13** after the consideration of the development impacts (i.e. **Section 5.0**), assessment assumptions and proposed mitigation strategy (**Section 9.0**).

Table 17: Assessment of Significance – Threatened Species, EPs and EECs

Assessment Criteria	Assessment
a) In the case of a threatened species …… is likely to be placed at risk of extinction.	No core habitat for a threatened species is to be modified by the development. Future development is predominantly restricted to existing cleared bushland tracks, with impacts to native vegetation cover restricted to modified environs. Native vegetation removal restricted to a maximum of 0.17 ha near Tunnel Road within a chronically distured area and 0.1 ha at Richmond Main East (0.1 ha of KSSW). Threatened species secondary habitat to experience a temporary impact during construction and operation, which is to be mitigated. No significant impact on nominated 'Subject Species'.
b) In the case of an endangered population, .. is likely to be placed at risk of extinction.	No listed EPs are known to occur within the site. Impacts are localised and are not likely to significantly contribute to a cumulative impact on local EPs.
c) In the case of an endangered ecological community or critically endangered ecological community, whether the action proposed	
(i) is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or	No. The direct permanent impacts of the proposed transport corridors are largely restricted to existing cleared lands (i.e. existing tracks). Indirect impacts are temporary and mitigated.
(ii) Is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction.	No. The extent of Lower Hunter Spotted Gum Ironbark Forest and Kurri Sand Swamp Woodland within the study area will not be adversely impacted by the proposed development.

Assessment Criteria	Assessment
(d) In relation to the habitat of a threatened species, population or ecological community: (i) The extent to which habitat is likely to be removed or modified as a result of the action proposed. (ii) Whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed action. (iii) The importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species, population or ecological community in the locality.	None. Direct development impacts will be largely restricted to cleared lands (i.e. existing bushland tracks). Indirect impacts will be limited through mitigation and will not adversely affect the long term status of local native vegetation cover and/or habitats for the nominated 'Subject Species'. No. Development within the site will not contribute to any further wildlife corridor loss. The habitats to be directly/ indirectly impacted by the development are not of sufficient area, quality or importance for the long term survival of a species, population or ecological community in the locality (i.e. nominated Subject Species).
(e) Whether critical habitat will be directly or indirectly affected.	No critical habitat declared within or adjacent to the site. No further consideration warranted.
(f) Whether the action proposed is consistent with the objectives or actions of a recovery plan or threat abatement plan.	No recovery plans or threat abatement plans relevant to the development. No further consideration warranted.
(g) Whether the action proposed constitutes or is part of a key threatening process or is likely to result in the operation of, or increase the impact of, a key threatening process.	No. The proposed development of the site is not considered a KTP nor will it result in the operation of or increase the impact of a KTP.

The impact assessment for the proposed development clearly identifies there will no significant impact on the threatened biodiversity. No further mitigation measures are recommended to minimise the impacts stated in **Section 5.0**.

10.2 EPBC Act

Listed Threatened Species

Habitat analysis and sie survey identified the site to contain known habitat for the Parramatta Redgum (*Eucalyptus parramattensis subsp. decadens*) and *Grevillea parviflora* subsp. *parviflora*. Potential secondary habitat also exists for the Large-eared Pied Bat (*C. dwyeri*), Spotted-tailed Quoll (*D. maculatus*), Regent Honeyeater (*X. phrygia*), Swift Parrot (*L. discolor*) and Grey-headed Flying Fox (*P. poliocephalus*). These species and other EPBC Act 'Subject Species' have habitat preferences that are largely restricted to naturally vegetated parts of the study area, which will not be impacted by future development.

Listed Communities

White Box Yellow Box Blakely's Redgum Woodland and Derived Grasslands CEEC has no known occurrences within the locality, with no recorded presence within the site. No impact on this CEEC is expected as a consequence of site development.

Listed Migratory Species

Nine migratory species (terrestrial and wetland) were identified in the EPBC Act Protected Matters Report as potentially occurring in the locality. However, none of the listed migratory species or their habitats is likely to occur within the site. Therefore, it is concluded that there will be no significant impact on this matter of NES.

Significance Analysis

The nature and magnitude of the development's impact has considered the following matters to determine whether a referral to the Department of Environment and Water Conservation is necessary.

Table 18: NES Matters

All on site and off site impacts	Permanent removal of derived grassland, not woodland or forest derived grasslands will result in a permanent inconsequential biodiversity loss that will not directly impact any NES matters. Sufficient habitat contained within the locality/ retained within the site.
All direct and indirect impacts	Direct impacts will be restricted to the site with the impact being the permanent loss of groundcover biodiversity contained within the derived grasslands, which have limited threatened species values. No direct impacts expected on threatened plants.
The frequency and duration of the action	The proposed development is planned to be a single event and will be permanent.
The total impact which can be attributed to that action over the entire geographic area affected	Low.
The sensitivity of the receiving environment	The sensitivity of the receiving environment is low (i.e. existing cleared bush tracks). Areas of higher sensitivity such as those contained within adjoining forests and woodlands will be retained within the site and throughout the locality. Native vegetation corridors will not be affected by site development.
The degree of confidence with which the impacts of the action are known and understood	A high degree of confidence is placed on this assessment.

In summary, it is concluded that there will be a low insignificant impact on matters of National Environmental assuming the development includes the recommended mitigation measures. Accordingly, it is recommended that a referral to the Department of Environment and Water Consevation not be required to determine whether the proposed development is a controlled action under the EPBC Act.

10.3 SEPP 44 – Koala Habitat Protection

The site was assessed for Koala activity using the following methods:

- A search of the NPWS *Wildlife Atlas* Database (DEC, 2007);
- A survey on foot, with koala food trees being inspected for signs of koala use. Trees were inspected and identified for the presence of koalas, characteristic scratch and claw marks on the trunk and scats around the base of each tree. The proportion of trees showing signs of koala use was calculated. Additionally the location and density of droppings, if found, were documented; and
- Identification and an assessment of tree density (stems/ha) for preferred feed trees listed in SEPP No. 44 - Koala Habitat Protection, including an estimate of the tree density for each tree species across the site, determined by averaging the percentage of stems counted.

One preferred Koala feed tree species listed on Schedule 2 of SEPP 44 was found during the survey of the site (i.e. *Eucalyptus punctata*). No Koalas or evidence of recent Koala activity was observed during the survey period indicating the site is not core habitat. Given the absence of Koala preferred feed tree species and activity, it is considered that no further consideration of this matter is required for this site.

11.0 CONCLUSIONS

The results of the field survey, impact review and assessment support the following conclusions.

- Two threatened plant species listed on the TSC Act and EPBC Act were observed within the site during the survey period (i.e. *Eucalyptus parramattensis subsp. decadens and Grevillea parviflora subsp. parviflora*);
- Two EECs listed on the TSC Act were observed throughout areas that will be directly and indirectly impacted by the transport corridors (i.e. Lower Hunter Spotted Gum Ironbark Forest and Kurri Sand Swamp Woodland);
- No EPs and/or CEECs are known to occur within the site;
- No Critical Habtiat listed on the TSC Act and/or the EPBC Act occurs within the site;
- The proposed transport corridors will have a minor negligible direct/ indirect impact and will have no substantial affect on local biodiversity values in the medium to long term; and
- The impact on local and/or regional wildlife corridors will be low as development will be predominantly restricted to existing tracks and derived grasslands.

Assuming implementation of the recommoneded mitigation strategy it is considered that the proposed transport corridors will not require additional impact assessment (i.e. Referral to DEWR) for the further consideration of development impacts on threatened biodiversity.

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APPENDIX 1

EPBC Act Protected Matters Search

APPENDIX 2

Habitat Descriptions for Potential Subject Species

Species	Habitat Description
Bynoe's Wattle (Acacia bynoeana)	Acacia bynoeana is a decumbent shrub to 0.5 m high; branchlets +/- terete, +/- hairy, leaves narrow elliptic to linear slightly curved. Grows mainly in heath and dry sclerophyll forest, in shallow sandy soils south from Kurri Kurri to Nowra and west to Lithgow.
Parramatta Redgum (Eucalyptus parramattensis subsp. decadens)	Parramatta Redgum (Eucalyptus parramattensis subsp. decadens) is a locally frequentcanopy dominant occuring in dry sclerophyll woodland on sandy soils in low, often wet sites from Kurrir Kurri to Tomago near Newcastle.
Narrow-leaved Bottlebrush (Callistemon linearifolius)	Callistemon linearifolius is a bottlebruch growing to 3-4 m. Leaves are linear to linear-lanceolate, mostly 8-10 cm long and 5-7 mm wide, rarely up to 14 cm long and 12 mm wide, apex acute, margins thickened, lateral veins distinct. Flowers are red and appear in spring-summer. Grows in dry sclerophyll forest on the coast and adjacent ranges, chiefly from Georges R. to the Hawkesbury R.
Slaty Redgum (Eucalyptus glaucina)	Slaty Redgum (Eucalyptus glaucina) is a tree growing to 30 m high; bark smooth, white or grey, shedding in large plates or flakes. Juvenile leaves disjunct, ovate, glaucous. Adult leaves disjunct, lanceolate, 12-18 cm long, 2-3 cm wide, green or grey-green, dull, concolorous. Buds also glaucous. Locally frequent but very sporadic, in grassy woodland on deep, moderately fertile and well-watered soil; near Casino and from Taree to Broke.
Small-flowered Grevillea (Grevillea parviflora subsp. parviflora)	Small-flowered Grevillea (Grevillea parviflora subsp. parviflora) is a low open to erect shrub 0.3-1 m tall. Major branches ascending to erect; branchlets not secund with leaves not all held skywards. Leaves mostly 0.8-1.3 mm wide. Flower colour white with rusty brown hairs on limb; style white, sometimes becoming red with age. Flowers July-Dec. Endemic to N.S.W., occurring W and S of Sydney from W of Prospect (where now almost certainly extinct), Kemps Ck and lower Georges R. S to Camden, Appin and Cordeaux Dam, with disjunct northern populations S of Putty and near Cessnock and Cooranbong, possibly also S of Moss Vale.
Rutidosis heterogama	Rutidosis heterogama is a perennial herb with stems decumbent or erect and to 30 cm high from a woody base, +/- glabrous. Leaves alternate, linear, to 3.5 cm long, ca 2 mm wide with margins revolute. Flowers chiefly in autumn producing yellow flowers. Grows mostly in heath, often along disturbed roadsides; chiefly in coastal districts from Maclean to the Hunter Valley, and inland to Torrington, rare.
Black-eyed Susan (Tetratheca juncea)	Black-eyed Susan (Tetratheca juncea) grows in sandy, occasionally swampy heath and in dry sclerophyll forest; chiefly in coastal districts from Bulahdelah to Lake Macquarie, also recorded from Port Jackson to Botany Bay from which it is possibly extinct.
Rough-barked Apple (Angophora inopina)	Angophora inopina occurs in open woodland with a dense shrub understorey on deep white sandy soils over sandstone. This species is generally restricted to the Charmhaven - Wyee area, with records from western Port Stephens being the north limit of distribution.
Leafless Tongue Orchid (Cryptostylis hunteriana)	Leafless Tongue Orchid (Cryptostylis hunteriana) grows in swamp-heath on sandy soils, chiefly in coastal districts, south from the Gibraltar Range.
Pokolbin Mallee (Eucalyptus pumila)	A mallee growing to 6 m, bark smoth, white, grey or grey brown shedding in short ribbons. Juvenile leaves are disjunct and ovate. Adult leaves lanceolate green, glossy and concolorous. 7 flowed, fruit with raised disc and exsert valves. Grows in sclerophyll scrubland on skeletal sloping soils near Pokolbin.
North Rothbury Geebung (Persoonia pauciflora)	The North Rothbury Persoonia (Persoonia pauciflora) is a small spreading shrub, around 0.1-1.4 m high and 0.4-2 m wide. It has bright green needle like leaves which are moderately hairy when immature. The North Rothbury Persoonia closely resembles P. isophylla and to a lesser extent P. pinifolia, but can be distinguished by its fewer flowers and shorter flowering period (Weston 1999). The North Rothbury Persoonia occurs in dry open-forest or woodland habitats, generally with a grassy understorey (Patrick 1999).
Tiger Orchid (Cymbidium canaliculatum)	Epiphyte with linear leaves, 10-50 cm long, 1.5-4 cm wide, succulent, rigid, deeply V-shaped in cross section, not shiny. Flower 15-58 cm long, 12-60-flowered, suberect to pendent, basal; pedicel plus ovary 23-35 mm long. Sepals and lateral petals very variable in colour, usually olive green mottled with purple. Sepals 11-25 mm long, 4.5-10 mm wide. Labellum 9-15 mm long, with 2 parallel keels from the base to the base of the midlobe, not viscid, white to cream with red or purple markings (Harden, 1993). The Hunter River population associated with White Box (Eucalyptus albens), usually occurring singly or as single clumps,

Species	Habitat Description
	typically between two and six m above the ground. Less common hosts include Slaty Gum (E. dawsonii), Narrow-leaved Ironbark (E. crebra), Grey Box (E. moluccana), Rough-barked Apple (Angophora floribunda), Cooba (Acacia salicina) (NSW Scientific Committee, 2005). Database records identify the nearest occurrence of this species to be 70 km east of the study area near Sandy Hollow.
Pterostylis gibbosa	Terrestrial herb. Rosette leaves 4-7, elliptic to ovate, 1.5-3.5 cm long, 8-15 mm wide, margins entire. Scape to 45 cm high, with 3-6 closely sheathing stem leaves. Flowers 2-7, c. 1.5 cm long, bright green with transparent patches in the petals and galea, tips of lateral sepals brownish, shiny, semi-erect. Flowering: Aug.-Nov. Distribution and occurrence: Grows among grass in sclerophyll forest; rare, chiefly in the southern parts of the central coast, with a disjunct population in the Hunter Valley. NSW subdivisions: NC, CC
Stuttering Frog (Mixophyes balbus)	The Stuttering Frog (Mixophyes balbus) lives in forests such as Antarctic Beech, wet sclerophyll and rainforests. It often hides in leaf litter near permanent fast-flowing streams. Males call from beside streams during spring and summer. The female creates a small hollowed-out nest in shallow flowing water (in the gravel or leaf-litter) and lays the eggs into it.
Green and Golden Bell Frog (Litoria aurea)	The Green and Golden Bell Frog (Litoria aurea) prefers the edges of permanent water, streams, swamps, creeks, lagoons, farm dams and ornamental ponds where it is often located under debris including corrugated iron, timber and rock. Until recently this species was a common in coastal NSW, but has now drastically declined for unknown reasons. The former distribution of this species includes coastal swamps from Grafton in the north to the east Gippsland district of Victoria. Breeding occurs in spring and early summer, starting August, after heavy rains (Barker et al, 1995).
Green-thighed Frog (Litoria brevipalmata)	The Green-thighed Frog (Litoria brevipalmata) is a highly elusive secretive species that has irregular breeding and diverse habitat characteristics. However, this species has been observed in wet and swamp sclerophyll forests / woodlands north from Ourimbah to south-eastern Queensland. Breeding occurs in semi-permanent to ephemeral pools during late spring and summer, particularly after significant rainfall events. Advertisement calls by males are restricted to these heavy rainfall events and approximately 72hrs thereafter, with intensity and chorus participation decreasing with time.
Littlejohn's Tree Frog (Litoria littlejohni)	Littlejohn's Tree Frog (Litoria littlejohni) lives in sclerophyll forests, woodlands and heaths. This species calls in late winter and spring where most of the breed activity occurs.
Blue-billed Duck (Oxyura australis)	The Blue-billed Duck prefers deep water in large permanent wetlands and swamps with dense aquatic vegetation. The species is completely aquatic, swimming low in the water along the edge of dense cover. It will fly if disturbed, but prefers to dive if approached. It feeds by day far from the shore, particularly if dense cover is available in the central parts of the wetland. They feed on the bottom of swamps eating seeds, buds, stems, leaves, fruit and small aquatic insects such as the larvae of midges, caddisflies and dragonflies. Blue-billed Ducks are partly migratory, with short-distance movements between breeding swamps and overwintering lakes with some long-distance dispersal to breed during spring and early summer. They usually nest solitarily in Cumbungi over deep water between September and February. They will also nest in trampled vegetation in Lignum, sedges or Spike-rushes, where a bowl-shaped nest is constructed. The most common clutch size is five or six. Males take no part in nest-building or incubation. Young birds disperse in April-May from their breeding swamps in inland NSW to non-breeding areas on the Murray River system and coastal lakes.
Jabiru (Ephippiorhynchus asiaticus)	The Jabiru (Ephippiorhynchus asiaticus) inhabits wetlands, such as floodplains of rivers with large shallow swamps and pools, and deeper permanent bodies of water. Occasionally individuals will stray into open grass, woodland areas or flooded paddocks in search of food. In the past the species was found in much of eastern New South Wales, but is now extinct throughout much of this area. The range of the Black-necked Stork has been reduced with the modification of floodplains and tall reedbeds for agriculture, mining and human settlement.
Black-breasted Buzzard (Hamirostra melanosternon)	Usually solitary or in pairs or family groups but gathers in small numbers (up to nine recorded) at large carcasses. Movement by part of the population northward in winter for the dry season, but many birds resident year round. In summer, escapes tropical coasts (wet season) and hottest deserts. Usually nests

Species	Habitat Description
	as solitary pair but one polyandrous trio recorded. Builds a large platform of sticks lined with leaves in a living or dead tree in the open. Typically, lays a clutch of two eggs in August–October. Incubation about 36 days; chicks fledge after about seven or eight weeks.
Osprey (Pandion haliaetus)	The Osprey (Pandion haliaetus) is a specialist preditor feeding exclusively on a diet of fish in marine and brackish water environments. Habitats include coasts, eastuaries, bays, inlets islands and surrounding water, coral atolls, reefs, lagoons, rock cliffs. Nesting is generally within dead trees nearby the waters edge, with repeat nest use commonly encountered.
Australian Painted Snipe (Rostratula benghalensis)	The Australian Painted Snipe (Rostratula australis) is usually found in shallow inland wetlands, either freshwater or brackish, that are either permanently or temporarily filled. It is a cryptic bird that is hard to see and often overlooked, usually only single birds are seen. It nests on the ground amongst tall reed-like vegetation near water, and feeds near the water's edge and on mudflats, taking invertebrates, such as insects and worms, and seeds. The species has a scattered distribution throughout many parts of Australia, with some individuals being sedentary, while other individuals appearing to be nomadic, temporarily occupying areas where suitable habitat exists. The Murray–Darling drainage system appears to have been a key area for this species, as many records of this species come from this region. Although the Australian Painted Snipe can occur across Australia, the areas of most sensitivity to the species are those wetlands where the birds frequently occur and are known to breed.
Wompoo Fruit-Dove (Ptilinopus magnificus)	The Wompoo Fruit-dove (Ptilinopus magnificus) inhabits rainforests and their fringes (Pizzey and Knight, 1997) from Tuggerah Lakes in the south to Cape York to the north. The Wompoo Fruit-dove (Ptilinopus magnificus) feeds primarily on the fruit of rainforest trees and moist vegetation. Unlike the Superb Fruit-dove (Ptilinopus superbus), the Wompoo Fruit-dove (Ptilinopus magnificus) is a sedentary species that is not known to disperse throughout its prescribed range.
Superb Fruit-Dove (Ptilinopus superbus)	The Superb Fruit-dove (Ptilinopus superbus) inhabits rainforests and their fringes, as well as mangroves and wooded stream margins (Pizzey and Knight, 1997). Habitat within and near rainforests includes scrub, lantana thickets, isolated figs, pittosporums, Lilly Pilly, and blackberries (Pizzey and Knight, 1997). The Superb Fruit-dove feeds primarily on the fruit of rainforest trees and moist vegetation.
Gang-gang Cockatoo (Callocephalon fimbriatum)	The Gang-gang Cockatoo (Callocephalon fimbriatum) inhabits tall montane forests and woodlands in summer, particularly heavily timbered mature wet sclerophyll forests. Also occurs in sub-alpine Snow Gum woodland and occasionally in temperate rainforests. Undertakes nomadic and seasonal movements, and in winter tends to occur at lower altitudes in drier, more open eucalypt forest and woodland, particularly Box-Ironbark associations, and in dry forest in coastal areas (NSW Scientific Committee). Feeds on green acacia seeds, eucalypt seeds, fruits and berries, including seeds, fruits and berries of introduced plant species (Lindsey 1992; Blakers et al 1984). Tends to exhaust one food supply before moving to another (Blakers et al 1984). Nests in hollows in large old trees, usually close to water. Shows strong nest site fidelity. Breeding occurs mainly in tall mature wet sclerophyll forests with a dense understorey (NSW Scientific Committee).
Glossy Black-Cockatoo (Calyptorhynchus lathami)	The Glossy Black-cockatoo (C. lathami) has patchy distribution in a wide coastal band from Eungella, eastern Queensland, to Orbost, Victoria. In NSW it is found on the coast, tablelands and as far west as the Riverina and Pilliga Scrub. It feeds almost exclusively on the fruit of Forest Sheoak (A. torulosa) and Black Sheoak (A. littoralis) in coastal forests, woodlands and timbered watercourses (Pizzey and Knight, 1997). Chewed cones (fruits) beneath these shrub species are indicative of Glossy Black-cockatoo (C. lathami) activity.
Swift Parrot (Lathamus discolor)	The Swift Parrot (L. discolor) breeds in Tasmania and islands of Bass Strait, migrating in winter to Victoria and coastal NSW. Isolated flocks are occasionally observed near Sydney, the Hunter Valley and sometimes to the Queensland Border (Frith, 1982). The Swift Parrot (L. discolor) feeds primarily on the blossom of Mugga Ironbark (E. sideroxylon), Narrow-leaved Ironbark (E. crebra), Swamp Mahogany (E. robusta) and Spotted Gum (C. maculata) while migrating through the Sydney Basin Bioregion.
Turquoise Parrot	The Turquoise Parrot (Neophema pulchella) inhabits open eucalypt woodland and forest, especially with a grassy understorey and rocky outcrops (Lindsey

Species	Habitat Description
(Neophema pulchella)	1992). Prefers the edge of eucalypt woodland adjoining clearings and also timbered ridges and creeklines in farmland (Blakers et al 1984; NPWS 1999). Birds may move from eucalypt woodland to pasture after the breeding season in some places (Blakers et al 1984). Usual forests/woodlands have mixed assemblages of Cypress Pine Callitris sp and a variety of eucalypts including White Box, Yellow Box, Red Box, Blakely's Red Gum, Red Stringybark, Bimble Box or Mulga Ironbark (NPWS 1999). Usually occurs in small family groups, forages on the ground for seeds (native and introduced) (Lindsey 1992; Blakers et al 1984). Requires a reliable drinking supply (NPWS 1999). Nests may be located in hollows of small trees, in holes or stumps of dead eucalypts, fence posts or even logs lying on the ground (NPWS 1999). Suffered a major decline in numbers early this century (NPWS 1999; Lindsey 1992), possibly due to competition with livestock during drought and/or trapping (Blakers et al 1984). Appears now to have regained much of its former range (Blakers et al 1984; Lindsey 1992).
Barking Owl (Ninox connivens)	The Barking Owl (Ninox connivens) inhabits mainly woodland areas, but is also known to utilise open forest and partially cleared lands as part of its life cycle (NSW Scientific Committee, 1998). Pizzey and Knight (1997) report its habitat to consist of open forest, woodlands, dense scrubs, river red gums or other large trees near watercourses and paperbark woodlands. Barking Owls live in pairs and their territory size is generally large (greater than 100 ha). They use hollow-bearing trees for nesting purposes in association with open country for foraging. The primary diet of the Barking Owl comprises prey items such as small mammals and birds.
Powerful Owl (Ninox strenua)	The Powerful Owl (N. strenua) is found in a range of vegetation types from woodland and open forest to rainforest. In NSW it is distributed throughout the length of the Great Dividing Range and western slopes. The Powerful Owl (N. strenua) is a nocturnal, solitary, carnivorous owl that inhabits dense mountain gullies, coastal forests and woodlands, coastal scrubs, and pine plantations over a large range (approx. 400-1400 ha) (Pizzey and Knight, 1997).
Masked Owl (Tyto novaehollandiae)	The Masked Owl (T. novaehollandiae) occupies a wide range of forest types, including wet and dry sclerophyll and rainforest and is thought to prefer drier forests and woodlands in flat or undulating country. This species prefers a mosaic of sparse and dense ground cover. Habitat includes forests, open woodlands, farmlands with large trees, adjacent cleared country, timbered watercourses, paperbark woodlands and caves (Pizzey and Knight, 1997).
Sooty Owl (Tyto tenebricosa)	The Sooty Owl (T. tenebricosa) occurs throughout coastal south-east Australia from the Conondale Range in south-east Queensland to eastern Victoria and is found throughout coastal NSW, generally east of the Great Dividing Range (Pizzey and Knight, 2001). Although regarded as a specialist inhabitant of rainforest and tall open forest, it is occasionally recorded foraging in adjacent dry sclerophyll forests. It roosts by day in dense gully vegetation such as rainforest, although the species will also roost in tree hollows, caves and rock overhangs and occupies territory between 200-800ha. (Pizzey and Knight, 1997).
Brown Treecreeper (Climacteris picumnus)	The Brown Treecreeper is a medium-sized insectivorous bird that occupies eucalypt woodlands, particularly open woodland lacking a dense understorey. It is sedentary and nests in tree hollows within permanent territories, breeding in pairs or communally in small groups. Birds forage on tree trunks and on the ground amongst leaf litter and on fallen logs for ants, beetles and larvae (Pizzey and Knight, 1997). The eastern subspecies of the Brown Treecreeper Climacteris picumnus victoriae is 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 (NSW Scientific Committee, 2001b). The broad range of the Brown Treecreeper has not changed but it is now extinct in parts of its range. Declines in populations have been recorded from the Cumberland Plain, the New England Tablelands, the Inverell district, from Munghorn Gap Nature Reserve near Mudgee, and from travelling stock routes in the Parkes district (NSW Scientific Committee, 2001b). Reid (1999) identified the Brown Treecreeper as a 'decliner' in a review of bird species' status in the NSW sheep-wheatbelt. Habitat degradation, including loss of hollow bearing trees, threatens Brown Treecreeper populations. Grazing by stock in woodland areas leads to a decrease the diversity of ground-dwelling invertebrates decreasing the availability of food for the birds. In addition, Brown Treecreepers are likely to be threatened by such factors as increased competition with aggressive honeyeater species and increased levels of

Species	Habitat Description
	nest predation that are a consequence of fragmentation of habitat (NSW Scientific Committee, 2001b).
Speckled Warbler (Pyrrholaemus sagittatus)	The Speckled Warbler (C. sagittatus) inhabits woodlands with a grassy understorey, often on ridges or gullies. The species is sedentary, living in pairs or trios and nests on the ground in grass tussocks, dense litter and fallen branches. They forage on the ground and in the understorey for arthropods and seeds. Home ranges vary from 6-12 hectares. The preferred foraging habitat of Speckled Warbler (C. sagittatus) is areas with a combination of open grassy patches, leaf litter and shrub cover. This habitat is susceptible to degradation by stock and weed invasion. Nesting on the ground also makes them vulnerable to predation from exotic mammalian predators such as foxes and cats (NSW Scientific Committee, 2001a).
Black-chinned Honeyeater (Melithreptus gularis gularis)	The eastern form of the Black-chinned Honeyeater (Melithreptus gularis gularis) is found predominantly west of the Great Dividing Range in a narrow belt through NSW into southern Queensland, and south into Victoria and South Australia where it occupies eucalypt woodlands within an approximate annual rainfall range of 400-700mm. In NSW, the species is mainly found in woodlands containing box-ironbark associations and River Red Gum. Black-chinned Honeyeaters are also known from drier coastal woodlands of the Cumberland Plain, Western Sydney and in the Hunter, Richmond and Clarence Valleys (NSW Scientific Committee, 2001c).
Regent Honeyeater (Xanthomyza phrygia)	The Regent Honeyeater (X. phrygia) inhabits temperate eucalypt woodland and open forest including forest edges, wooded farmland and urban areas with mature eucalypts in areas of low to moderate relief on the inland slopes of the Great Dividing Range. The species also visits coastal southern areas and the northern tablelands (Pizzey and Knight, 1997). The Regent Honeyeater is a highly nomadic, arboreal nectivore and insectivore that relies on an abundance of nectar sources. This species follows flowering cycles of Eucalyptus, particularly Red Ironbark (E. sideroxylon), White Box (E. albens), Yellow Box (E. melliodora), Yellow Gum (E. leucoxylon) and River Red Gum (E. camaldulensis) as well as the flowers of mistletoe growing on River She-oak (Casuarina cunninghamiana). On the NSW Central Coast, this species is known to feed on Swamp Mahogany (E. robusta), Spotted Gum (C. maculata) and Coastal Banksia (Banksia integrifolia)
Painted Honeyeater (Grantiella picta)	The Painted Honeyeater (Grantiella picta) is a small nectivorous bird specialising in foraging on mistletoe. It largely occurs west of the Great Dividing Range and dry sub-coastal districts, with breeding occurring during November .
Hooded Robin (Melanodryas cucullata)	The Hooded Robin (Melanodryas cucullata) is distributed throughout south-eastern Australia, from Central Queensland, to Spencer Gulf, South Australia. The threatened form of the Hooded Robin occurs throughout NSW except for the north-west of the state where it inter-grades with the smaller northern form of the Hooded Robin. It occupies Eucalypt woodlands, Acacia shrublands and open forests. In temperate woodlands, the species favours open areas adjoining large woodland blocks, with areas of dead timber and sparse shrub cover. In semi-arid western NSW, the species favours open woodlands of Belah, Rosewood, Mulga and Cypress. Hooded Robins live in small family groups of pairs or trios, and build cup-shaped nests. Home ranges are relatively large, and averaged 18ha for birds from the New England Tableland. The species feeds on the ground by pouncing on insects, and forages in areas with a mix of bare ground, ground cover and litter (NSW Scientific Committee, 2001d)
Grey-crowned Babbler (Pomatostomus temporalis temporalis)	The Grey-crowned Babbler (P. temporalis) is a species that lives and breeds in a highly co-ordinated group. Groups generally consist of a pair of breeding adults, which are accompanied by sub-adults or offspring ranging from 5-12 individuals, with some groups containing as many as 16 during excellent breeding conditions (Mark Aitkens, pers. obs.). Groups often forage and breed within a territory up to 12 ha in area, and often interact with adjoining groups during territory battles. Foraging activity ranges from ground rummaging to active searches of tree bark and branches. Aerial prey is also readily targeted during foraging activities, however their ability to collect such items is regarded as poor (Frith, 1982). Overnight roosting occurs within two nest types including breeding and dormitory style structures, with their relative usage dependant on the time of year. Breeding is most often during the spring period, immediately or soon after significant rainfall, with autumn breeding less frequent and only apparent during particularly good seasons. Breeding success is considered poor,

Species	Habitat Description
	with larger groups often more successful than smaller ones. Accordingly, it is apparent that Grey-crowned Babblers (P. temporalis) are a long-lived species, relying on continued breeding attempts by life-long breeding partners rather than successful short breeding life cycles (Frith, 1982).
Diamond Firetail (Stagonopleura guttata)	The Diamond Firetail (Stagonopleura guttata) is a brightly coloured finch that occupies eucalypt woodlands, forests and mallee where there is a grassy understorey. Firetails build bottle-shaped nests in trees and bushes, and forage on the ground, largely for grass seeds and other plant material, but also for insects (Frith, 1982). This species is distributed through central and eastern NSW, extending north into southern and central Queensland and south through Victoria to the Eyre Peninsula, South Australia. In NSW, the species occurs predominantly west of the Great Dividing Range, although populations are known from drier coastal areas such as the Cumberland Plain of western Sydney and the Hunter, Clarence, Richmond and Snowy River valleys (NSW Scientific Committee, 2001e). The Diamond Firetail is threatened by habitat clearing and fragmentation. Isolation and reductions in the size of vegetation remnants inhibits dispersal and increase their vulnerability to local extinction via stochastic events. Small, isolated populations also lose their long-term genetic viability (NSW Scientific Committee, 2001e). Further, Diamond Firetail populations appear unable to persist in areas that lack remnants of native vegetation larger than 200 ha. Habitat degradation, particularly overgrazing of the grass understorey, threatens the granivorous Diamond Firetail. In addition, an increased abundance of predators such as Pied Currawongs and Australian Ravens may increase nest predation in fragmented woodland remnants (NSW Scientific Committee, 2001e).
Spotted-tailed Quoll (Dasyurus maculatus)	The Spotted-tailed Quoll (D. maculata) inhabits a variety of habitats including dry to moist open forests or closed forests containing rock caves, hollow logs or trees for shelter / breeding. Populations of the Spotted-tailed Quoll (D. maculata) are very sensitive to changes in the predator-prey relationship of their chosen environment (Catling and Burt, 1995). An area containing an abundant source of medium sized mammals (0.2-6.0 kg) is likely to indicate that the given area may contain the Spotted-tailed Quoll (D. maculata) and not the European Red Fox (V. vulpes). Conversely, the opposite relationship is true, with a low abundance of medium sized mammals indicating the absence of the Spotted-tailed Quoll (D. maculata) due to the predatory influence of the European Fox (V. vulpes) (Catling and Burt, 1995).
Koala (Phascolarctos cinereus)	The Koala (Phascolarctos cinereus) has a fragmented distribution from Townsville area in Queensland to southern Victoria, with isolated populations in southeastern South Australia and is widely distributed on either side of the Great Dividing Range. It is a large tree dwelling mammal that is a specialist feeder on a small selection of Eucalyptus trees. SEPP 44 lists a total of ten species statewide on which Koalas are reliant for food. At least 55 species of Eucalyptus and 11 non-Eucalypts are known foraging resources of the Koala. Population densities are typically much less than 10 per hectare. Habitat for the Koala is particularly sensitive to disturbances such as land clearing, logging, habitat fragmentation, predation by dogs and repetitive fire regimes.
Yellow-bellied Glider (Petaurus australis)	The Yellow-bellied Glider occupies coastal forests and adjacent sub coastal forests of mid-to-high elevations and the dry and moist escarpment forests in north-east NSW. It occupies tall mature eucalypt forest with the associated large trunk size and adapts well to utilising highly disturbed forest, such as in urban areas. It feeds on the sap of eucalypts and also plant / animal exudates, nectar and pollen (Strahan, 1998). This species is often associated with ecotones between wet and dry sclerophyll forests where there is a high diversity of tree species for sap. The home range is of the order of 35 ha and individuals may travel more than 2 km from the den to foraging sites (Strahan, 1998).
Squirrel Glider (Petaurus norfolcensis)	The Squirrel Glider (P. norfolcensis) inhabits the drier sclerophyll forest and woodlands of southeastern Australia and is generally absent from the wetter coastal forests. This species usually occurs in biologically diverse woodlands and forests on moderately fertile soils below 600 m above sea level, particularly where there is high nectar-producing eucalypts and flowering shrubs. This species often feeds on nectar, pollen, eucalypt sap, Acacia gum and arthropods. Banksia, Xanthorrhea and Acacia also provide important food resources (Strahan, 1998). This species requires trees with hollows for nests and den sites. On the NSW Central Coast, the Squirrel Glider is most abundant in woodlands and forests with winter flowering eucalypts (i.e. Spotted Gum, Forest Redgum) and

Species	Habitat Description
	understorey with Banksia (Banksia spinulosa) and Wattle (Acacia irrorata). The highests densities reorded in this region were in woodlands dominated by Scribbly Gum (Eucalyptus haemastoma), Smooth-barked Apple (Angophora costata) and Red Bloodwood (Corymbia maculata) with banksia and xanthhorrohea understorey (Smith and Murray, 2003)
Brush-tailed Rock-wallaby (Petrogale penicillata)	The Brush-tailed Rock Wallaby (Petrogale penicillata) is a highly agile and distinctively marked medium-sized wallaby, which occupies rocky habitats. Habitats occupied by this species tend to take one of three forms: loose piles of large boulders containing a maze of subterranean holes and passageways; cliffs (usually over 15m high) with many mid-level ledges and with some caves and/or ledges covered by overhangs; and isolated rock stacks, usually sheer-sided and often girdled with fallen boulders (Short 1982). These habitats are likely to be a subset of those occupied by the species prior to European settlement, and may represent refuge sites in which competition and predation pressures are reduced. Vegetation forms a vital habitat component (especially in refuge sites in association with rock outcrops), but its importance has been largely overlooked in many areas.
Grey-headed Flying Fox (Pteropus poliocephalus)	The Grey-headed Flying Fox (P. poliocehpalus) is a colonising species that travels daily to suitable foraging areas within an average radius of 15 km from its daily roost. The Grey-headed Flying Fox feeds on a variety of flowering and fruiting plants and is responsible for the seed dispersal of many rainforest tree species (Strahan, 1998). This species is relatively common to the east coast of NSW during the summer months where it forms large roosting colonies by day only to disperse during the night to forage throughout an area up to 70 km away from the primary roost locality. The Grey-headed Flying Fox (P. poliocehpalus) has been recorded forming a large perennial diumal roost within the Sydney Basin, from which they disperse by night to a number of suitable foraging grounds including native vegetation and agricultural areas supporting stone fruit orchards. Local foraging activity in the eucalypt canopy is probable in areas containing suitable eucalypt blossom.
Yellow-bellied Sheathtail-bat (Saccolaimus flaviventris)	The Yellow-bellied Sheath-tailed Bat (Saccolaimus flaviventris) is known from relatively few, dispersed sites where it inhabits rainforests, sclerophyll forests and woodlands. This species has been noted to forage and breed throughout these habitats where suitable tree hollows are available for roosting (Churchill, 1998).
Eastern Freetail Bat (Mormopterus norfolkensis)	The Eastern Free-tail Bat (M. norfolkensis) is known to frequent a variety of habitats including sclerophyll forests and woodlands. It has been recorded in a variety of forest types ranging from rainforest to dry-hardwood forest (Strahan, 1998). The Eastern Free-tail Bat (M. norfolkensis) hunts insects above the forest canopy or in clearings. It is known to roost in tree hollows, under loose bark and in houses and outbuildings (Churchill, 1998). Strahan (1998) states that it tends to be predominantly tree dwelling
Eastern False Pipistrelle (Falsistrellus tasmaniensis)	The Eastern False Pipistrelle (F. tasmaniensis) is widely distributed and known from rainforest, wet and dry sclerophyll forests and is more common at cool elevations (Strahan, 1998). It prefers wet habitats where trees are more than 20 metres high (Churchill, 1998). This species roosts in tree hollows, abandoned buildings and in caves. Foraging resources include moths, beetles and ants at or just below the tree canopy. Foraging patterns over water have also been noted (Churchill, 1998).
Little Bentwing Bat (Miniopterus australis)	The Little Bent-wing Bat (Miniopterus australis) has been recorded in rainforest, wet sclerophyll forest, dense coastal scrub and other habitats with dense understoreys. It forages below the canopy within open forests and woodlands, feeding on small insects (Strahan, 1998). Melaleuca swamps and dry sclerophyll forests are also frequently used habitats (Strahan, 1998). The Little Bent-wing Bat has been found mostly roosting in caves, mines, culverts, old buildings and tunnels, however it has also been infrequently observed in tree hollows (although their importance is unknown).
Eastern Bentwing Bat (Miniopterus schreibersii)	The Eastern Bent-wing Bat has been recorded in rainforest, wet and dry sclerophyll forest, and woodland (Strahan, 1998). Core habitat is restricted to a relatively small number of caves that are used for breeding. This species feeds on small insects at night above and beneath the canopy of well-timbered valleys (Strahan, 1998).

Species	Habitat Description
Large-footed Myotis (Myotis adversus)	The Large-footed Myotis (M. adversus) inhabits a range of habitats from rainforests to sclerophyll forests in close proximity to creeks and lakes over which it forages for aquatic insects and small fish (Churchill, 1998). This species is known to roost in caves, mines and tunnels with tree hollow roosts recorded throughout it southern range (Menkhorst and Knight, 2001).
Greater Broad-nosed Bat (Scoteanax rueppellii)	The Greater Broad-nosed Bat (S. rueppellii) inhabits a wide variety of habitats from woodland through to moist and dry eucalypt forest to rainforest. This species roosts in tree hollows and is known to feed on small vertebrates and insects in the understorey vegetation and at the interface between clearings and woodlands. It has been found in roof spaces of old buildings (Strahan, 1998).
Large-eared Pied Bat (Chalinolobus dwyeri)	The Large-eared Pied Bat (Chalinolobus dwyeri) has a restricted distribution from south central Queensland to central and northern NSW and is localised and uncommon throughout its range, occurring in Rainforest, wet sclerophyll forest to dry sclerophyll forest and woodland habitats (Churchill, 1998). It has been recorded in the Richmond and Nightcap Ranges and near Singleton (NPWS, 2003). Strahan (1998) indicates a more extended range, with recordings from Rockhampton in central coastal Queensland to Bungonia in southern NSW.
Eastern Cave Bat (Vespadelus troughtoni)	The Eastern Cave Bat (Vespadelus troughtoni) is a widely distributed cave roosting species occurring north from the Hunter Valley along coastal and tableland districts.

APPENDIX 3

Flora and Fauna Species Lists

Table A2.1 Flora Species Recorded within the Site

Scientific Name	Native	c.a.	Derived Grassland	Forest	Woodland
Cheilanthes sieberi subsp. sieberi	Y	2	1	1	
Yucca aloifolia	N	2	1		
Gomphrena celosioides	N	4	1	1	
Caesia parviflora	Y	1		1	
Laxmannia gracilis	Y	1	1	1	
Gomphocarpus fruticosus	N	2	1		
Calotis lappulacea	Y	2	1		
Chrysocephalum apiculatum	Y	1	1		
Cirsium vulgare	N	2	1		
Conyza bonariensis	N	1	1	1	
Coreopsis lanceolata	N	2		1	
Cotula australis	Y	1	1	1	
Hypochaeris radicata	N	1	1		
Ozothamnus diosmifolius	Y	2	1		
Senecio madagascariensis	N	1			
Senecio sp.	N	1		1	
Solenogyne bellioides	Y	1		1	
Vernonia cinerea	Y	1		1	
Allocasuarina littoralis	Y	1	1		
Gahnia aspera	Y	1		1	
Lepidosperma laterale	Y	1	1	1	
Ptilothrix deusta	Y	2			1
Hibbertia pedunculata	Y	1	1	1	
Drosera peltata	Y	1	1		
Leucopogon virgatus	Y	4			1
Lissanthe strigosa	Y	1	1	1	
Melichrus urceolatus	Y	1	1		
Breynia oblongifolia	Y	2		1	
Phyllanthus hirtellus	Y	1	1	1	
Daviesia ulicifolia	Y	1	1	1	
Dillwynia retorta	Y	1	1		
Glycine clandestina	Y	1		1	
Gompholobium pinnatum	Y	1			1
Indigofera australis	Y	2	1		
Jacksonia scoparia	Y	2		1	
Pultenaea daphnoides	Y	2			1
Pultenaea spinosa	Y	1	1		
Trifolium sp.	N	1	1		
Acacia brownii	Y	1	1	1	
Acacia elongata	Y	2	1		
Acacia longifolia	Y	1	1	1	
Acacia parvipinnula	Y	1	1	1	
Acacia terminalis	Y	1		1	
Goodenia hederacea	Y	2	1		
Gonocarpus teucrioides	Y	1			1
Patersonia sericea	Y	2			1
Pratia purpurascens	Y	1	1	1	

Scientific Name	Native	c.a.	Derived Grassland	Forest	Woodland
Lomandra filiformis subsp. filiformis	Y	2		1	
Lomandra glauca	Y	4			1
Lomandra longifolia	Y	2		1	
Lomandra multiflora ssp. multiflora	Y	2	1		
Sida rhombifolia	N	1	1	1	
Myrsine variabilis	Y	2		1	
Angophora bakeri	Y	2			1
Callistemon linearis	Y	2	1	1	
Corymbia maculata	Y	1	1	1	
Eucalyptus crebra	Y	1		1	
Eucalyptus fibrosa	Y	1		1	
Eucalyptus parramattensis subsp. decadens	Y	2			1
Eucalyptus punctata	Y	2	1	1	
Leptospermum polygalifolium	Y	1	1	1	
Melaleuca nodosa	Y	1	1	1	
Melaleuca styphelioides	Y	1		1	
Melaleuca thymifolia	Y	2			1
Syncarpia glomulifera	Y	1		1	
Notelaea longifolia	Y	2	1		
Thelymitra nudum	Y	2			1
Oxalis perrenans	Y	1		1	
Dianella caerulea	Y	2	1	1	
Dianella revoluta var. revoluta		4			1
Bursaria spinosa	Y	1	1	1	
Pittosporum undulatum	Y	1		1	
Plantago lanceolata	N	1	1		
Andropogon virginicus	N	1	1	1	
Aristida vagans	Y	2	1	1	1
Austrodanthonia sp.	Y	4	1	1	
Chloris gayana	N	2	1	1	
Cymbopogon refractus	Y	1		1	
Cynodon dactylon	Y	1	1	1	
Dichelacne micrantha	Y	1	1	1	
Digitaria parviflora	Y	4	1	1	
Entolasia marginata	Y	1		1	
Entolasia stricta	Y	1	1	1	1
Eragrostis brownii	Y	1		1	
Eragrostis leptostachya	Y	2		1	
Imperata cylindrica	Y	2	1	1	
Microlaena stipoides var stipoides		1	1		
Panicum effusum	Y	3	1		
Panicum simile	Y	1	1	1	
Paspalum dilatatum	N	2	1		
Pennisetum clandestinum	N	2	1		
Poa labillardieri	Y	1	1		
Setaria gracilis	N	1	1	1	
Sporobolus creber	Y	2	1		
Themeda australis	Y	1		1	1

Scientific Name	Native	c.a.	Derived Grassland	Forest	Woodland
Anagallis arvensis	N	1			
Banksia spinulosa	Y	4			1
Grevillea montana	Y	1	1	1	
Grevillea parviflora subsp. parviflora	Y	1			1
Grevillea sericea	Y	1			1
Hakea sericea	Y	2		1	
Isopogon anemonifolius	Y	1			1
Lambertia formosa	Y	2			1
Persoonia linearis	Y	1		1	
Pomax umbellata	Y	1	1	1	
Correa reflexa	Y	1	1		
Exocarpos strictus	Y	1		1	
Vebascum thapsus	N	1	1	1	
Pimelea linifolia	Y	2	1		
Urtica incisa	Y	1		1	
Lantana camara	N	1		1	
Verbena bonariensis	N	2	1	1	
Xanthorrhoea australis	Y	2			1
Macrozamia flexuosa	Y	2	1	1	

Table A2.2: Fauna Species recorded within the Site

Class	Family	Scientific Name	Common Name	Exotic
Avifauna	Acanthizidae	*Acanthiza chrysorrhoa*	Yellow-rumped Thornbill	
		Smicrornis brevirostris	Weebill	
	Artamidae	*Cracticus nigrogularis*	Pied Butcherbird	
		Cracticus torquatus	Grey Butcherbird	
		Gymnorhina tibicen	Australian Magpie	
		Strepera graculina	Pied Currawong	
	Cacatuidae	*Eolophus roseicapillus*	Galah	
		Calyptorhynchus funereus	Yellow-tailed Black-Cockatoo	
	Campephagidae	*Coracina novaehollandiae*	Black-faced Cuckoo-shrike	
	Columbidae	*Ocyphaps lophotes*	Crested Pigeon	
		Phaps chalcoptera	Common Bronzewing	
	Corvidae	*Corvus coronoides*	Australian Raven	
	Dicaeidae	*Grallina cyanoleuca*	Magpie-lark	
		Rhipidura albiscapa	Grey Fantail	
	Halcyonidae	*Dacelo novaeguineae*	Laughing Kookaburra	
	Maluridae	*Malurus cyaneus*	Superb Fairy-wren	
	Meliphagidae	*Anthochaera carunculata*	Red Wattlebird	
		Lichenostomus chrysops	Yellow-faced Honeyeater	
		Lichenostomus penicillatus	White-plumed Honeyeater	
		Manorina melanocephala	Noisy Miner	
		Philemon corniculatus	Noisy Friarbird	
	Pachycephalidae	*Colluricincla harmonica*	Grey Shrike-thrush	
		Pachycephala pectoralis	Golden Whistler	
		Pachycephala rufiventris	Rufous Whistler	
	Pardalotidae	*Pardalotus punctatus*	Spotted Pardalote	
		Pardalotus striatus	Striated Pardalote	
		Platycercus adscitus eximius	Eastern Rosella	
		Platycercus elegans	Crimson Rosella	
	Zosteropidae	*Zosterops lateralis*	Silvereye	
Mammalia		*Vulpes vulpes*	Fox	*
		Oryctolagus cuniculus	Rabbit	*

Class	Family	Scientific Name	Common Name	Exotic
	Macropodidae	*Macropus giganteus*	Eastern Grey Kangaroo	
		Macropus rufogriseus	Red-necked Wallaby	
	Phalangeridae	*Trichosurus vulpecula*	Common Brushtail Possum	
	Tachyglossidae	*Tachyglossus aculeatus*	Short-beaked Echidna	
Reptilia	Agamidae	*Pogona barbata*	Eastern Bearded Dragon	
		Lampropholis delicata	Dark-flecked Garden Sunskink	
	Varanidae	*Varanus varius*	Lace Monitor	

Hunter Enviro-Mining (Operations) Pty Limited

Preferred Project Report

Chitter & Tailings Reclamation Project

Appendix 9

Noise Impact Review

October 2007

12 September 2007

Ref: 06225/2336

Mr Alan Wells
Wells Environmental Services
PO Box 205
East Maitland NSW 2323

RE: DECC QUERIES IN RELATION TO HEBBURN NO. 3 RECLAMATION PROJECT (APPLICATION 06/0236)

Dear Alan,

This letter is written in response to queries raised by the N.S.W. Department of Environment and Climate Change (DECC) in relation to the noise impact assessment (NIA) for the proposed Hebburn No. 3 Chitter and Tailings Reclamation Project. The letter specifically addresses points raised in the DECC's letter to the NSW Department of Planning reference number 273149A3:DOC 07/784. For ease of communication this letter will address points raised using the numbering system employed in the DECC response.

1.4 Predicted Noise Levels

1.4.1 Operational Noise Levels

In relation to noise from trucks on the access roads to the project areas, the NIA states that the nature of extraction at each of the proposed sites is not static. The location of the extraction site will move as resource is progressively depleted. With all such mobile operations noise exposure in the direction of, and at the location of, individual receivers will vary depending on the instantaneous location of each noise source.

The noise criterion for the assessment of impacts is based on a 15 minute Leq. As indicated there may be 5 or 6 trucks on site during a given 15 minute period but those trucks will not be stationary and producing maximum noise emissions for that period. Rather, they will move onto site, be loaded and move off. The sound power level (Lw) of 97 dB(A) for a truck moving at low speed has been sourced from the Spectrum Acoustics technical database which contains noise measurements of trucks operating in a similar manner at other sites. As stated in Table 4 of the NIA it represents a 15 minute Leq and is not the static Lw of a truck. Whilst being loaded the truck will be at idle. At this time the major noise source at that location will be that of the front end loader. Noise from this source is included in the noise model for each site.

Should there be more than one truck waiting to be loaded part of the noise management strategy for the project is to ensure these trucks are shut down (as detailed in the NIA).

The practical operation of the extraction process is such that there will not be any times when there is a stationary truck on any of the access roads for any extended periods. In fact trucks would only stop in rare circumstances and, at those times, would likely shut down. The approach taken in the NIA was to determine the 15 minute Leq noise level, relative to a receiver, for a truck passing along an access road and to model a noise source of this magnitude at a worst case location (relative to the closest receiver for each site) on the access road.

In relation to the Lw of the other noise sources, the text of the NIA indicates how these were derived. They too represent 15 minute Leq noise levels for machinery that is moving about relative to an individual receiver. They are not stationary Lw's. In setting up a noise model for a project Spectrum Acoustics does not consider it appropriate, for example, to model a front end loader as a point noise producing its maximum noise emissions in the direction of a single receiver for a full 15 minute period. In a practical, operating, scenario this does not occur.

The potential use of a scraper was noted within the NIA, and compared to a front end loader. Scrapers would only be used if the tailings are not free standing and a front end loader cannot be used for the resource extraction. This will not be known until extraction starts. If a scraper is to be used it will be on a campaign basis where a layer is stripped and the surface allowed to dry before further stripping can occur. An estimate of the proposed operations would have this occur for approximately 4 hours per day over 5 days per fortnight.

The Spectrum Acoustics technical database contains noise measurements for a CAT 657E scraper which has an Lw of 112 dB(A). This is consistent with data in the RTA's Environmental Noise Management Manual which indicates a typical Lw of 111 dB(A) for a scraper. The operation of a scraper would be as described above for a front end loader or other mobile machinery. That is, the scraper would be constantly in motion and not producing maximum noise at any individual receiver for a full 15 minute period. Assuming the scraper is producing maximum noise (with an Lw of 112 dB(A)) at any receiver for 5 minutes out of the 15 minute period, this would equate to an Lw of 107 dB(A) Leq (15 min). We are aware of other consultants applying a -7 dB correction to static Lw's in order to estimate a 15 minute Leq noise level. Our preference is to calculate a realistic and practical correction, which often ends in a more conservative approach as is the case in the current assessment.

For each of the deposits noise modelling was carried out assuming a dozer working at ground level and noise contours produced for this in Figures 9, 10, 15 and 16 (for Neath and Aberdare East). As the modelled 15 minute Leq for a dozer was 108 dB(A), these contours would give a very good approximation of the potential noise emissions from a scraper working at ground level on these deposits. It should be noted that the use of a dozer on the surface is a worst case scenario. This would lead to a noise exceedance of up to approximately 6 to 8 dB(A) at residences in Aberdare East and up to approximately 5 to 6 dB(A) at the old colliery residence near the Neath deposit.

1.4.2 Way Forward

The results of the NIA showed that, under the assessed conditions the received noise will exceed the PSNL's for the project at each of the sites. The discussion detailed above also shows that the received noise as a result of emissions from a scraper working at ground level will also exceed the PSNL's for those times when a scraper may be working at each of the Neath and Aberdare East sites.

In keeping with the request in the DECC response the noise model has been run with noise sources representing the extraction process situated at ground level at each of the sites. This modelling represents the worst case scenario and will be only of short term duration near the commencement of extraction. The results of the modelling are shown in Figures 1, 2, 3, 4, 5 and 6. Operational scenario numbering follows on from the NIA.

Aberdare East

1. *Scenario 17* - Front end loader and a truck at ground surface and truck at access point on route A2 north west wind,

2. *Scenario 18* - Front end loader and a truck at ground surface and truck at access point on route A2 south east wind,

Neath

3. *Scenario 19* - Front end loader and a truck at ground surface and truck at access point on route N1 north west wind,

4. *Scenario 20* - Front end loader and a truck at ground surface and truck at access point on route N1 south east wind,

Richmond Main East

5. *Scenario 21* - Front end loader and a truck at ground surface and truck at access point on route R1 north west wind, and

6. *Scenario 22* - Front end loader and a truck at ground surface and truck at access point on route R1 south east wind.

The original noise modelling was carried out with a noise source representing the extraction activities at a source height of 2m and a solid acoustic barrier to a height of 3m between the source and the nearest receivers. This approximates the situation of a 3m working face between the noise source and the receivers. For this reason the contours shown in **Figure 1** are similar to those in Figure 13 in the NIA (that is the a north west wind will have no barrier effects with the barrier to the north of the extraction area). Similarly, the contours in **Figure 4** are similar to those in Figure 18 in the NIA and the contours in **Figure 5** are similar to those in Figure 23 in the NIA.

The remaining figures show that there is very little variation in the modelled received noise with or without the noise barrier in place. This is due to the fact that, with a 3m/s source to receiver wind, a 1m high noise barrier (i.e. noise source at 2m and barrier height at 3m) will offer very little noise attenuation, under the modelled conditions, over the sort of distances that are present to the nearest receivers in this instance.

The noise contours shown in Figure 2 are worthy of particular note. The noise model has been set up to account for ground and atmospheric conditions but it cannot take into account the acoustic screening effects of individual houses in Aberdare. That is, the contours can be regarded as accurate to the first row of houses in Cessnock Street, but beyond this the noise attenuation offered by these houses and those behind is greater than that indicated by the contours. Noise levels at houses on the northern side of Greta Street would be expected to be at least 3 dB(A) less than those shown whilst noise levels on Aberdare Road would be at least 5 dB(A) lower than the contours.

Modifying Factor Corrections

Based on the noise model inputs detailed in the NIA the results of the noise modelling show that the received noise will not contain low frequency or impulsive noise components as per the definitions in the INP. The modelling does not allow for the assessment of impulsive noise. Impulsive noise is defined as the difference between the maximum noise levels on a sound level meter when on fast or impulse response. The difference in the measured levels is the correction, up to a maximum of 5 dB. Based on our experience impulsive noise from processes such as the current project are not common. Impulsive noises are usually associated with significant impacts, hammering etc. Such impacts etc may or may not be impulsive and could only be accurately determined through direct measurement such as during noise monitoring. Similarly, it is possible that noise from truck bodies as the vehicle hits a pothole, for example, may have an impulsive component. The potential for this would be diminished through regular maintenance of roads.

Noise Mitigation Measures

The INP indicates that where noise impacts are predicted, noise control should be applied where this is considered feasible and reasonable. As indicated in the DECC response, the NIA contains a discussion in regards to reasonable and feasible noise control that may be considered in order to minimise adverse impacts. In this instance feasibility refers to engineering practicality, whilst reasonability relates to the application of judgements taking into account such things as, noise mitigation benefits, costs of mitigation, community views and existing and future noise levels and changes in these.

In relation to reasonableness of the application of noise control for the current project, emphasis has been placed on the relatively short term nature of the works at any one location and the even shorter term nature in relation to individual receivers. Consideration must also be given to the relative cost of any mitigation measures and the potential for this to impact on the economic viability of the project.

In mitigating noise from an industrial source Section 7 of the INP provides guidance on what mitigation and management procedures might be appropriate. Essentially there are three main mitigation strategies for noise control;

- Controlling noise at the source,
- Controlling noise transmission, and
- Controlling noise at the receiver.

In relation to the first strategy, the mining plan has been designed to, where practicable, commence at locations furthest from any receivers and progress towards the receivers with the working face of the excavation between the operations and the receivers, thus minimising noise emissions. In addition the NIA contains a discussion on general noise control measures, as detailed in the DECC response, which will serve to reduce noise emissions.

To control noise transmission the options are limited to noise barriers which are discussed in the NIA.

In relation to controlling noise at the receiver, the INP notes that this option is expensive when many receivers require treatment, as is the case here, particularly for the Aberdare East deposit. To ensure the effectiveness of any noise control each receiver would need to be assessed individually which would add significantly to the expense of any treatments. The INP also describes this as the least preferred option as it protects only the internal noise environment and not the external noise environment.

As indicated in the NIA, in determining the reasonableness of noise control the INP also looks at the social benefits of a project. In this instance the potential for short term, day time only, elevated noise levels needs to be weighed against the potential long term benefits of the rehabilitation of each of the sites.

It should be noted that, the Minister for Planning has the authority to permit exceedences of the INP criteria where it can be demonstrated that there are economic and social benefits to the community as a whole as a consequence of the project being approved.

1.4.4 Road Traffic Noise Assessment

Noise Model Inputs

The NIA actually states that there will be a truck arriving, departing or loading constantly throughout a 15 minute period. The nature of truck movements and, consequently, potential vehicle noise impacts will be intermittent. That is, the assessment of noise from vehicles on public roads has been undertaken to individual receivers. At a rate of 20 truck movements in an hour this equates to one movement past a receiver every three minutes which is not acoustically constant.

A review of the transport routes shows that the route from Richmond Main East will only be on public roads for a short section of Leggetts Drive and then on the HEZ spine road. There are no receivers in the vicinity of this and, therefore, existing traffic noise is not an issue. Similarly the route from Neath will pass for a short distance on each of Tunnel Road, where the nearest residence is more then 100m away, Maitland Road and Duffie Drive at locations where there are no receivers in the near vicinity.

On some occasions extraction may be carried out at all of the proposed sites simultaneously. Under these circumstances the worst case truck movements would occur past the junction of the Neath and Aberdare East haulage routes. Here there may be up to 40 truck movements per hour. This is a private section of road and potential noise impacts are addressed in the discussion accompanying Table 1, later in this report.

From Aberdare East, the haul road will pass along public roads again for only a short distance along Government Circuit and then Caledonia Street. Government Circuit carries only local traffic and the existing traffic level would not be significant. The day time traffic noise criterion for a local road is 55 dB(A) Leq (1 hour). Caledonia Street would be regarded as a collector road under definitions in the ECRTN. Under these definitions the road has a day time noise criterion of 60 dB(A) Leq (1 hour). Based on our many years of experience in these matters we believe it is very unlikely that existing traffic noise on Government Circuit and Caledonia Street would be near the criterion.

Justification

Since preparing the NIA, Spectrum Acoustics has conducted noise tests at a coal mine in northern NSW to determine how varying truck speed affects noise levels, and a discussion of that work follows.

A series of 1-hour truck noise tests was conducted on several occasions, for a different coal mine, at a residence 70m from a local road. The trucks were a mix of truck/dog, semi-trailers and b-doubles (both empty and full) and the measurement results showed 52 dB(A),Leq(1-hour) for 28 truck pass-bys in an hour at a set speed of 90 km/h. Measurements were conducted at 1-second intervals and detailed notes were taken during the surveys. To analyse the results, each truck pass-by was highlighted and inserted into a computer file that ended up containing only the truck noise. The pass-by levels and durations provided an accurate 1-hour Leq level.

The passing trucks approximate a line source (1/r law, hemi-cylindrical expansion) rather than a point source ($1/r^2$ law, hemi-spherical expansion) and the Leq levels for the same truck numbers decrease (increase) at a rate of 3 dB per doubling (halving) of distance. At a distance of 25m (the approximate distance of the closest house to the transport route in Government Circuit) the level is 56 dB(A). Again, this is for 28 trucks per hour travelling at 90km/h.

A further study was conducted which showed that the maximum pass-by level of empty trucks on flat ground dropped by 6 dB when the speed was reduced from 90km/h to 50 km/h. The lower speed extends the duration of the noise, but, calculates to a decrease in Leq (1-hour) of 4 dB. The truck noise level for 28 trucks in an hour passing a house 25m away at a speed of 50 km/h is therefore 52 dB(A).

Adjustments were made for a reduction in truck numbers by the usual accepted method based on the fact that the noise level from N identical sources each producing X dB(A) is (X + 10log(N)) dB(A). This equates to 3 dB noise reduction per halving of truck numbers (note that this approach gives the same results as the often used sound exposure level (SEL) method applied to discrete sources). Applying this to 52 dB(A) for 28 trucks gives 51 dB(A) for 20 truck movements. Which is 4 dB(A)

below the criterion for a local road. Even at haulage rates of up to 36 truck movements per hour the noise level is more than 1dB (A) below the criteria.
In order for the "total" level of 55 dB(A) Leq (1 hour) to be exceeded, the existing traffic noise level would need to be no greater than 53 dB(A) Leq (1 hour). As Government Circuit services only a very small number of houses, and there is no through traffic, the existing traffic noise level may be assumed to be significantly less than 53 dB(A) Leq (1 hour). Further, the worst case predicted noise level of 51 dB(A) Leq (1 hour) at 25m will not contribute to an exceedance of the 60 dB(A) Leq (1 hour) criterion along Caledonia Street.

The calculations are based on measurements of actual truck pass-bys on a tar road. At other locations along the haul route on private and Crown land trucks will travel on gravel roads. What difference the road being tar or gravel makes to noise levels depends on many factors and is difficult to define. Generally, trucks are louder on (flat) tar roads at high speed due to the tyre noise. We believe that at 50 km/h there would not be much difference between a tar and gravel surface as engine/exhaust noise dominates over tyre noise. This would require a gravel road to be reasonably smooth, however, as significant potholing would clearly elevate body noise from empty trucks.

Based on the previous measurements, detailed herein, it can generally be shown that, for trucks travelling at 50 km/h and 90 km/h, the received noise for 20 truck movements per hour would be as shown below in **Table 1**.

As discussed previously, there may be a maximum of 40 truck movements per hour on the haulage route beyond the junction of the Neath and Aberdare East haulage routes. The received noise, at representative distances from a road, for a scenario of 40 truck movements per hour is also shown in Table 1.

Table 1 - Calculated Truck Noise Levels

Trucks per hour	Speed	Distance to Receiver	Received Noise
20	50 km/h	70m	47 dB(A) Leq (1 hour)
20	90 km/h	70m	51 dB(A) Leq (1 hour)
20	50 km/h	140m	44 dB(A) Leq (1 hour)
20	90 km/h	140m	48 dB(A) Leq (1 hour)
20	50 km/h	280m	41 dB(A) Leq (1 hour)
20	90 km/h	280m	45 dB(A) Leq (1 hour)
20	50 km/h	560m	38 dB(A) Leq (1 hour)
20	90 km/h	560m	42 dB(A) Leq (1 hour)
40	50 km/h	140m	47 dB(A) Leq (1 hour)
40	90 km/h	140m	51 dB(A) Leq (1 hour)
40	50 km/h	280m	44 dB(A) Leq (1 hour)
40	90 km/h	280m	48 dB(A) Leq (1 hour)
40	50 km/h	560m	41 dB(A) Leq (1 hour)
40	90 km/h	560m	45 dB(A) Leq (1 hour)

Noise from vehicles travelling on private roads is typically assessed against the PSNL's for the project. The private road sections of the haul routes will pass near various residential areas. These can be generally grouped into Aberdare, Kearsley, Neath and Neath Road. PSNL's for Aberdare and Neath were derived in the NIA and detailed below in **Table 2**. A graphical depiction of the measured noise levels are attached to this letter. Noise levels in each of the other two areas were previously

measured as part of related projects. The measured noise levels and PSNL's derived from them are also shown in Table 2.

TABLE 2
MEASURED AMBIENT NOISE LEVELS

Location	Day i.e. hours of operation between 7am-6pm	
	Background L90 dB(A)	PSNL
Cessnock Street, (Aberdare) (2006)	33	38 dB(A) Leq (15 min)
Maitland Rd. (Neath) (2003)	39	44 dB(A) Leq (15 min)
Neath Road (2001)	31	36 dB(A) Leq (15 min)
48 Pokolbin Street, Kearsley (2003)	34	39 dB(A) Leq (15 min)

Based on the noise levels shown above in Table 1, for 20 truck movements per hour, and trucks travelling at 50 km/h and assuming a relatively consistent movement of trucks (i.e. 5 trucks in a 15 minute interval), this would mean the criteria would be met in Neath at distances of over 140 m from the haul road. There are no residences in this zone.

In Aberdare and the Government Circuit area, the criterion would be met for all residences greater than approximately 560m from the private sections of the haul road given the lower ambient noise levels. The only residences to be impacted would be in the Government Circuit area. The nearest residence in this area approximately 60m from where the route joins the private section of road. At this distance the received noise would be approximately 48 dB(A) Leq (15 min) and would therefore experience a noise level above the PSNL criterion of 38 dB(A) Leq (15 min). There are no residences in this area that would experience an exceedance of the ECRTN local road criterion of 55 dB(A) Leq (1-hour)

The criterion in Ellalong Street, Kearsley would be met at distances of greater than approximately 500m from the private haul road. There are three residences that are approximately 220m from the road and noise levels at these will be approximately 40 dB(A) Leq (15 min) and would therefore experience a noise level above the PSNL criterion of 39 dB(A) Leq (15 min). There are no residences in this area that would experience an exceedance of the ECRTN local road criterion of 55 dB(A) Leq (1-hour).

For residents in the vicinity of Neath Road it is possible that there may be up to 40 trucks per hour on the haul private haul road. For a scenario of 40 truck movements per hour the criteria of 36 dB(A) Leq (15 min) would be exceeded for all residents within approximately 2000 m. It should be noted that these calculations are somewhat simplistic as at distances beyond several hundred metres ground absorption effects would significantly impact on received noise. This would add a degree of conservatism to the discussion above. The nearest residences to the haul road in the Neath Road area are approximately 400m to the north and 150m to the south. At 400m the received noise would be approximately 43 dB(A) Leq (15 min), whilst at 150m the received noise would be approximately 44 dB(A) Leq (15 min) and would therefore experience a noise level above the PSNL criterion of 36 dB(A) Leq (15 min).. There are no residences in this area that would experience an exceedance of the ECRTN local road criterion of 55 dB(A) Leq (1-hour).

With regard to the exceedance of PSNL's calculated for the haulage roads it should be noted that if the development was to utilise existing public roads the road traffic noise levels from the development would meet the ECRTN noise level of 55 dB(A) Leq (1-hour) or 60dB(A) Leq (1-hour) for local and

arterial roads respectively. However the use of public roads would see trucks pass substantially more residential dwellings at significantly shorter distances. The adoption of the ECRTN local road criterion of 55 dB(A) Leq (1-hour) would see no noise level criterion exceedances. Cessnock City Council in their Ordinary Meeting of 21 March 2007 adopted the proposed haulage routes having regard to traffic and the reduced burden on the community.

It should be noted, as previously discussed, the Minister for Planning has the authority to permit exceedances of INP criteria where it can be demonstrated there are social and economic benefits to the community as a whole.

We trust this report fulfils your requirements at this time, however, should you require additional information or assistance please do not hesitate to contact the undersigned.

Yours faithfully,
SPECTRUM ACOUSTICS PTY LIMITED

Author:



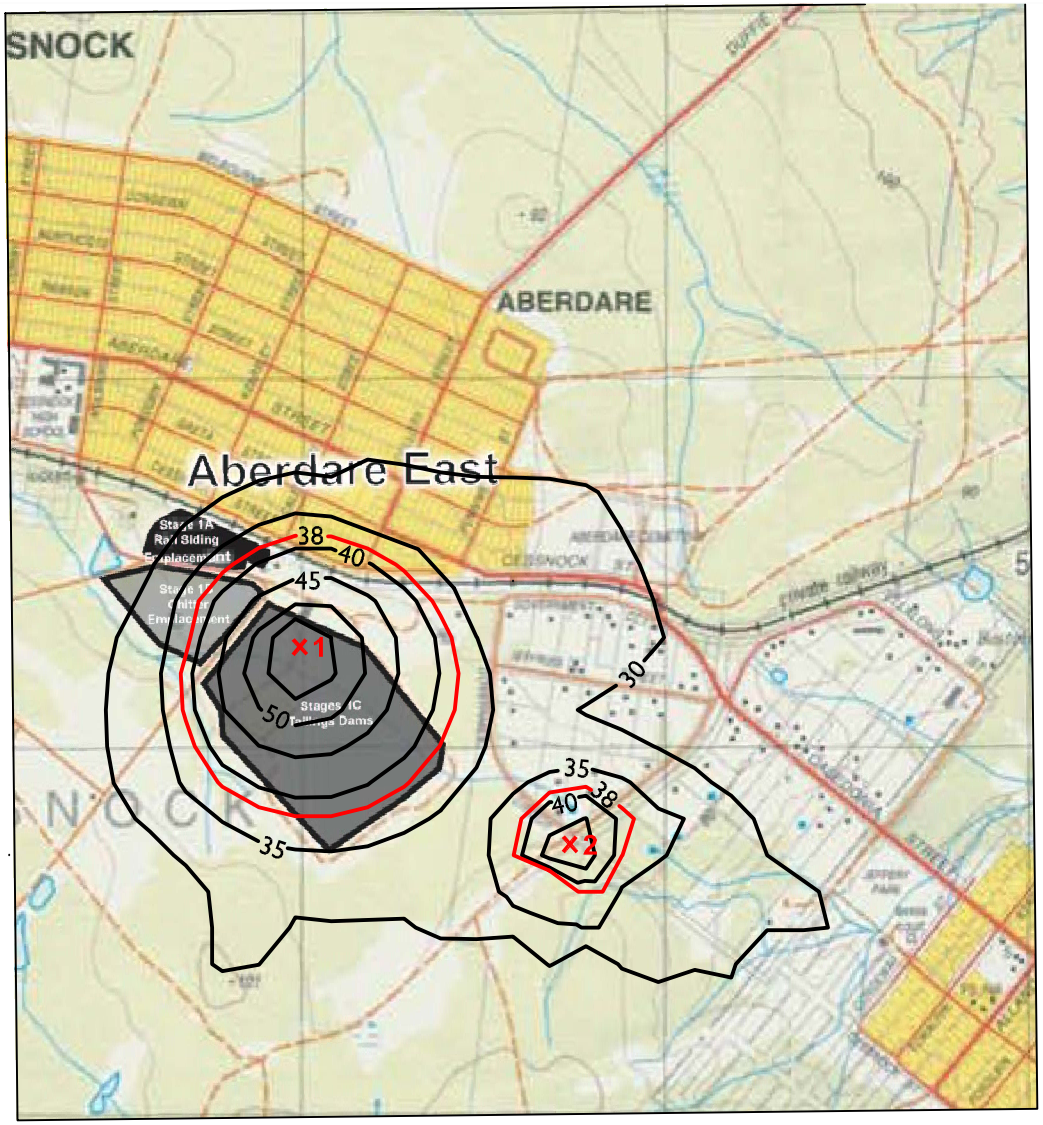
Ross Hodge
Acoustical Consultant

Reviewed by



Neil Pennington
Acoustical Consultant

FIGURES



N
W
E
S

Not to scale

LEGEND:

30 Noise Contours dB(A)

×1 Front End Loader & Truck at ground surface

×2 Truck

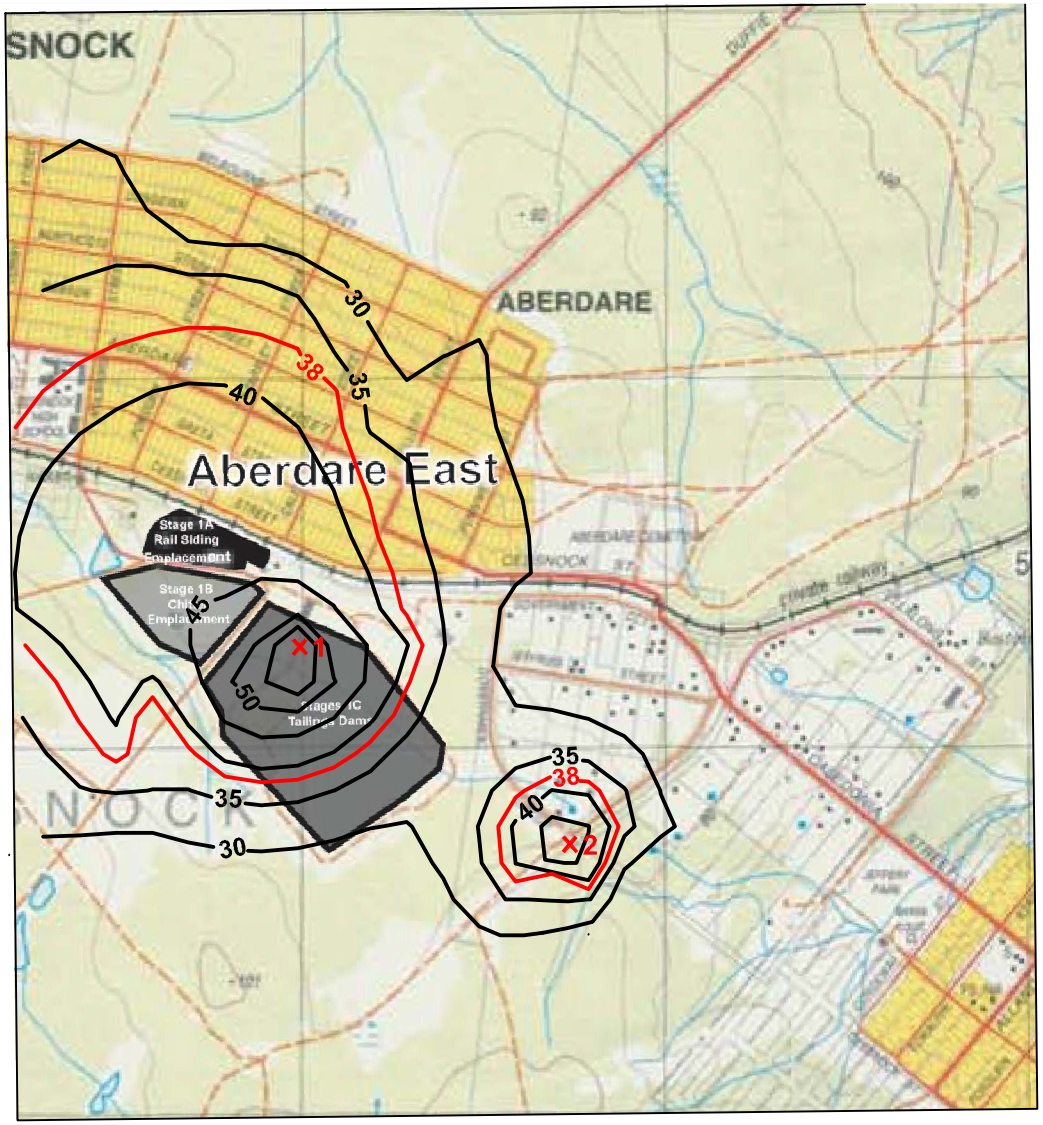
Base Source: Cessnock 1 : 25 000 Topographic Map

FIGURE 1

Noise Levels, dB(A)

ABERDARE EAST, SCENARIO 17, NORTH WEST WIND

SPECTRUM ACOUSTICS



Not to scale

LEGEND:

30 Noise Contours dB(A)

×1 Front End Loader & Truck at ground surface

×2 Truck

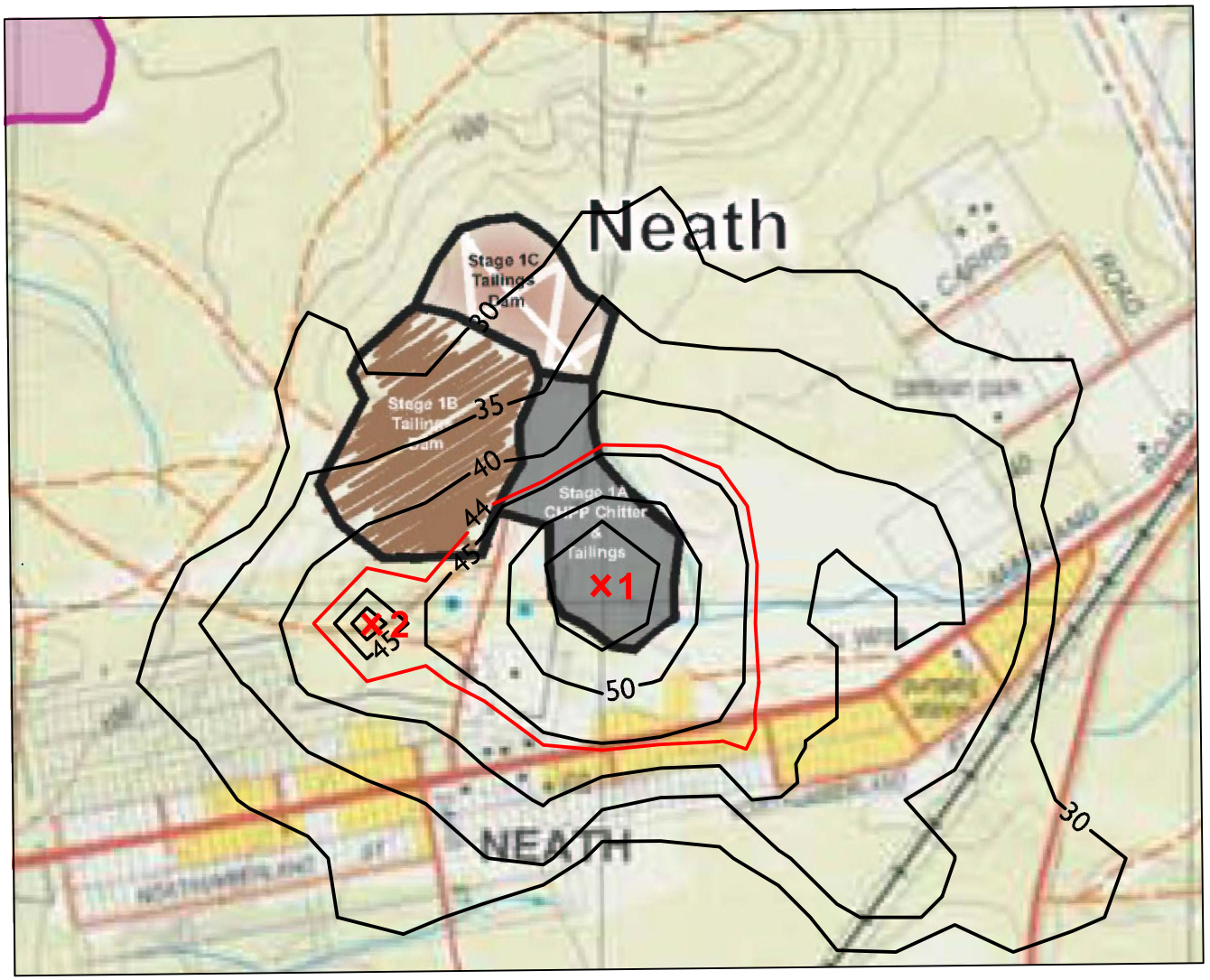
Base Source: Cessnock 1 : 25 000 Topographic Map

FIGURE 2

Noise Levels, dB(A)

ABERDARE EAST, SCENARIO 18, SOUTH EAST WIND

SPECTRUM ACOUSTICS



Not to scale

LEGEND:

30 Noise Contours dB(A)

×1 Front End Loader & Truck at ground surface ×2 Truck

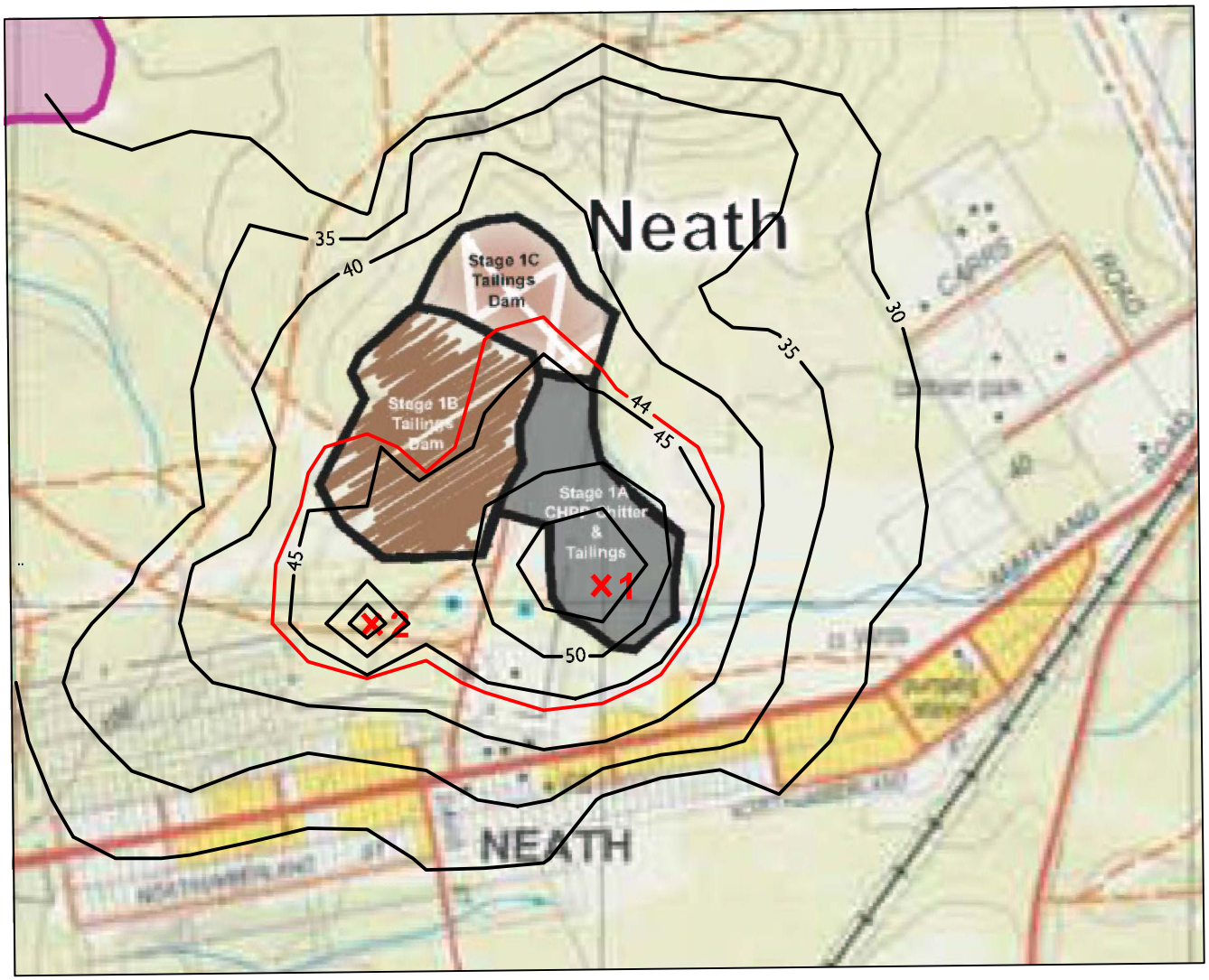
Base Source: Cessnock 1 : 25 000 Topographic Map

FIGURE 3

Noise Levels, dB(A)

NEATH, SCENARIO 20, NORTH WEST WIND

SPECTRUM ACOUSTICS



N
W
E
S

Not to scale

LEGEND:

30 Noise Contours dB(A)

×1 Front End Loader & Truck at ground surface ×2 Truck

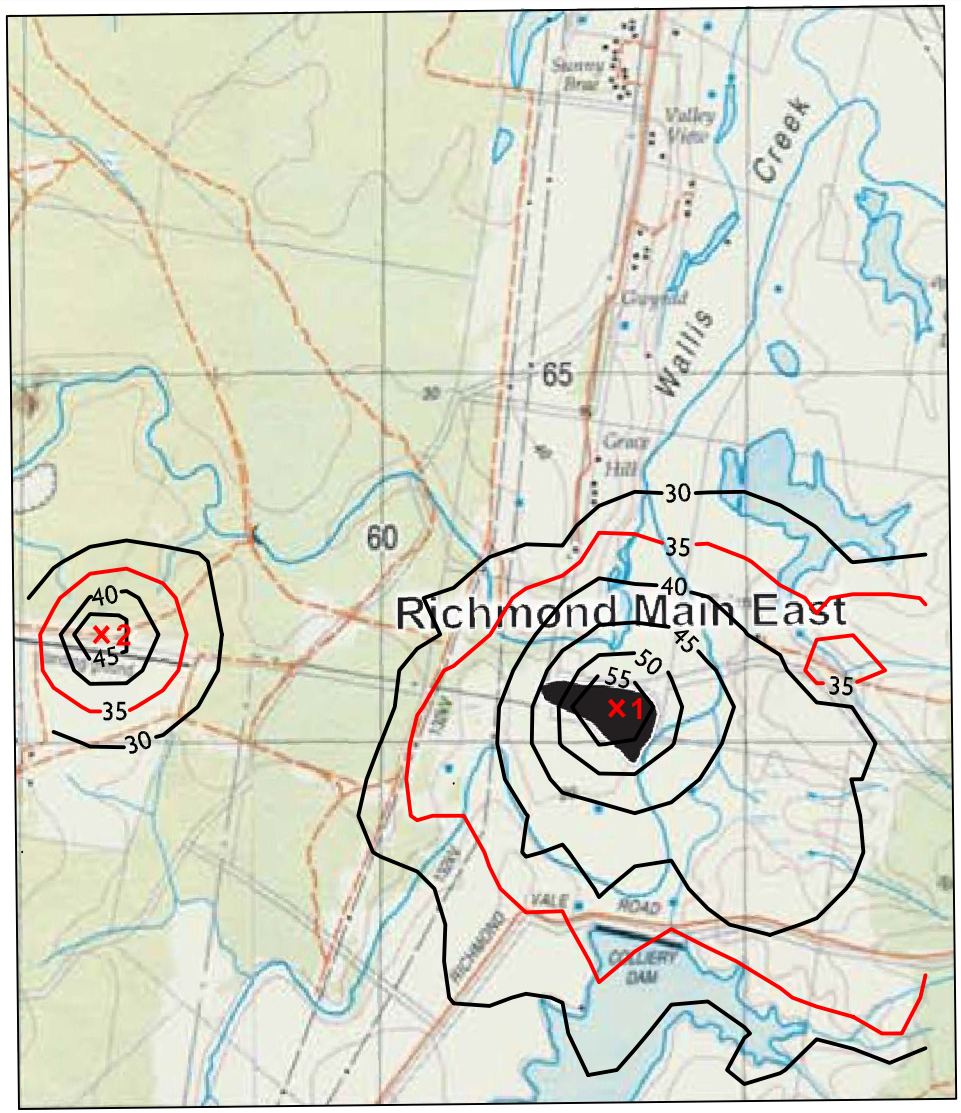
Base Source: Cessnock 1 : 25 000 Topographic Map

FIGURE 4

Noise Levels, dB(A)

NEATH, SCENARIO 20, SOUTH EAST WIND

SPECTRUM ACOUSTICS



N
W E
S

Not to scale

LEGEND:

30 Noise Contours dB(A)

×1 Front End Loader & Truck at ground surface

×2 Truck

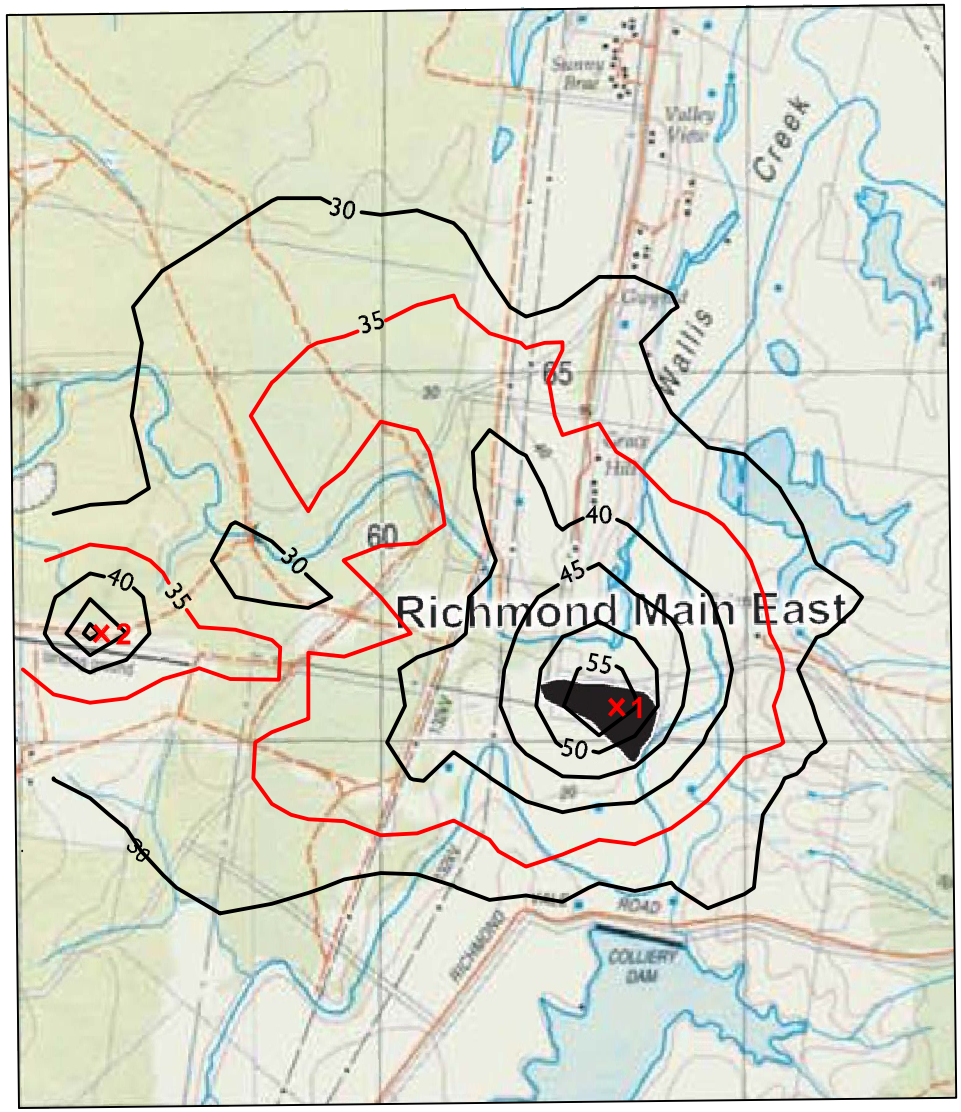
Base Source: Cessnock 1 : 25 000 Topographic Map

FIGURE 5

Noise Levels, dB(A)

RICHMOND MAIN EAST, SCENARIO 21, NORTH WEST WIND

SPECTRUM ACOUSTICS



N
W
E
S

Not to scale

LEGEND:

30 Noise Contours dB(A)

×1 Front End Loader & Truck at ground surface

×2 Truck

Base Source: Cessnock 1 : 25 000 Topographic Map

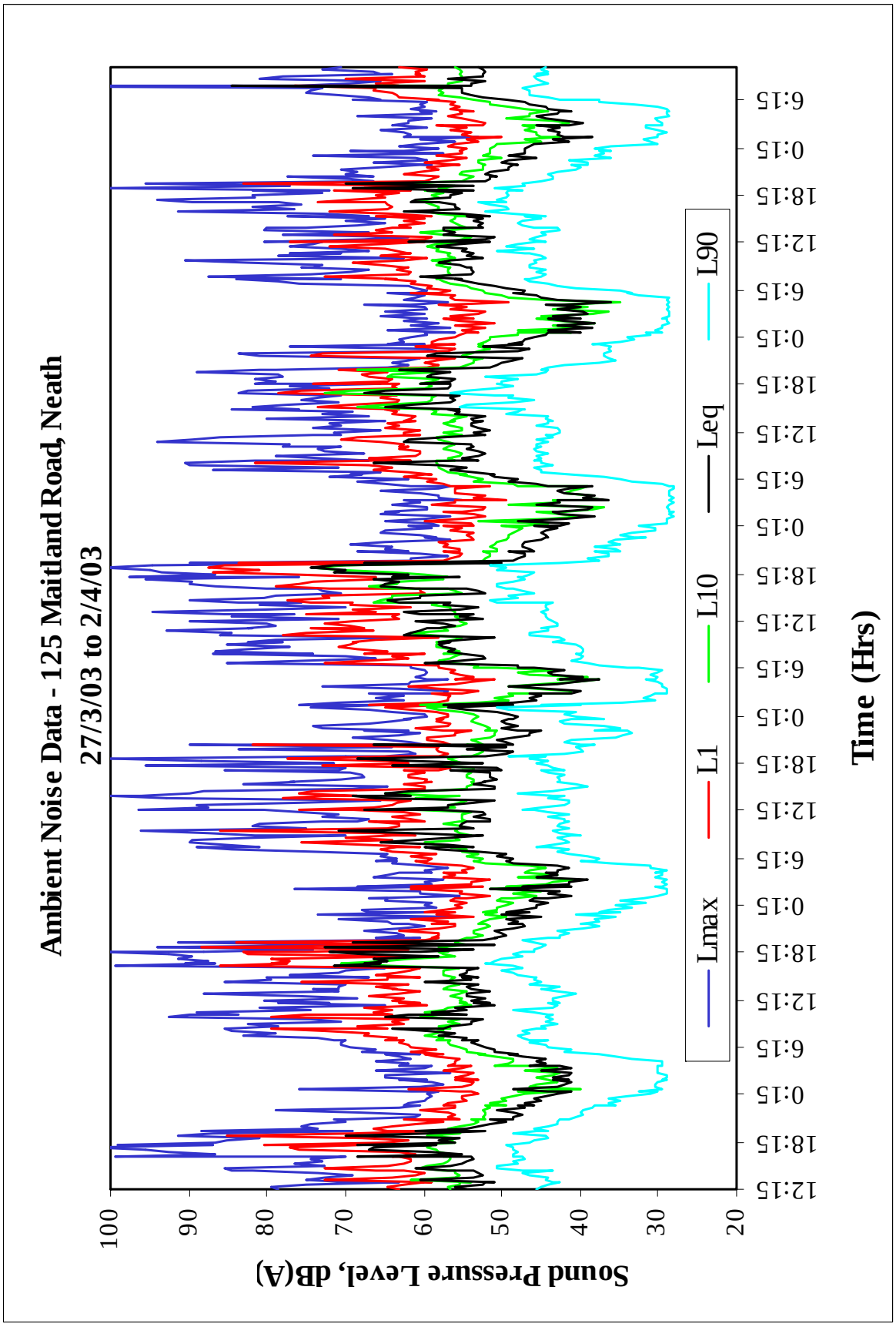
FIGURE 6

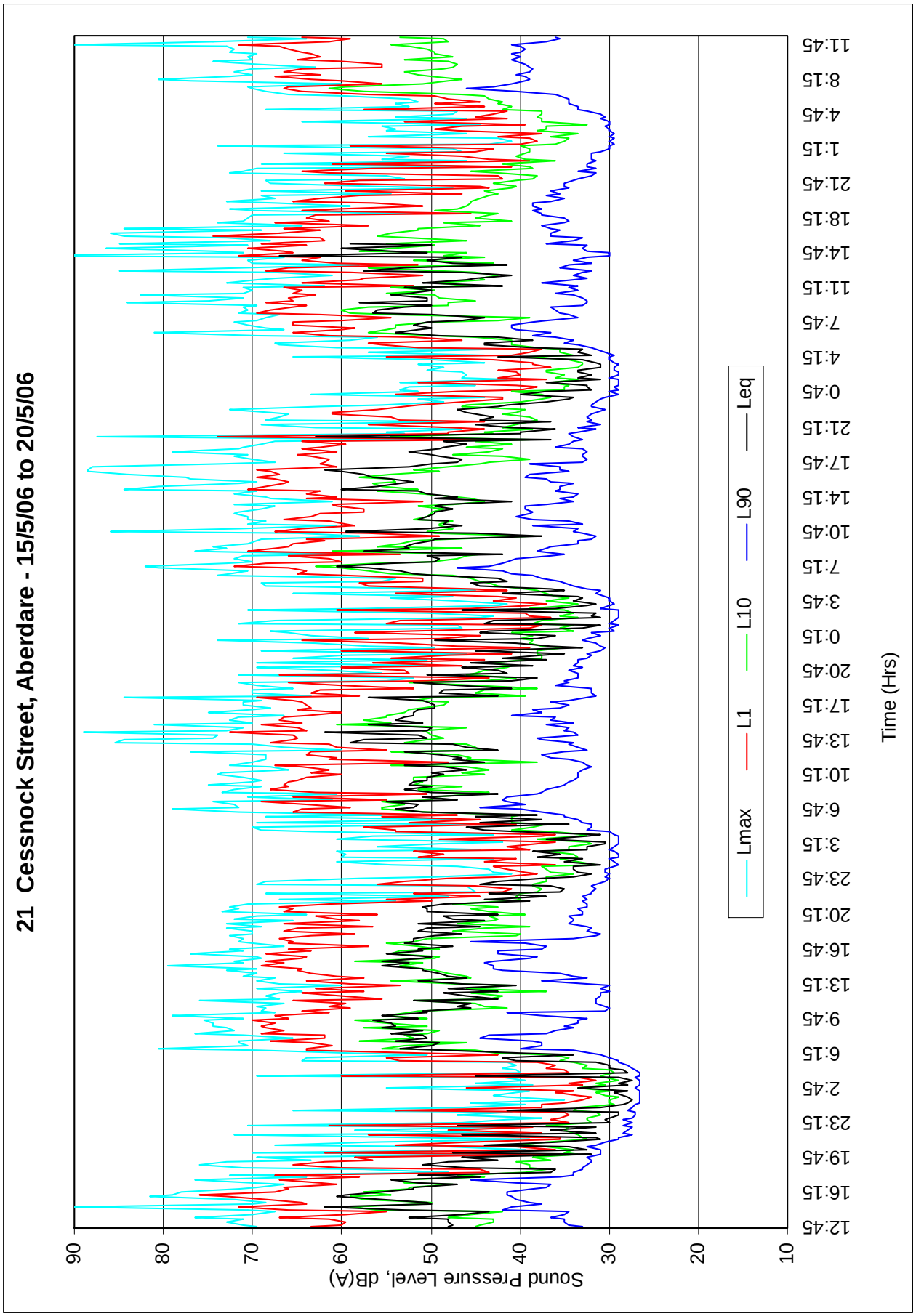
Noise Levels, dB(A)

RICHMOND MAIN EAST, SCENARIO 22, SOUTH EAST WIND

SPECTRUM ACOUSTICS

MEASURED AMBIENT NOISE LEVELS


Ambient Noise Data - 125 Maitland Road, Neath
27/3/03 to 2/4/03
Sound Pressure Level, dB(A)
100
90
80
70
60
50
40
30
20
Time (Hrs)
12:15
18:15
0:15
6:15
12:15
18:15
0:15
6:15
12:15
18:15
0:15
6:15
12:15
18:15
0:15
6:15
12:15
18:15
0:15
6:15
Lmax
L1
L10
Leq
L90


21 Cessnock Street, Aberdare - 15/5/06 to 20/5/06
Sound Pressure Level, dB(A)
90
80
70
60
50
40
30
20
10
Lmax
L1
L10
L90
Leq
Time (Hrs)
12:45
16:15
19:45
23:15
2:45
6:15
9:45
13:15
16:45
20:15
23:45
3:15
6:45
10:15
13:45
17:15
20:45
0:15
3:45
7:15
10:45
14:15
17:45
21:15
0:45
4:15
7:45
11:15
14:45
18:15
21:45
1:15
4:45
8:15
11:45

Hunter Enviro-Mining (Operations) Pty Limited

Preferred Project Report

Chitter & Tailings Reclamation Project

Appendix 9A

Receptor Noise Levels

October 2007

Appendix 9A

Receptor Noise Levels

The following tables specify receivers and the potential acoustic impact with and without the shielding effects of houses between the source and receiver. The shielding effect has been assumed to be approximately 1.5dB(A) per row of houses up to approximately 5dB(A), that is a 3dB(A) reduction in the predicted noise levels when there are two rows of houses between the source and the receiver, and a 5dB(A) reduction after 4 rows. The level of impact has been stated consistent with noise contours presented within the Environmental Assessment for Aberdare East and Richmond Main East (attached). As the Neath haulage route changed the worst probable case has been presented as modelled in Appendix 9.

Receptors that may experience an exceedance of the noise goal are bold and highlighted. Receptors that are located outside the modelled area are assumed to not experience impacts from this project above existing background noise levels.

At Aberdare East, five (5) receptors may experience an exceedance of less then 5db(A) above the criterion (two (2) of these do not contain dwellings).

At Neath two (2) receptors may experience an exceedance of less then 5db(A) above the criterion. It should be noted that the Preferred haulage route results in a reduced noise impact to Neath community residents.

At Richmond Main East, one (1) receptor may experience an exceedance of the noise goal by less then 5dB(A) above the criterion.

Table 1: Noise levels under Scenario 5 with and without shielding effects of buildings.

Aberdare East HEM_ID	Land Status	Noise Goal (Background +5dB(A))	Acoustic Impact (no shielding)	Approximate Acoustic Impact (with shielding)	Revised Level of Impact Including Potential House Shielding Effects
A11		38	28.7	25.7	30dB(A) or 'Background'
A12		38	28.9	25.9	30dB(A) or 'Background'
A13		38	29.1	26.1	30dB(A) or 'Background'
A14		38	29.2	26.2	30dB(A) or 'Background'
A15		38	29.4	26.4	30dB(A) or 'Background'
A16		38	30.2	27.2	30dB(A) or 'Background'
A17		38	30.5	27.5	30dB(A) or 'Background'
A18		38	30.7	27.7	30dB(A) or 'Background'
A19		38	31.0	28.0	30dB(A) or 'Background'
A20		38	31.3	28.3	30dB(A) or 'Background'
A21		38	31.6	28.6	30dB(A) or 'Background'
A22		38	31.8	28.8	30dB(A) or 'Background'
A23		38	32.1	29.1	30dB(A) or 'Background'
A24		38	33.0	30.0	30dB(A) or 'Background'
A25		38	33.2	31.7	30-35
A26		38	33.5	32.0	30-35
A27		38	35.1	33.6	30-35
A28		38	34.9	33.4	30-35
A29		38	34.9	33.4	30-35
A30		38	35.0	33.5	30-35
A31		38	35.0	33.5	30-35

Aberdare East HEM_ID	Land Status	Noise Goal (Background +5dB(A))	Acoustic Impact (no shielding)	Approximate Acoustic Impact (with shielding)	Revised Level of Impact Including Potential House Shielding Effects
A32		38	35.1	33.6	30-35
A33		38	35.1	33.6	30-35
A34		38	35.2	33.7	30-35
A35		38	35.3	33.8	30-35
A36		38	35.4	33.9	30-35
A37		38	35.5	34.0	30-35
A38		38	35.6	34.1	30-35
A39		38	35.6	35.6	35-38
A40		38	35.5	35.5	35-38
A41		38	35.4	35.4	35-38
A42		38	35.3	35.3	35-38
A43		38	35.3	35.3	35-38
A44		38	35.3	35.3	35-38
A50		38	28.1	26.6	30dB(A) or 'Background'
A51		38	28.6	27.1	30dB(A) or 'Background'
A52		38	28.7	27.2	30dB(A) or 'Background'
A53		38	28.9	27.4	30dB(A) or 'Background'
A54		38	29.1	27.6	30dB(A) or 'Background'
A55		38	29.2	27.7	30dB(A) or 'Background'
A56		38	29.5	28.0	30dB(A) or 'Background'
A57		38	29.7	28.2	30dB(A) or 'Background'
A58		38	29.9	28.4	30dB(A) or 'Background'
A59		38	30.9	29.4	30dB(A) or 'Background'
A60		38	31.3	29.8	30dB(A) or 'Background'
A61		38	31.6	30.1	30-35
A62		38	31.9	30.4	30-35
A63		38	32.3	30.8	30-35
A64		38	32.6	31.1	30-35
A65		38	33.0	31.5	30-35
A66		38	33.3	31.8	30-35
A67		38	33.7	32.2	30-35
A68		38	34.0	32.5	30-35
A69		38	34.8	33.3	30-35
A70		38	35.1	33.6	30-35
A71		38	35.4	35.4	35-38
A72		38	35.6	35.6	35-38
A73		38	35.9	35.9	35-38
A74		38	36.1	36.1	35-38
A75		38	36.3	36.3	35-38
A76		38	36.4	36.4	35-38
A77		38	36.6	36.6	35-38
A78		38	37.0	37.0	35-38
A79		38	36.9	36.9	35-38
A80		38	36.8	36.8	35-38
A267		38	30.0	25.0	30dB(A) or 'Background'
A268		38	30.1	25.1	30dB(A) or 'Background'
A269		38	30.4	25.4	30dB(A) or 'Background'
A270		38	30.5	25.5	30dB(A) or 'Background'
A271		38	30.6	25.6	30dB(A) or 'Background'

Aberdare East HEM_ID	Land Status	Noise Goal (Background +5dB(A))	Acoustic Impact (no shielding)	Approximate Acoustic Impact (with shielding)	Revised Level of Impact Including Potential House Shielding Effects
A272		38	30.7	25.7	30dB(A) or 'Background'
A273		38	30.9	25.9	30dB(A) or 'Background'
A274		38	31.0	26.0	30dB(A) or 'Background'
A275		38	31.2	26.2	30dB(A) or 'Background'
A276		38	31.3	26.3	30dB(A) or 'Background'
A277		38	31.5	26.5	30dB(A) or 'Background'
A278		38	32.0	27.0	30dB(A) or 'Background'
A279		38	32.0	27.0	30dB(A) or 'Background'
A280		38	32.2	27.2	30dB(A) or 'Background'
A281		38	32.3	27.3	30dB(A) or 'Background'
A282		38	32.4	27.4	30dB(A) or 'Background'
A283		38	32.5	27.5	30dB(A) or 'Background'
A284		38	32.7	27.7	30dB(A) or 'Background'
A285		38	32.8	27.8	30dB(A) or 'Background'
A286		38	33.0	28.0	30dB(A) or 'Background'
A359		38	29.5	29.5	30dB(A) or 'Background'
A360		38	29.5	29.5	30dB(A) or 'Background'
A361		38	29.5	29.5	30dB(A) or 'Background'
A362		38	29.5	29.5	30dB(A) or 'Background'
A363		38	33.4	33.4	30-35
A364		38	33.4	30.4	30-35
A365		38	33.4	30.4	30-35
A374		38	31.5	31.5	30-35
A426		38	30.5	30.5	30-35
A449		38	33.3	33.3	30-35
A450		38	33.8	30.8	30-35
A451		38	34.5	31.5	30-35
A453		38	36.5	36.5	35-38
A459		38	37.0	37.0	35-38
A462		38	37.6	37.6	35-38
A463		38	38.0	36.5	35-38
A467		38	29.7	29.7	30dB(A) or 'Background'
A469		38	29.8	29.8	30dB(A) or 'Background'
A470		38	29.9	29.9	30dB(A) or 'Background'
A471		38	30.0	30.0	30-35
A472		38	30.1	30.1	30-35
A474		38	30.3	30.3	30-35
A475		38	30.9	30.9	30-35
A476		38	31.0	31.0	30-35
A477		38	31.1	31.1	30-35
A490		38	31.2	31.2	30-35
A491		38	31.3	31.3	30-35
A493		38	31.5	31.5	30-35
A495		38	31.6	31.6	30-35
A497		38	31.7	31.7	30-35
A499		38	31.8	31.8	30-35
A503		38	32.2	32.2	30-35
A505		38	32.1	32.1	30-35
A508		38	32.1	32.1	30-35

Aberdare East HEM_ID	Land Status	Noise Goal (Background +5dB(A))	Acoustic Impact (no shielding)	Approximate Acoustic Impact (with shielding)	Revised Level of Impact Including Potential House Shielding Effects
A512		38	32.0	32.0	30-35
A581		38	28.0	28.0	30dB(A) or 'Background'
A587		38	28.1	28.1	30dB(A) or 'Background'
A592		38	28.1	28.1	30dB(A) or 'Background'
A595		38	28.2	28.2	30dB(A) or 'Background'
A596		38	30.0	30.0	30dB(A) or 'Background'
A597		38	28.4	28.4	30dB(A) or 'Background'
A598		38	30.0	30.0	30-35
A599		38	30.1	30.1	30-35
A600		38	30.2	30.2	30-35
A601		38	30.2	30.2	30-35
A602		38	30.2	30.2	30-35
A603		38	30.2	30.2	30-35
A604		38	28.7	28.7	30dB(A) or 'Background'
A605		38	30.3	30.3	30-35
A606		38	28.9	28.9	30dB(A) or 'Background'
A610		38	29.0	29.0	30dB(A) or 'Background'
A614		38	29.6	29.6	30dB(A) or 'Background'
A617		38	29.9	29.9	30dB(A) or 'Background'
A618		38	30.2	30.2	30-35
A620		38	30.5	30.5	30-35
A621		38	30.8	30.8	30-35
A627		38	31.7	31.7	30-35
A629		38	32.1	32.1	30-35
A632		38	32.4	32.4	30-35
A635		38	32.8	32.8	30-35
A649		38	33.2	33.2	30-35
A658		38	33.6	33.6	30-35
A661		38	34.0	34.0	30-35
A663		38	34.4	34.4	30-35
A671		38	34.8	34.8	30-35
A673		38	35.2	35.2	35-38
A675		38	36.1	36.1	35-38
A677		38	36.4	36.4	35-38
A679		38	36.8	36.8	35-38
A681		38	37.1	37.1	35-38
A682	no house	38	37.4	37.4	35-38
A683	no house	38	37.6	37.6	35-38
A685		38	37.9	37.9	35-38
A686	**no house**	**38**	**38.0**	**38.0**	**38-40_0-2dBA Exceedance**
A687	**no house**	**38**	**38.2**	**38.2**	**38-40_0-2dBA Exceedance**
A690		**38**	**38.2**	**38.2**	**38-40_0-2dBA Exceedance**
A693		38	37.4	37.4	35-38
A836		38	29.4	24.4	30dB(A) or 'Background'
A837		38	29.6	24.6	30dB(A) or 'Background'
A838		38	29.8	24.8	30dB(A) or 'Background'
A839		38	30.2	25.2	30dB(A) or 'Background'
A840		38	30.4	25.4	30dB(A) or 'Background'

Aberdare East HEM_ID	Land Status	Noise Goal (Background +5dB(A))	Acoustic Impact (no shielding)	Approximate Acoustic Impact (with shielding)	Revised Level of Impact Including Potential House Shielding Effects
A841		38	30.6	25.6	30dB(A) or 'Background'
A842		38	30.9	25.9	30dB(A) or 'Background'
A843		38	31.1	26.1	30dB(A) or 'Background'
A844		38	31.1	26.1	30dB(A) or 'Background'
A845		38	31.8	26.8	30dB(A) or 'Background'
A846		38	32.0	29.0	30dB(A) or 'Background'
A847		38	33.7	30.7	30-35
A848		38	33.8	30.8	30-35
A849		38	33.9	30.9	30-35
A850		38	34.0	31.0	30-35
A851		38	34.1	31.1	30-35
A852		38	34.2	31.2	30-35
A853		38	34.4	31.4	30-35
A854		38	34.5	31.5	30-35
A855		38	34.7	31.7	30-35
A856		38	34.8	33.3	30-35
A857		38	34.9	33.4	30-35
A858		38	35.0	33.5	30-35
A887		38	33.5	33.5	30-35
A895		38	37.9	37.9	35-38
A1012	no house	38	30.0	30.0	30dB(A) or 'Background'
A1127		38	27.9	27.9	30dB(A) or 'Background'
A1130	no house	38	30.7	30.7	30-35
A1131	no house	38	34.7	34.7	30-35
A1132		38	33.8	33.8	30-35
A1133		38	33.6	33.6	30-35
A1134		38	34.7	34.7	30-35
A1135		38	32.5	32.5	30-35
A1136		38	31.4	31.4	30-35
A1137	no house	38	33.2	33.2	30-35
A1138		38	31.2	31.2	30-35
A1139		38	33.9	33.9	30-35
A1140		38	33.4	33.4	30-35
A1141		38	30.3	30.3	30-35
A1142		38	29.6	29.6	30dB(A) or 'Background'
A1143		38	29.2	29.2	30dB(A) or 'Background'
A1144		38	29.2	29.2	30dB(A) or 'Background'
A1145		38	34.0	34.0	30-35
A1146		38	36.3	36.3	35-38
A1147		**38**	**38.5**	**38.5**	**38-40_0-2dBA Exceedance**
A1148		38	31.8	31.8	30-35
A1149		38	32.7	32.7	30-35
A1150		**38**	**41.6**	**41.6**	**40-45_2-7dBA Exceedance**
A1151		38	28.2	28.2	30dB(A) or 'Background'
A1154		38	28.9	28.9	30dB(A) or 'Background'
A1156		38	28.5	28.5	30dB(A) or 'Background'
A1157		38	29.4	29.4	30dB(A) or 'Background'
A1158		38	29.1	29.1	30dB(A) or 'Background'

Aberdare East HEM_ID	Land Status	Noise Goal (Background +5dB(A))	Acoustic Impact (no shielding)	Approximate Acoustic Impact (with shielding)	Revised Level of Impact Including Potential House Shielding Effects
A1159		38	29.8	29.8	30dB(A) or 'Background'
A1160		38	33.9	33.9	30-35
A1161		38	31.5	31.5	30-35
A1162		38	30.6	30.6	30-35
A1163		38	30.1	30.1	30-35
A1164		38	28.4	28.4	30dB(A) or 'Background'
A1165		38	28.2	28.2	30dB(A) or 'Background'
A1171		38	31.5	31.5	30-35
A1172		38	31.2	31.2	30-35
A1176		38	31.6	31.6	30-35
A1177		38	30.0	25.0	30dB(A) or 'Background'
A1180		38	29.4	29.4	30dB(A) or 'Background'
A1204		38	32.0	29.0	30dB(A) or 'Background'
A1205		38	32.1	29.1	30dB(A) or 'Background'
A1206		38	32.3	29.3	30dB(A) or 'Background'
A1207		38	32.4	29.4	30dB(A) or 'Background'
A1208	no house	38	32.6	29.6	30dB(A) or 'Background'
A1209		38	32.8	29.8	30dB(A) or 'Background'
A1210		38	32.8	29.8	30dB(A) or 'Background'
A1211		38	33.0	30.0	30dB(A) or 'Background'
A1212		38	33.5	30.5	30-35
A1213		38	34.2	31.2	30-35
A1214		38	34.9	31.9	30-35
A1215		38	34.3	32.8	30-35
A1217	admin building	38	35.6	35.6	35-38
A1222		38	33.5	33.5	30-35
A1223		38	33.0	30.0	30-35
A1224		38	32.9	27.9	30dB(A) or 'Background'
A1225	no house	38	32.1	27.1	30dB(A) or 'Background'
A1226		38	32.5	27.5	30dB(A) or 'Background'
A1227	no house	38	35.0	30.0	30dB(A) or 'Background'
A1228		38	34.8	33.3	30-35
A1229	no house	38	34.7	33.2	30-35
A1230	no house	38	33.4	31.9	30-35
A1231		38	33.4	30.4	30-35
A1236		38	36.3	36.3	35-38
A1237		38	37.1	35.6	35-38
A1242	no house	38	30.1	30.1	30-35
A1243	no house	38	28.5	28.5	30dB(A) or 'Background'
A1244		38	28.8	28.8	30dB(A) or 'Background'
A1245		38	28.4	28.4	30dB(A) or 'Background'
A1248	no house	38	35.0	35.0	35-38
A1249		38	35.1	33.6	30-35
A1259	no house	38	29.9	29.9	30dB(A) or 'Background'
A1260		38	29.8	24.8	30dB(A) or 'Background'
A1261		38	30.0	25.0	30dB(A) or 'Background'
A1262		38	30.1	25.1	30dB(A) or 'Background'
A1263		38	30.3	25.3	30dB(A) or 'Background'
A1266		38	28.2	28.2	30dB(A) or 'Background'

Aberdare East HEM_ID	Land Status	Noise Goal (Background +5dB(A))	Acoustic Impact (no shielding)	Approximate Acoustic Impact (with shielding)	Revised Level of Impact Including Potential House Shielding Effects
A1269		38	34.0	34.0	30-35
A1270		38	34.8	33.3	30-35
A1274		38	28.3	28.3	30dB(A) or 'Background'
A1275	no house	38	28.2	26.7	30dB(A) or 'Background'
A1276		38	28.2	26.7	30dB(A) or 'Background'
A1286		38	28.9	28.9	30dB(A) or 'Background'
A1287		38	29.4	29.4	30dB(A) or 'Background'
A1288		38	30.5	30.5	30-35
A1291		38	28.4	28.4	30dB(A) or 'Background'
A1292		38	28.3	28.3	30dB(A) or 'Background'
A1293	no house	38	28.5	28.5	30dB(A) or 'Background'
A1294		38	28.6	27.1	30dB(A) or 'Background'
A1300	no house	38	36.7	36.7	35-38
A1301	no house	38	36.8	35.3	35-38
A1302	no house	38	37.4	35.9	35-38
A1303		38	29.2	29.2	30dB(A) or 'Background'
A1304		38	29.5	29.5	30dB(A) or 'Background'
A1305		38	29.3	29.3	30dB(A) or 'Background'
A1310		38	28.1	28.1	30dB(A) or 'Background'
A1311	no house	38	28.2	28.2	30dB(A) or 'Background'
A1312		38	27.9	27.9	30dB(A) or 'Background'
A1333		38	30.2	30.2	30-35
A1334	no house	38	30.6	25.6	30dB(A) or 'Background'
A1339	no house	38	32.2	32.2	30-35
A1340		38	32.0	29.0	30dB(A) or 'Background'
A1341		38	32.5	29.5	30dB(A) or 'Background'
A1342		38	32.7	31.2	30-35
A1347	no house	38	28.3	28.3	30dB(A) or 'Background'
A1348	no house	38	28.3	28.3	30dB(A) or 'Background'
A1351		38	30.1	30.1	30-35
A1352		38	30.3	28.8	30dB(A) or 'Background'
A1356		38	31.6	31.6	30-35
A1357		38	31.1	31.1	30-35
A1358		38	30.7	30.7	30-35

Table 2: Noise levels under Scenario 10 with trucks using David Street and Scenario 20 using fire trail. Given the space between houses in this area no shielding effects of buildings has been applied, not withstanding the probability of several houses experiencing some shielding.

Neath HEM_ID	Land Status	Noise Goal (Background +5dB(A))	Acoustic Impact Scenario10 in EA	Acoustic Impact Scenario 20 in PPR	Level of Impact
N1		44	30.3	29.2	30dB(A) or 'Background'
N2		44	30.7	29.4	30dB(A) or 'Background'
N3		44	31.0	29.6	30dB(A) or 'Background'
N4		44	31.3	29.8	30dB(A) or 'Background'
N5		44	31.5	30.0	30dB(A) or 'Background'
N6		44	31.8	30.1	30-35
N7		44	33.1	31.0	30-35
N8		44	33.2	31.1	30-35
N9	no house	44	32.7	30.6	30-35

Neath HEM_ID	Land Status	Noise Goal (Background +5dB(A))	Acoustic Impact Scenario10 in EA	Acoustic Impact Scenario 20 in PPR	Level of Impact
N10		44	33.3	30.9	30-35
N11		44	33.4	30.9	30-35
N12		44	33.8	30.9	30-35
N13		44	33.9	30.8	30-35
N14		44	34.1	30.8	30-35
N15		44	34.3	30.6	30-35
N16		44	34.4	30.2	30-35
N17		44	37.8	31.3	30-35
N18		44	38.6	31.5	30-35
N19		44	39.2	31.8	30-35
N20		44	40.0	32.1	30-35
N21		44	40.7	32.5	30-35
N22		44	41.1	32.9	30-35
N23		44	39.1	32.6	30-35
N24		44	40.8	35.6	35-40
N25	no house	44	37.2	36.5	35-40
N26		44	37.2	37.2	35-40
N27	no house	44	36.5	36.8	35-40
N28		44	36.1	36.9	35-40
N29		44	35.9	36.8	35-40
N30		44	35.9	36.7	35-40
N31		44	35.6	36.1	35-40
N32		44	35.5	36.3	35-40
N33		44	35.5	36.1	35-40
N34		44	35.0	35.3	35-40
N35		44	35.5	36.0	35-40
N36		44	35.6	35.9	35-40
N37		44	35.3	35.6	35-40
N38		44	35.4	35.7	35-40
N39		44	35.2	35.4	35-40
N40		44	35.0	35.9	35-40
N41		44	34.3	36.1	35-40
N42		44	33.7	35.9	35-40
N43		44	33.3	35.7	35-40
N44		44	32.9	35.2	35-40
N45		44	32.3	34.1	30-35
N46		44	32.2	33.4	30-35
N47		44	32.1	33.0	30-35
N48		44	31.8	32.3	30-35
N49		44	31.5	31.6	30-35
N50		44	31.4	31.2	30-35
N51		44	31.0	30.6	30-35
N52		44	30.6	30.0	30-35
N53		44	30.3	29.7	30dB(A) or 'Background'
N54		44	30.1	29.4	30dB(A) or 'Background'
N55		44	29.8	29.1	30dB(A) or 'Background'
N56		44	29.5	28.6	30dB(A) or 'Background'
N57		44	29.5	28.5	30dB(A) or 'Background'
N72		44	31.3	30.2	30-35
N73		44	31.8	30.6	30-35

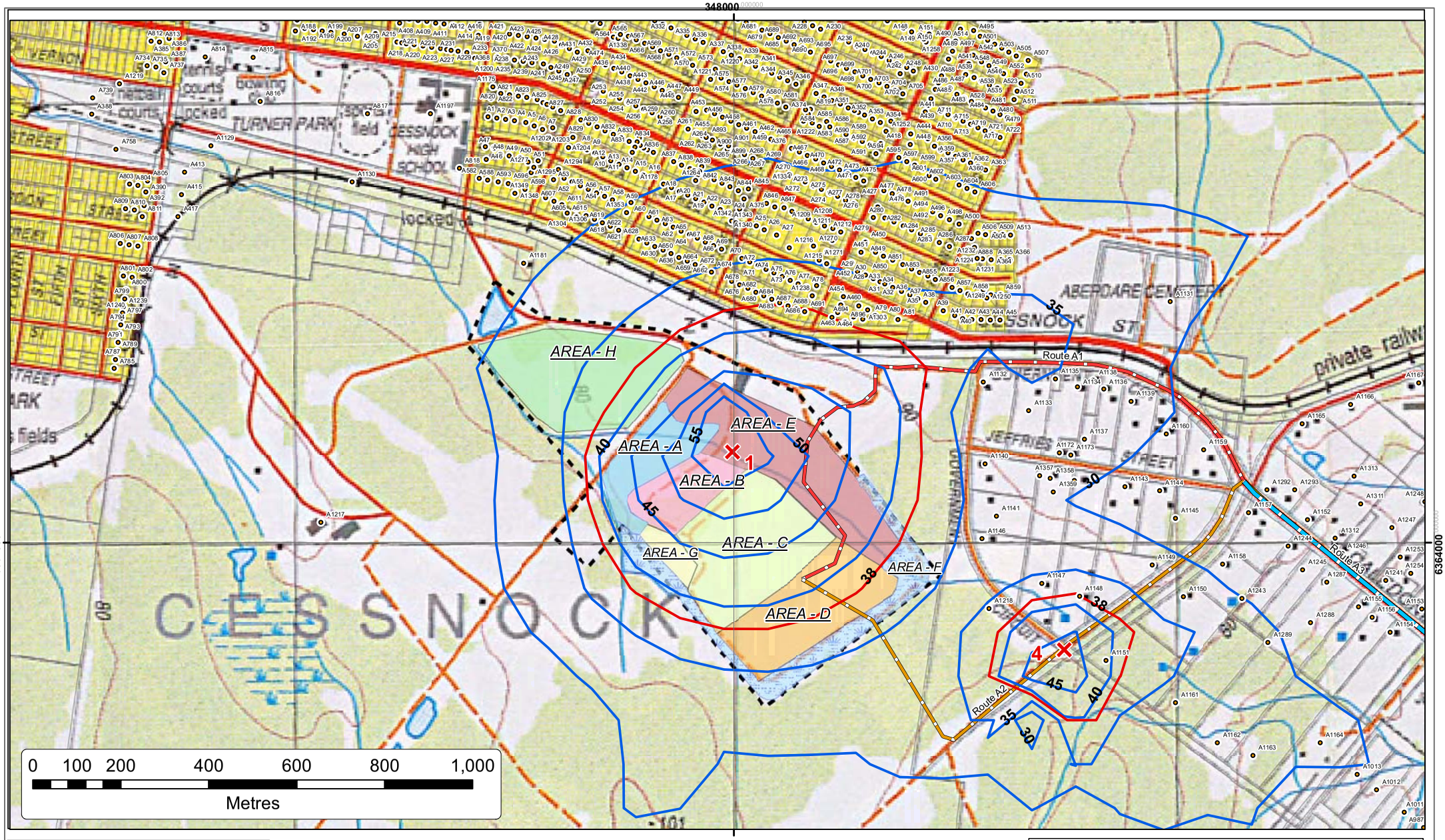
Neath HEM_ID	Land Status	Noise Goal (Background +5dB(A))	Acoustic Impact Scenario10 in EA	Acoustic Impact Scenario 20 in PPR	Level of Impact
N74		44	32.2	31.0	30-35
N75		44	32.8	31.5	30-35
N76		44	33.3	31.9	30-35
N77		44	33.6	32.1	30-35
N78		44	34.1	32.6	30-35
N79		44	34.5	32.9	30-35
N80		44	35.6	33.2	30-35
N81		44	35.7	33.0	30-35
N82		44	36.0	33.0	30-35
N83		44	36.1	32.7	30-35
N84		44	36.7	32.9	30-35
N85		44	37.6	32.4	30-35
N86		44	38.7	33.0	30-35
N87		44	39.1	32.8	30-35
N88		44	39.8	33.0	30-35
N89		44	41.0	33.5	30-35
N90		44	41.8	33.6	30-35
N91		44	42.7	33.8	30-35
N92		44	44.5	34.3	30-35
N93		44	46.3	34.6	30-35
N94		44	47.6	34.8	30-35
N95	no house	44	44.1	38.4	35-40
N96		44	41.8	38.9	35-40
N97		44	39.9	39.3	35-40
N98	no house	44	38.8	40.4	40-44
N99		44	38.4	40.6	40-44
N100		44	38.1	40.6	40-44
N101	**no house**	**44**	**40.1**	**44.6**	**44-45_1-2dB(A) Exceedance**
N102		44	38.0	40.9	40-44
N103		44	38.2	41.0	40-44
N104		44	37.8	40.2	40-44
N105		44	37.8	40.1	40-44
N106		44	37.4	39.6	35-40
N110	no house	44	33.2	32.2	30-35
N111	no house	44	33.8	32.8	30-35
N112		44	39.1	35.4	35-40
N113		44	45.0	37.6	35-40
N114		44	46.1	37.9	35-40
N115		44	49.7	38.2	35-40
N116	no house	44	51.4	37.7	35-40
N117		44	35.1	31.2	30-35
N118	no house	44	35.1	33.7	30-35
N119	no house	44	34.8	33.4	30-35
N120	no house	44	30.4	30.8	30-35
N121	no house	44	30.6	31.1	30-35
N122	no house	44	30.8	31.3	30-35
N123		44	30.8	31.0	30-35
N124		44	30.8	30.7	30-35
N125		44	30.6	30.3	30-35
N126		44	30.5	29.9	30dB(A) or 'Background'

Neath HEM_ID	Land Status	Noise Goal (Background +5dB(A))	Acoustic Impact Scenario10 in EA	Acoustic Impact Scenario 20 in PPR	Level of Impact
N127		44	30.3	29.5	30dB(A) or 'Background'
N128		44	30.0	29.1	30dB(A) or 'Background'
N129		44	29.8	28.8	30dB(A) or 'Background'
N130		44	29.6	28.6	30dB(A) or 'Background'
N131		44	29.4	28.3	30dB(A) or 'Background'
N132		44	29.1	28.0	30dB(A) or 'Background'
N133		44	29.1	28.1	30dB(A) or 'Background'
N134		44	28.8	27.7	30dB(A) or 'Background'
N146	no house	44	35.5	35.2	35-40
N147		44	0.0	0.0	30dB(A) or 'Background'
N148		44	0.0	0.0	30dB(A) or 'Background'
N149		44	0.0	0.0	30dB(A) or 'Background'
N150		44	29.3	29.3	30dB(A) or 'Background'
N154		**44**	**44.1**	**47.3**	**45-50_1-6dB(A) Exceedance**
N157	no house	44	35.1	33.5	30-35
N158	no house	44	35.3	33.7	30-35
N159	no house	44	35.5	33.7	30-35
N160		44	35.3	33.2	30-35
N161		44	37.8	41.2	40-44
N162	Basspark	44	29.9	29.9	30dB(A) or 'Background'
N163	Basspark	44	29.9	29.8	30dB(A) or 'Background'
N164	Basspark	44	29.8	29.7	30dB(A) or 'Background'

Table 3: Richmond Main East Acoustic Impacts of Scenario 15.

Richmond Main East HEM_ID	Land Status	Noise Goal dB(A)	Approximate Scenario 15 Acoustic Impact	Scenario 15 Typical Level of Impact
R1		35	27.8	30dB(A) or 'Background'
R2		35	0.0	30dB(A) or 'Background'
R3		35	26.4	30dB(A) or 'Background'
R4		35	0.0	30dB(A) or 'Background'
R5		35	0.0	30dB(A) or 'Background'
R7		35	31.4	30-35
R8		35	28.8	30dB(A) or 'Background'
R9		35	0.0	30dB(A) or 'Background'
R10	no house	35	33.4	30-35
R11		**35**	**38.1**	**35-40 0-5dB(A) Exceedance**
R12		35	27.1	30dB(A) or 'Background'
R13		35	0.0	30dB(A) or 'Background'
R14		35	0.0	30dB(A) or 'Background'
R15		35	31.1	30-35
R16	no house	35	+50.0	Site Centre

Figures



Wells Environmental Services

N W E S

Datum: MGA94 / Zone 56
Scale: 1:8,000 @ A3

LEGEND:

30 Noise Contours dB(A)

×1 Front End Loader & Truck

×4 Truck (Sth Entrance)

Base Source: Cessnock 1 : 25 000 Topographic Map

406: _Figures.DWG

SPECTRUM ACOUSTICS

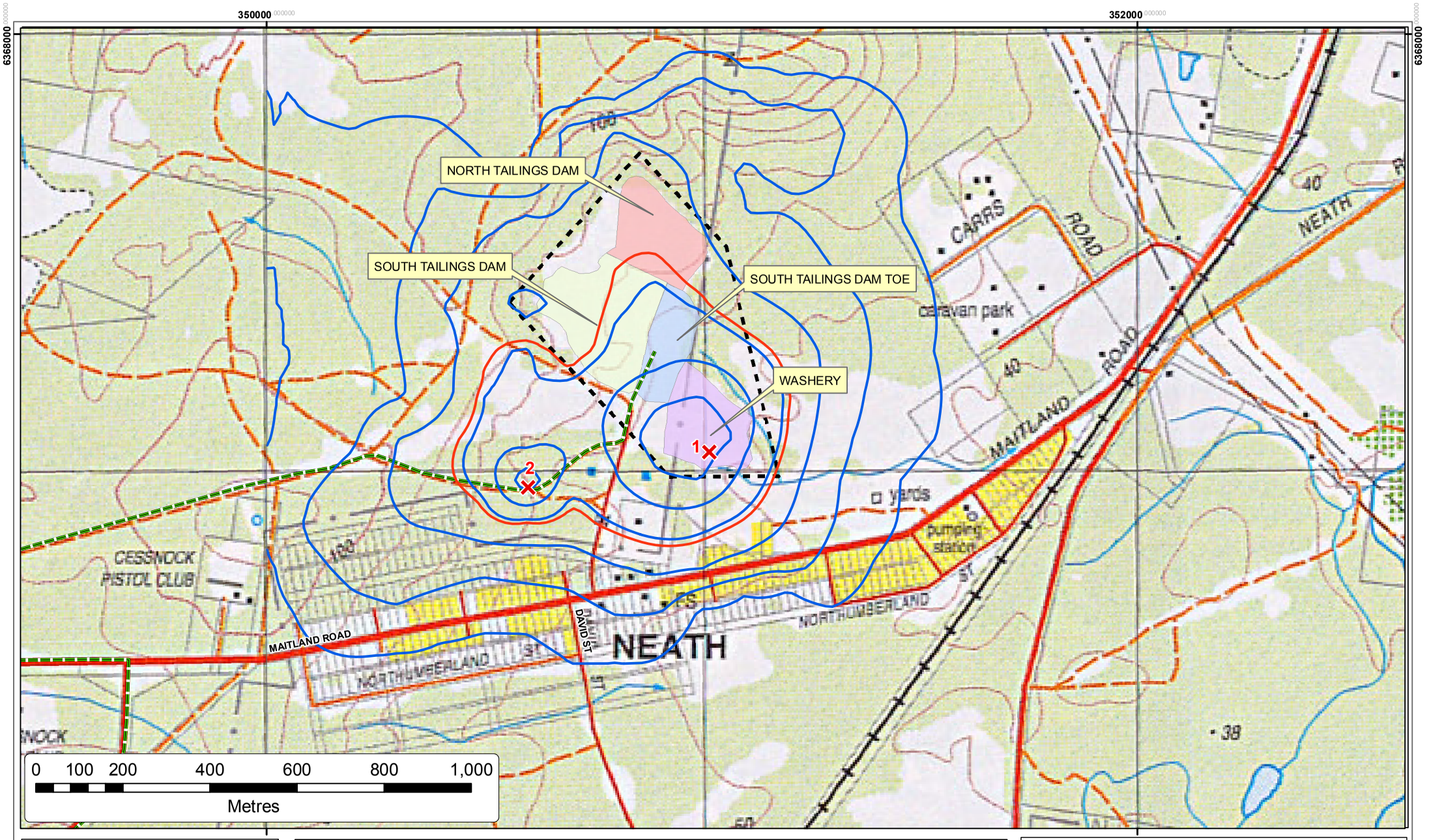
HUNTER ENVIRO-MINING (OPERATIONS) PTY LIMITED

Chitter and Tailings Reclamation Project

ABERDARE EAST - PREDICTED NOISE LEVELS UNDER SCENARIO 5

Drawn: JPB	17 December 2006	Checked: JPB	17 December 2006
File Name:	FIGURE_5.5_051006		

FIGURE 5.5



Wells Environmental Services

N W E S

Datum: MGA94 / Zone 56
Scale: 1:8,000 @ A3

LEGEND:

30 Noise Contours dB(A)

2 Truck

1 Front-end Loader and Truck at Surface

Base Source: Cessnock 1 : 25 000 Topographic Map

4061_Figures.DWG

SPECTRUM ACOUSTICS

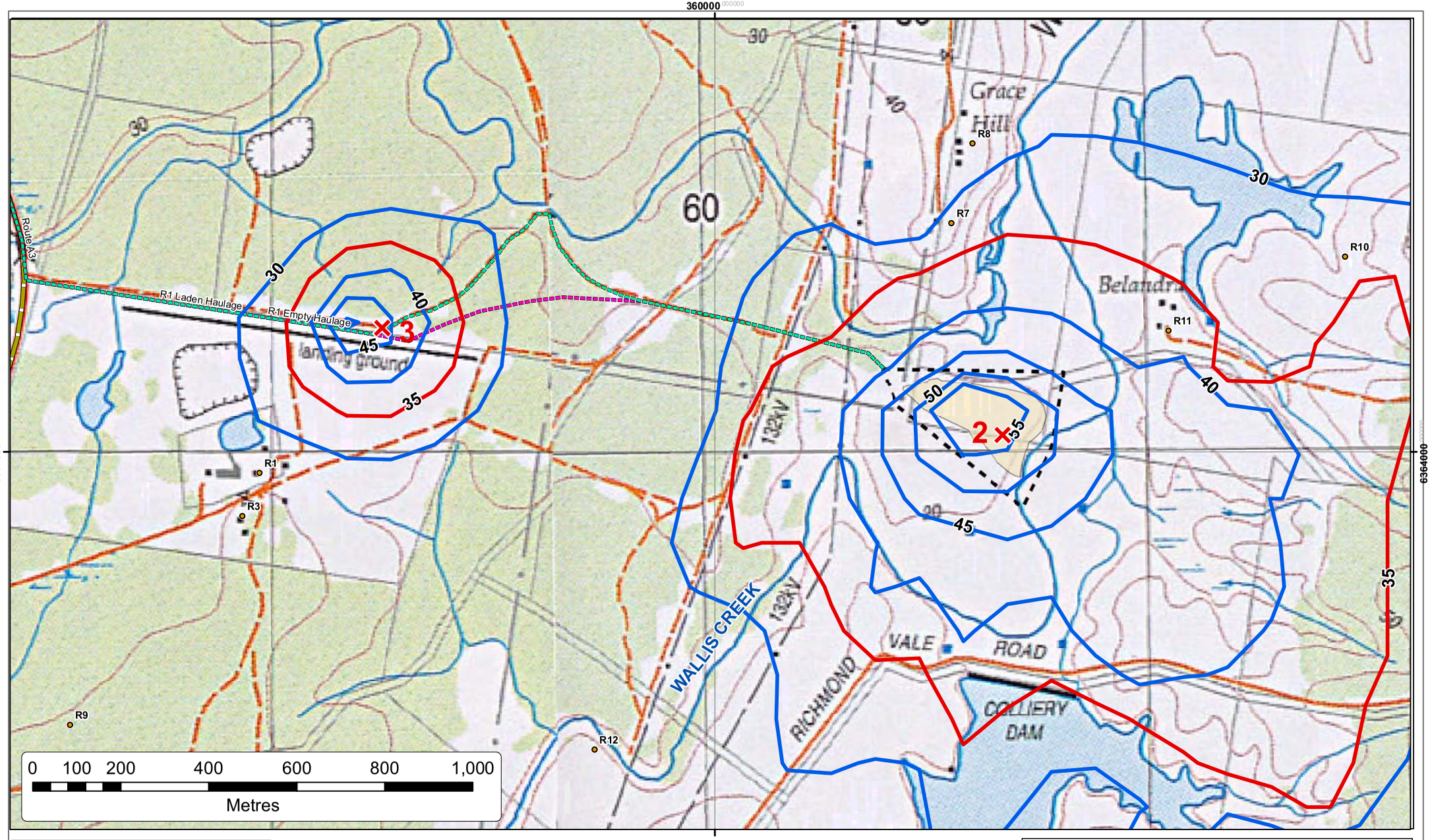
HUNTER ENVIRO-MINING (OPERATIONS) PTY LIMITED

Chitter and Tailings Reclamation Project
Preferred Project Report

NEATH - PREDICTED NOISE LEVELS UNDER SCENARIO 20 PREFERRED HAULAGE ROUTE

Drawn: JPB	09 October 2007	Checked: JPB	09 October 2007
File Name:	PPR_NOISE_1_091007		

FIGURE 1



Wells Environmental Services

N W E S

Datum: MGA94 / Zone 56
Scale: 1:8,000 @ A3

LEGEND:

30 Noise Contours dB(A)

x3 Truck

x2 Dozer

Base Source: Cessnock 1 : 25 000 Topographic Map

4061 Figures.DWG

SPECTRUM ACOUSTICS

HUNTER ENVIRO-MINING (OPERATIONS) PTY LIMITED

Chitter and Tailings Reclamation Project

RICHMOND MAIN EAST - PREDICTED NOISE LEVELS UNDER SCENARIO 15

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File Name: FIGURE_5.7_051006

FIGURE 5.7

Hunter Enviro-Mining (Operations) Pty Limited

Preferred Project Report

Chitter & Tailings Reclamation Project

Appendix 10

Statement of Heritage Impact

October 2007

Hunter Enviro-Mining (Operations) Pty Limited

STATEMENT OF HERITAGE IMPACT
FOR
ABERDARE EAST, NEATH AND RICHMOND MAIN EAST COAL WASTE EMPLACEMENTS



This statement forms part of the Preferred Project Report
for the
HEM Chitter and Tailing Reclamation Project

Wells Environmental Services

October 2007

TABLE OF CONTENTS

1 INTRODUCTION 3

1.1 LOCATION 3

2 HERITAGE STATUS 5

3 HISTORIC SUMMARY 6

3.1 ABERDARE EAST 6

3.1.1 Aberdare East Colliery 6

3.1.2 Aberdare Shaft Colliery 10

3.2 ABERDARE NORTH TUNNEL 14

3.3 NEATH 17

3.4 RICHMOND MAIN EAST 21

4 ASSESSMENT OF SIGNIFICANCE 22

4.1 APPLICATION OF SIGNIFICANCE CRITERIA 22

4.2 ABERDARE EAST 23

4.3 ABERDARE NORTH TUNNEL 24

4.4 NEATH 24

4.5 RICHMOND MAIN EAST 25

4.6 STATEMENT OF CULTURAL SIGNIFICANCE 25

5 STATEMENT OF HERITAGE IMPACT 26

6 REFERENCES 28

FIGURES

Figure 1 Site Locations and proposed haulage routes.

APPENDICIES

Appendix A Results of database searches.

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1 Introduction

This Statement of Heritage Impact (SHI) has been prepared by Bernice Campbell and Jonathan Berry of Wells Environmental Services. It should be noted that the authors of this report are not qualified archaeologists. The SHI assesses the potential impact of the proposed Hunter Enviro-Mining (Operations) Pty Ltd (HEM) Chitter and Tailings Reclamation Project on three subject sites Aberdare East Colliery, Neath Colliery and Richmond Main East Coal Waste Emplacements and associated remaining infrastructure.

HEM propose to clean up and rehabilitate these three areas by collecting and transporting the material from the emplacements to the Hebburn No. 3 processing plant and processing this material to extract saleable coal, refer to **Figure 1**.

This SHI forms part of the Chitter and Tailings Reclamation Project.

1.1 Location

The locations of the three subject sites are described below and illustrated in **Figure 1**:

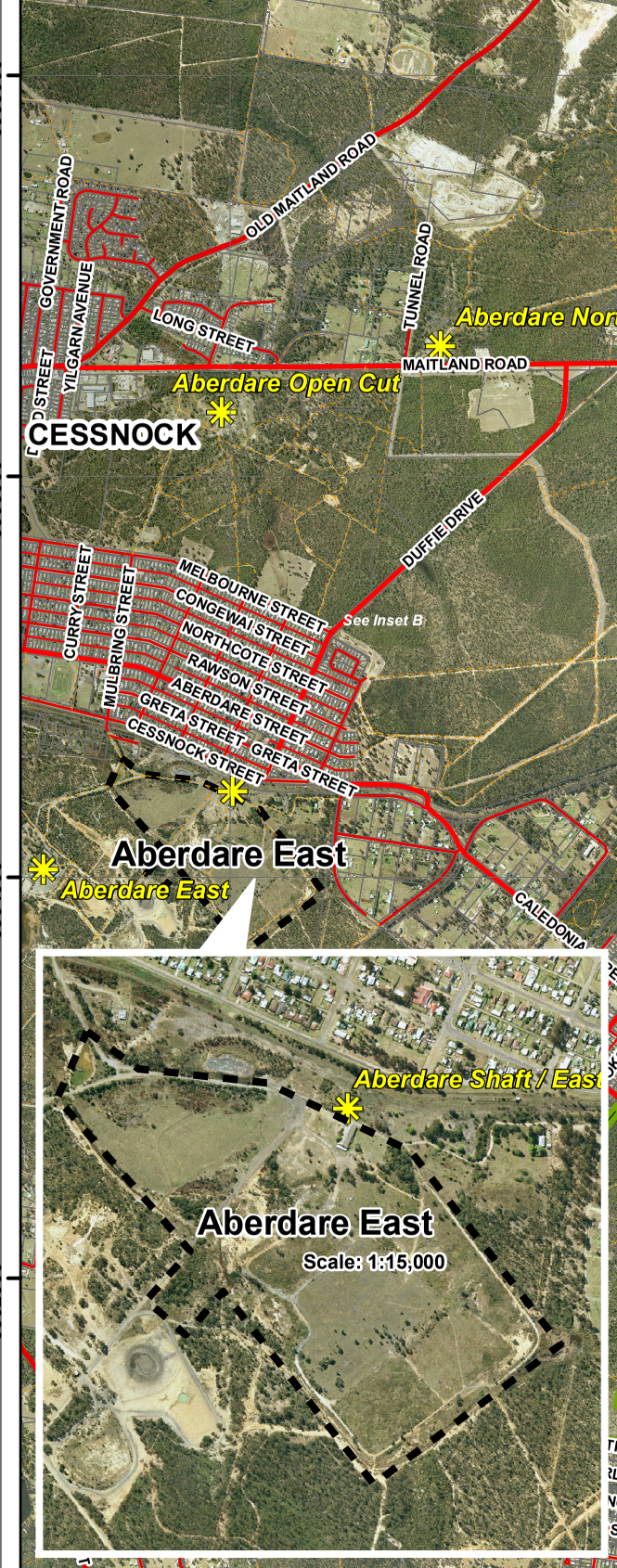
- Aberdare East and Aberdare Shaft Colliery - south of the South Maitland Railway and Cessnock Street, Aberdare. Former site of the Aberdare Shaft Colliery and Aberdare East Washery. Approximate centre of the site is 347710ME 6364550MN (MGA Zone 56);
- Neath - North of Maitland Road, Neath, off David Street. Site of the former Neath Colliery and coal washery. Approximate centre of the site is 350847ME 6367300MN (MGA Zone 56); and
- Richmond Main East - north of Richmond Vale Road and East of the Kurri-Mulbring Road, Richmond Vale. Approximate centre of the site is 360642mE 6364097mN (MGA Zone 56).

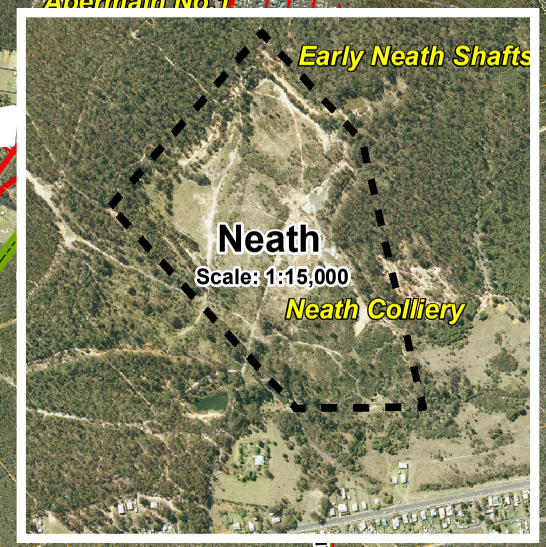
348000 000000 | 350000 000000 | 352000 000000 | 354000 000000 | 356000 000000 | 358000 000000 | 360000 000000

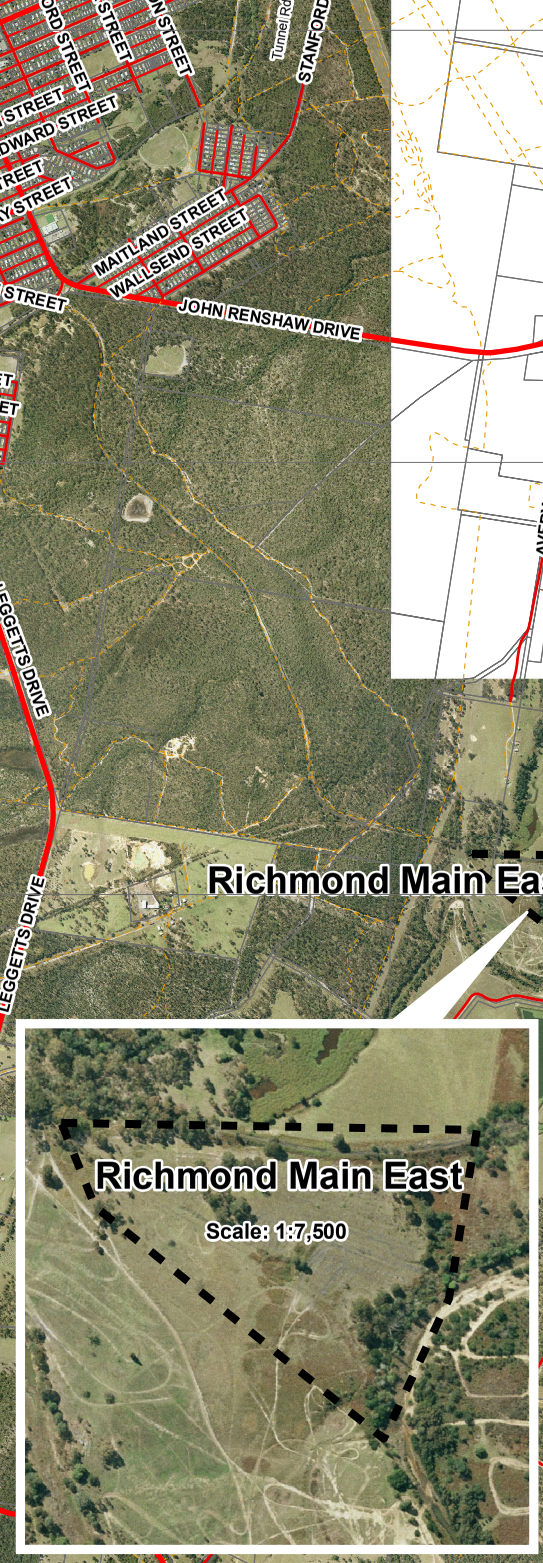
6368000 000000 | 6366000 000000 | 6364000 000000 | 6362000 000000

Neath Open Cut
Neath Open Cut
Early Neath Shafts
Neath
Neath Colliery
Aberdare North / Tunnel
Aberdare Open Cut
CESSNOCK
Abermain No.3
Abermain No.1
WILLIAM STREET
CESSNOCK ROAD
Pinkeye
Hebburn No.1
KURRI KURRI
Pelaw Main
Richmond Main
Richmond Main East
Aberdare East
Aberdare East
Abermain No.2
Elrington
HEBBURN NO.3 (CML1)
Hebburn No.2
WERAKATA NATIONAL PARK
See Inset B

OLD MAITLAND ROAD
GOVERMENT ROAD
YILGARN AVENUE
LONG STREET
TUNNEL ROAD
MAITLAND ROAD
DUFFIE DRIVE
NEATH ROAD
CURRY STREET
MULBRING STREET
MELBOURNE STREET
CONGEWAI STREET
NORTHCOTE STREET
RAWSON STREET
ABERDARE STREET
GRETA STREET
CESSNOCK STREET
CALEDONIA
KEARSLEY ROAD
COLLIERY ROAD
LAKE ROAD
HEBBURN ROAD
TUMBLEBEE TRAIL
Kearsley Powerline Fire Trail
HEZ SPINE ROAD
DAM ROAD
COLEMANS ROAD
HOWELLS ROAD
FIRST STREET
SCOTT STREET
ELFORD STREET
HOSPITAL ROAD
BOUNDARY STREET
DEAKIN STREET
ABERDARE STREET
MAITLAND STREET
BRUNKER STREET
LANG STREET
BARTON STREET
RAWSON STREET
HOPETOUN STREET
EDWARD STREET
CORONATION STREET
RAILWAY STREET
POKOLBIN STREET
HEBBURN STREET
ABERMAIN STREET
ABERDARE STREET
NEATH STREET
STANFORD STREET
GRETA STREET
HEDDON STREET
Tunnel Rd
STANFORD ROAD
MAITLAND STREET
WALLSEND STREET
JOHN RENSHAW DRIVE
AVERYS LANE
LEGGETTS DRIVE
NEW STREET







Legend

Mining Lease Application Boundary
Hebburn No.3 CML1
Werakata_National_Park

Abandoned Collieries in Cessnock Locality

N
W E
S

Wells Environmental Services

BASE MAP: AERIAL SEPT 2004 PLATEAU IMAGES

Datum: MGA94 / Zone 56
Scale: 1:35,000 @ A3

0 500 1,000 2,000 3,000 4,000 5,000
Metres

HUNTER ENVIRO-MINING (OPERATIONS) PTY LIMITED

Statement of Heritage Impact

LOCATION OF SITES IN CONTEXT OF CESSNOCK/KURRI KURRI COAL FIELDS

Drawn: JPB	13 August 2007	Checked: JPB	04 October 2007
File Name:	SHI_Loco		

FIGURE 1

2 Heritage Status

The results of searches of relevant databases, Regional Environmental Plans and Local Environmental Plans are attached at **Appendix A** and summarised below.

A search of the Australian Heritage Database revealed that the three subject sites are not listed.

A search of the NSW State Heritage Register and State Heritage Inventory revealed that the three subject sites are not listed on the NSW State Heritage Register. Whilst Richmond Main Colliery is listed (as noted by the NSW Heritage Office, email dated 23 January 2007), it should be noted that Richmond Main East is a separate and distinct locality that is well beyond the boundary of the Richmond Main Colliery precinct.

Review of Schedule 1 – Items of State environmental heritage, Schedule 2 – Items of regional environmental heritage and Schedule 3 – Items of local environmental heritage of the Hunter Regional Environmental Plan 1989 (Heritage) revealed that Neath Colliery is listed as an item of local environmental heritage.

Review of Schedule 3 – Items of environmental heritage of the Cessnock Local Environmental Plan 1989 has revealed that the three subject sites are not listed as items of environmental heritage.

3 Historic Summary

The following section presents a brief history of each of the three subject sites. Each of the three sites has a history steeped in coal mining. However, mining or mine related activities at these sites have not been undertaken for at least two decades. Upon cessation of mining activities at these sites much of the pit top infrastructure and buildings have been demolished, dismantled, removed, sold or recycled, with landforms modified during the rehabilitation process. This summary provides an inventory of the infrastructure and buildings that were known to exist at the site and where possible provides their current status with the logic that infrastructure and buildings are likely to contain the greatest heritage values.

Prior to undertaking works at the site HEM will undertake a survey of each site mapping and pegging/flagging the locations of known infrastructure and buildings in relation to proposed HEM activities.

It should be noted that proposed HEM activities will not typically be undertaken in the vicinity of the known locations of old infrastructure and buildings (whether or not they exist today), there the potential impact on heritage items (or their footings) are considered to be low. The primary areas that will be impacted by HEM activities are tailings and chitter dumps.

3.1 Aberdare East

The Aberdare East resource area consists of rejects and tailings produced primarily from the Aberdare East Colliery and the Aberdare Shaft Colliery. Therefore a summary of each of their histories are provided below.

3.1.1 Aberdare East Colliery

The history of Aberdare East Colliery operations are provided below. It should be noted that most of the surface facilities (which would hold the most heritage value) for this colliery are beyond the boundary of the proposed HEM Chitter and Tailings Reclamation Project. The only surface aspects of the colliery that will be impacted by the HEM project include the tailings dams and coal stockpile pad produced from the reject generated by the Aberdare Shaft Colliery Washery that washed a combination of Aberdare East and Aberdare Shaft coal.

Aberdare East Colliery operated from 1966 to 1982 in a virgin area of coal resulting from the combination of a number of Caledonian Colliery leases. It is believed that the virgin coal reserves consisted of a solid block over 640 acres in size It is located adjacent to the South Maitland Railway, south east of Cessnock High School and south of the Aberdare Shaft Colliery.

Entry to the colliery was via two drift tunnels. The main drift was for the entry of men and materials, the second drift was the cable belt drift. Another entry was provided which was the up-cast air shaft.

Aberdare East Colliery was planned to be worked by mechanisation methods with rubber belting conveyor haulage under the board and pillar system. The longwall method of coal mining was investigated and it was concluded that the high seam was beyond the usual safe mining practices for the period.

Aberdare East Colliery sourced its electricity from two separate flows of high tension power lines, supplying approximately 11,000 volts power to the mine. It is reported that it appears that Coal and Allied removed all of its high tension electricity mains when the company's

apprentice training scheme in the area wound up. This is evident by the fact that in September 1989 Shortland County Council ran a new electricity main from the Cessnock town supply to meet electricity requirements for the new occupiers, the Hunter Plan Operators Training School Limited.

Aberdare East Colliery was expected to be inundated by underground water. The designers of Aberdare East Colliery arranged for a bore to be sunk to pump underground pit water. Problems with the bore and pump system were encountered from the pumps and piping being eroded away by pit acid water. By 1973, a huge underground dam was formed with an estimated capacity of 2,000,000 gallons in a worked out section of the mine. Some 46 pumps were operated simultaneously to move underground water to the dam from other parts of the mine. A new bore was sunk above the underground dam and a stainless steel pipe inserted. Water was pumped from the underground dam to a settling pond, and from the pond through a tumbler to a set of four ponds and then to a lime treatment pond.

The coal from Aberdare East (and apparently some from Aberdare North Tunnel) was washed at the Aberdare Shaft Colliery Washery, north east of the Aberdare East pit top. This washery ceased operations in 1982 when Aberdare East Colliery closed. According to Berry (2002) after processing 20% of the raw coal remains as refuse. Coarse refuse was typically disposed of in the construction of rock filled dams to contain the slurry form of finer rejects from the washery. Fines, slurry form were typically produced in the dewatering of the coarser fractions and consist of fine particles suspended in water. It was taken from the washery by pipeline and may have been passed through a thickener before it was disposed of in the rock fill dams. The structure of the tailings at Aberdare is similar to a 'turkey'/s nest' structure. Such structures consists of coarse chitter and reject material stacked to create shallow dam structures which were then filled with the fine waste. When the dam became full, the structure is built higher, and the process repeated which leads to a turkey nest shape.

The Tailings Dam emplacements on the Aberdare East site resulted from the reject created by the Aberdare Shaft Colliery washery, primarily from washing Aberdare East coal. The Chitter Resource area was a former coal stockpile pad, and is thought to have a mix of product coal and reject material.

Coal production was transported from Aberdare East Colliery by motor lorries to the Aberdare Shaft washery plant for treatment. There was never a direct rail connection. After treatment at the Aberdare Shaft washery, coal was loaded in a fleet of wooden hopper rail coal wagons in the Aberdare Shaft Colliery sidings to 1973 when the government disbarred the haulage of coal via wooden hooper vehicles into Port Waratah. From this point coal was loaded onto large steel wagons.

There were several pit top structures. Aberdare East Colliery did not have any colliery houses which was unusual for the period. The focal point at the colliery was the huge circular steel 2000 tons capacity raw coal holding bin. Two separate conveyor belts ran from beneath the bin to the elevated lorry loading bins, each loading bin had a capacity of 20 tons. Other pit top structures include a cable conveyor drive house, a materials drift haulage and control house, transformer and switch yard, cable repair shop, rail services track (between the materials transport tunnel portal and the cable repair shop), workshop and stores building, fire fighting equipment shed, miner's lamp cabin, colliery offices, bath house and change rooms.

In addition to the underground water problems the working conditions of the site were difficult. The roof consisted of a poor type mudstone which proved too soft to allow major expansion. In addition heatings and fires combined to prevent access to the majority of coal production potential. All development work ceased on the 21st March 1977 following Coal and Allied consulting with the Commonwealth Scientific Investigation and Research Organisation (CSIRO), the Australian Coal Industry Research Laboratory Limited (ACIRL), Dr K Moelle a Goeologist from Newcastle University and various other visiting overseas mining engineers

who conceded that further development was not viable. Reportedly only 6% of its available potential coal was won from the colliery.



Photograph 1: Aberdare East (Source: A History of the Greta Coal Measures, Jack Delany http://archive.amol.org.au/newcastle/greta/frames.html)

Aberdare East Colliery ceased its mining production operations on 24th September 1982, and the services of its employees were terminated with the exception of a skeleton crew who were retained to recover machinery and seal off the mine. Surface machinery, equipment and structures were demolished, recovered and transferred by scrap metal merchants as required by Coal and Allied and the balance sold as scrap. An earth moving contractor bulldozed over the drift entrances and air shaft on the 23rd November 1982. The office building, workshop structure, store room and bathhouse/changeroom were allowed to stand, all else was destroyed, demolished and removed.

Throughout the life of, and upon closure of Aberdare East Colliery, much of the equipment used in the course of mining was transported to other Coal and Allied mines for use in their operations.

After closing in 1982, the surface facilities were used by Coal & Allied for their Apprentice Training School until which commenced on 2nd February 1983 and was closed at the end of 1988. In 1989, Hunter Plant Operators Training School took over the surface and use the facilities to train earth moving personnel to this day. It should be noted that conditions of the Hunter Plant Operator Training School Limited lease for the use of the site require the lessee is responsible for:

- The removal or burial of mine waste material; and
- Ensuring that the acid water leachate areas are correctly drained and kept separate from Black Creek.

The above information was sourced from the History of the Greta Coal Measures accessed on the Newcastle Regional Museum website.

Table 1 summarises the infrastructure known to exist at the site, and their present status (if known).

Table 1: Summary of Known Aberdare East Infrastructure and Current Status.

Structures	Status	Impact by HEM Chitter and Tailings Reclamation Project?
Three drifts (main entry, secondary entry and air shaft)	Bulldozed by earth moving contractor in 1982	No – beyond the boundary of the proposed project
Electricity high tension power line	Removed by Coal and Allied prior to 1989	No – beyond the boundary of the proposed project
Old and new underground dewatering bore	Unknown – assumed to be destroyed	No – beyond the boundary of the proposed project
Water treatment ponds	Unknown – assumed to be destroyed	No – beyond the boundary of the proposed project
Raw coal handling bin	Destroyed, demolished and removed	No – beyond the boundary of the proposed project
Conveyor belts	Destroyed, demolished and removed	No – beyond the boundary of the proposed project
Lorry loading bins	Destroyed, demolished and removed	No – beyond the boundary of the proposed project
Conveyor drive house	Destroyed, demolished and removed	No – beyond the boundary of the proposed project
Materials drift haulage and control house	Destroyed, demolished and removed	No – beyond the boundary of the proposed project
Transformer and switch yard	Destroyed, demolished and removed	No – beyond the boundary of the proposed project
Cable repair shop	Destroyed, demolished and removed	No – beyond the boundary of the proposed project
Rail services track	Destroyed, demolished and removed	No – beyond the boundary of the proposed project
Workshop and stores building	Allowed to stand and currently used by Hunter Plant Operator Training School Limited	No – beyond the boundary of the proposed project
Fire fighting equipment shed	Destroyed, demolished and removed	No – beyond the boundary of the proposed project
Miner's lamp cabin	Destroyed, demolished and removed	No – beyond the boundary of the proposed project
Colliery offices	Allowed to stand and currently used by Hunter Plant Operator Training School Limited	No – beyond the boundary of the proposed project
Bath house and change room	Allowed to stand and currently used by Hunter Plant Operator Training School Limited	No – beyond the boundary of the proposed project
Tailings dam	Currently capped and remains insitu, however leaching salt and acid into the surrounding	**Yes – within project boundary however low heritage value**

Structures	Status	Impact by HEM Chitter and Tailings Reclamation Project?
	environment	
Coal stockpile pad and chitter emplacement	Remains insitu, however leaching salt and acid into the surrounding environment	**Yes – within project boundary however low heritage value**

3.1.2 Aberdare Shaft Colliery

Aberdare Shaft Colliery is located to the north east of the Aberdare East colliery, the history of Aberdare Shaft Colliery is provided below. Similar to Aberdare East Colliery most of the surface facilities (which would hold the most heritage value) for this colliery are beyond the boundary of the proposed HEM Chitter and Tailings Reclamation Project. The only surface aspects of the colliery that will be impacted by the HEM project include the tailings dams, coal stockpile pad, and chitter emplacements produced from the reject generated by the Aberdare Shaft Colliery Washery that washed a combination of Aberdare East and Aberdare Shaft coal and the coal laboratory.

Aberdare Shaft Colliery operated from 1904 to 1982. The first sod of dirt was turned in March 1904 by the Caledonian Coal Company and the coal seam reached in the main shaft in May 1905. The first train of coal was lifted from the Aberdare Shaft Colliery sidings in October 1905.

Two shafts were sunk at the colliery, a down cast airway, a fan shaft, and an up cast airway. Initially it was estimated that the sinking of both shafts would take 6 months, however in actuality it was 14 months before both shafts were sunk. The sinking of the shafts resulted in an accident with one fatality and several injuries resulting in the shift boss committed for trial on a charge of manslaughter. A drift tunnel was commenced in 1914 and completed in 1915 to provide an additional air intake, and was later used for better access for the pit horses. As a result the Aberdare Shaft pit top stables were transferred to near the tunnel, and the horses paddocked adjacent to this drift. The tunnel was also used for miners for their travel in and out of the pit and later became the entrance to the Aberdare North Tunnel Colliery.

Aberdare Shaft Colliery worked on a board and pillar system.

A direct current electricity generation plant was constructed at the colliery and completed in September 1905.

During the 1950's at the Aberdare Shaft Colliery a coal washery and treatment plant was constructed and erected on the surface. The washery plant treated coals from Aberdare Shaft Colliery, Aberdare East Colliery, Aberdare North Tunnel, Aberdare West Colliery and later from other Caledonian Collieries Limited. Aberdare Shaft Colliery ceased operations for the raising of coal production via the shaft in November 1960, however the coal washery plant continued to be used to treat coal from a number of the company's other pits, open cuts and tunnels through to 1982.

In 1957, following construction and erection of the washery plant a coal laboratory was constructed within a section of the bathhouses previously erected at the site. Despite the closure of the Aberdare Shaft Washery, the laboratory continued to operate to service the various needs of Coal and Allied Limited's mines. The laboratory was closed in 1985.

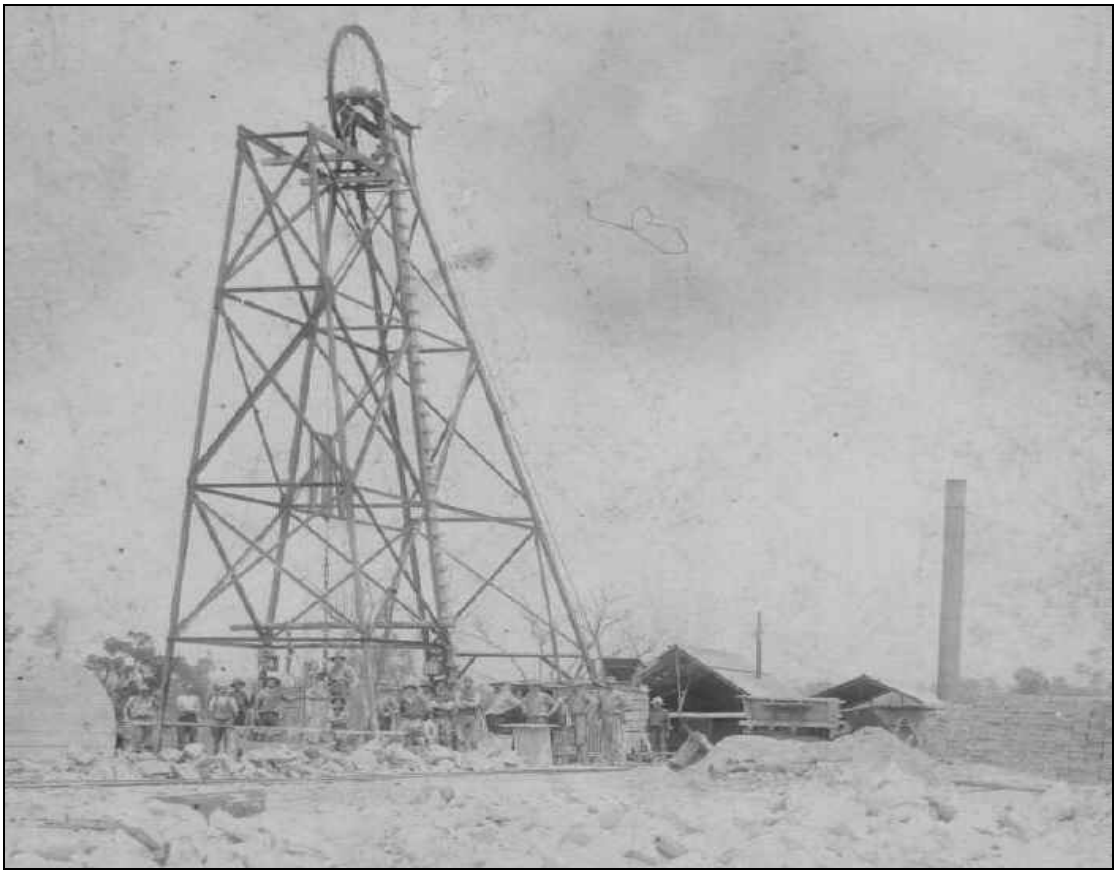
The first hauling winding engines at Aberdare Shaft Colliery were high pressure steam engines. Endless rope haulage operated from early in 1907. Two jig haulage systems assisted the pit horse haulage in bringing coal to the endless rope. From 1910 onwards electric powered haulage was introduced. An electric winder was supplied to Aberdare Shaft

Colliery in 1929 which saw the removal of the first steam winder. Pit horses were used extensively in the colliery haulage and was used for the full life of the Aberdare Shaft Colliery operations.

Aberdare Shaft Colliery's steam requirements were provided by a set of 9 boilers. In the colliery's early days two surface dams were constructed to supply water for use in the boilers.

All production from Aberdare Shaft Colliery was transported by rail in the wooden hopper style coal rail wagon. From the early war years Caledonian Collieries built up a direct trade with country gas works for the supply of coal. Aberdare Shaft provided much of this coal, the NSW Government Railways steel 'S' type were used to transport such orders. Coal from the Aberdare East Colliery washed in the Aberdare Shaft Colliery washery was transported initially in wooden hopper style coal wagons, until 1973 when barred by the state government. From this point onwards coal was transported to Port Waratah in a variety of the NSW Government Railways steel vehicles.

Three railway sidings were initially constructed at the colliery, followed by crossover points which carried the locomotive from the siding to the running road. Chitter, stone, mine debris and pit rubbish from screening and picking areas were transported and dumped towards the end of the loaded coal wagons standing sidings. This material was used to create the base for additional sidings. The Aberdare Shaft Colliery rail yard sidings are reported to have played a most important role in the efficient traffic working and rail operations.



Photograph 2: Aberdare Shaft Colliery, looking south west (Source: A History of the Greta Coal Measures, Jack Delany http://archive.amol.org.au/newcastle/greta/frames.html).

Pit top infrastructure at Aberdare Shaft Colliery included the heapstead (pit top), light skip railway, rail yard, main engine house, the boiler house, powerhouse, rope and iron storeroom, blacksmith's shop, fitter's shop, the carpenter's shop, general storeroom, mine office building, two brick residences, 6 timber houses and bath house. A small coal holding box was constructed to hold coal deemed to be too small. There was also an open cut loading point in the Aberdare Shaft Colliery Rail yards to receive and load coal from the open cut operations. Brick kilns were constructed onsite to manufacture bricks used to construct the various buildings onsite. A horse ambulance, a horse drawn covered vehicle was held in a small shed adjacent to the stables.

Aberdare Shaft Colliery ceased the raising of its coal production via its shaft on the 11th November 1960. The earlier working areas were added to the Aberdare North Tunnel Colliery's territory. Aberdare North Tunnel Colliery ceased mining operations on Friday 30th April 1988, this mine had been part of the original Aberdare Shaft Colliery coal lease. Aberdare West Colliery ceased its mining operations on 5th March 1968, it too had been part of the original Aberdare Shaft Colliery lease.

Soon after the Aberdare West Colliery ceased operations, all reusable plant was recovered. As the coal under the pit top was intended for an open cut mining operation, the bath house, the colliery office and the short air shaft were bulldozed into earlier open cut depressions and covered by overburden.

When Aberdare East Colliery ceased mining operations in 1982, the washery unit plant erected on Aberdare Shaft Colliers property also ceased operations.

In 1985 Coal and Allied demolished all pit top structures including rail sidings and removed them from the site, all suitable materials were recovered for scrap. The early small coal holding bin was demolished and levelled. The colliery officials houses were demolished and removed. The washery plant was dismantled in late 1982 and transferred to Liddell Colliery. In 1985 surplus washery machinery and the steel framed galvanised corrugated building of the washery were demolished.

The large coal holding elevated steel bins, the rubber conveyor and its structure at Aberdare North Tunnel Colliery pit top were demolished and sold as scrap. As at July 2007 the only structures to remain standing at the Aberdare Shaft Pit top were:

- A modern brick tile roofed residences that was utilised as a colliery officials' homes; and
- A Brick Coal Laboratory building.

Table 2 summarises the infrastructure known to exist at the site, and their present status (if known).

Table 2: Summary of Known Aberdare Shaft Infrastructure and Current Status.

Structures	Status	Impact by HEM Chitter and Tailings Reclamation Project?
Three shafts (down cast airway shaft, upcast airway shaft and drift tunnel)	Unknown – believed to be destroyed	No – beyond the boundary of the proposed project
Pit top stables	Unknown – believed to be destroyed	No – beyond the boundary of the proposed project
Electricity generation plant	Unknown – believed to be destroyed	No – beyond the boundary of the proposed project
Coal washery and treatment	Dismantled in 1982 and transported	No – beyond the boundary of the

Structures	Status	Impact by HEM Chitter and Tailings Reclamation Project?
plant	to Liddell	proposed project
Coal Laboratory	Still standing	No – beyond the boundary of the proposed project
Rail sidings	Demolished from site by Coal and Allied in 1985	No – beyond the boundary of the proposed project
Bath house	Bulldozed into open cut depression and covered with overburden	No – beyond the boundary of the proposed project
Colliery Office	Bulldozed into open cut depression and covered with overburden	No – beyond the boundary of the proposed project
Heapstead	Demolished from site by Coal and Allied in 1985	No – beyond the boundary of the proposed project
Rail yard	Demolished from site by Coal and Allied in 1985	No – beyond the boundary of the proposed project
Main engine house	Demolished from site by Coal and Allied in 1985	No – beyond the boundary of the proposed project
Boiler house	Demolished from site by Coal and Allied in 1985	No – beyond the boundary of the proposed project
Power house	Demolished from site by Coal and Allied in 1985	No – beyond the boundary of the proposed project
Rope and iron storeroom	Demolished to allow space for the new washery	No – beyond the boundary of the proposed project
Blacksmith shop	Demolished to allow space for the new washery	No – beyond the boundary of the proposed project
Fitter shop	Demolished to allow space for the new washery	No – beyond the boundary of the proposed project
Carpenter shop	Demolished from site by Coal and Allied in 1985	No – beyond the boundary of the proposed project
General storeroom	Demolished from site by Coal and Allied in 1985	No – beyond the boundary of the proposed project
Mine office building	Demolished from site by Coal and Allied in 1985	No – beyond the boundary of the proposed project
Brick residences	Standing	No – beyond the boundary of the proposed project
Timber residences	Demolished from site by Coal and Allied in 1985	No – beyond the boundary of the proposed project
Bathhouse	Standing as of 1988	No – beyond the boundary of the proposed project
Small coal holding box	Demolished and levelled in 1985 by Coal and Allied	No – beyond the boundary of the proposed project
Open cut loading point	Unknown – believed to be destroyed	No – beyond the boundary of the proposed project
Road vehicles coal weighbridge	Unknown – believed to be destroyed	No – beyond the boundary of the proposed project
Brick kilns	Unknown – believed to be destroyed	No – beyond the boundary of the proposed project

Structures	Status	Impact by HEM Chitter and Tailings Reclamation Project?
Horse ambulance shed	Unknown – believed to be destroyed	No – beyond the boundary of the proposed project
Tailings dam	Currently capped and remains insitu, however leaching salt and acid into the surrounding environment	**Yes – within project boundary however low heritage value**
Coal stockpile pad and chitter emplacement	Remains insitu, however leaching salt and acid into the surrounding environment	**Yes – within project boundary however low heritage value**

3.2 Aberdare North Tunnel

Part of HEM's preferred haulage route will traverse the Aberdare North Tunnel Pit top area, therefore consideration of Aberdare North Tunnel has been included in this Statement of Heritage Impact.

Aberdare North Tunnel operated from 1914 to 1988.

Development of the colliery commenced in 1914 by Caledonian Collieries Limited with the construction of an additional intake airway for the Aberdare Shaft Colliery, however it wasn't until 1952 that Aberdare Tunnel was official recognised by the Mines Department as being a separate mine, following the sinking of an upcast air shaft in late 1951. In 1954 an additional drift tunnel was driven, it is believed that the purpose of this drift was to work a solid block of coal, however no coal was ever winched out. This drift tunnel then became the new travelling road for pit horses being placed underground. An existing drift used by Aberdare West Colliery was re-opened and widened, a return airway drift was then driven in late 1964.

Aberdare North Tunnel Colliery was isolated and divided from the Aberdare Shaft Colliery for the sole purpose of introducing 'mechanised mining', which was the method used for the duration of the mine's life.

Over the life of the Colliery, Aberdare North experienced considerable numbers of heatings and underground fires, thought to be caused by spontaneous combustion which resulted in large quantities of coal being sealed off and lost from production.

In the mid 1950's, the Northern Collieries Proprietors Association made a grant to the University of Sydney so that research could be undertaken to find uses of high sulphur coal from the area. Aberdare North Tunnel Colliery was closed in 1959 due to the high content of sulphur in the coal and the contraction of markets for that type of coal. The colliery was reopened in 1964 when coal reserves in the Aberdare West Colliery appeared to be near depletion. Soon after the colliery was again plagued by fire and heatings and in 1965 a serious fire again threatened the closure of the mine. In 1966 another serious fire threatened the colliery, as a result the mine was temporarily closed until inspections could confirm that works undertaken to subdue the fire were successful. Another serious underground fire threatened to close the colliery again in 1975.

Mine haulage was undertaken by way of a rubber belting conveyor structure. A number of minor conveyor belts fed the main conveyor belt structure. Battery powered shuttle cars transported the coal production from the face in the boards to the minor belts.

Coal production on reaching the surface poured from the belt into a 400 ton capacity elevated steel bin. From the bin motor lorries transported the coal to the reception bin. During mid 1957, instead of coal being loaded into this reception bin, coal was unloaded into a special

reception bin located adjacent to the Aberdare Shaft Colliery washery plant. From this bin coal was raised by a series of conveyor belting into the washery building.

In 1959 a private road was constructed to provide access from Aberdare North Tunnel Colliery to the Neath Colliery washery whose open cut had ceased operations. From this point all coal production from Aberdare North Tunnel Colliery was transported to Neath Colliery plant to be washed.

As Aberdare North Tunnel Colliery was largely mechanised, pit horses played a very minor role, generally restricted to snigging timbers. No horses were used for coal haulage.

Aberdare North Tunnel Colliery never had an electricity power generation plant. Much of the electricity for the electric coal cutting machines were from underground powerlines from Aberdare Shaft Colliery powerhouse. After separation form Aberdare Shaft Colliery, it appears that Aberdare North Tunnel continued to source power from the Aberdare Shaft Colliery electricity sub-station.

Aberdare North Tunnel Colliery was never directly connected to the railway. All coal production until 1959 was loaded at the Aberdare Shaft Colliery rail sidings. From 1959 onwards, the Colliery's coal production was treated at the Neath washery and loaded into rail wagons at that point. Coal was loaded into the company's fleet of wooden hopper rail coal wagons up until 1976 when the NSW government banned the haulage of coal in such vehicles to Port Waratah. From 1973 coal was transported to Port Waratah by rail in a variety of NSW Government Railway vehicle types. From 1973 to 1978 coal was transported by wooden hopper to the Hexham Preparation Plant for storage and blending purposes.

In addition to the infrastructure described above the following buildings were constructed at Aberdare North Tunnel Colliery. A colliery office was constructed and in late 1967 a new air conditioned office constructed, the first building office was demolished and removed to provide better car parking facilities for employees.



Photograph 3: Aberdare North Colliery (Source: A History of the Greta Coal Measures, Jack Delany http://archive.amol.org.au/newcastle/greta/frames.html).

It is believed that the first workshops at Aberdare North Tunnel Colliery were converted stable structures. In 1967 – 1968 a new steel framed building was constructed, tradesman shared this building in their various sections, a large portion of the building doubled as a store's department.

During 1967 a series of coal holding steel bins were erected on the surface at Aberdare North Tunnel Colliery, the bins were elevated to allow motor lorries to be loaded underneath by gravity feed.

In 1954 a bath house was constructed at Aberdare North Tunnel Colliery. Prior to this employees of the mine were utilising the bath house at Aberdare Shaft Colliery.

A separate concrete brick small room was set up as a mine's ambulance room. Three large concrete water tanks were placed at the pit top for fire fighting purposes.

Aberdare North Tunnel Colliery reached the end of its economic operation in 1988 and between April and November 1988 most of the pit top structures had been demolished and removed. The belting conveyors, its support structures and the drive-head were recovered and transferred to the company's other mining projects. The steel coal holding bins as well as all recoverable skip track rails were sold as scrap. The drift tunnel entry and the fan air shaft opening were flattened, levelled and concrete sealed over. It is reported that as of 1998 the workshop building, office building and bath house building were still standing. Reconnaissance of the site confirms that these buildings have since been removed, however it is evident that the concrete slab from the workshop still remains on site. It is proposed that this slab will form part of the base for the haul road.

Table 3 summarises the infrastructure known to exist at the site, and their present status (if known).

Table 3: Summary of Known Aberdare North Tunnel Infrastructure and Current Status.

Structures	Status	Impact by HEM Chitter and Tailings Reclamation Project?
Four shafts (Aberdare Shaft original intake airway, upcast air shaft, additional drift tunnel and existing Aberdare West drift tunnel)	Flattened, levelled and concrete sealed over in 1988	No – beyond the boundary of the proposed haul road
Rubber belting conveyor structure	Recovered and transferred to other Coal and Allied mining projects	No – beyond the boundary of the proposed haul road
Coal reception bin	Recovered and sold as scrap	No – beyond the boundary of the proposed haul road
Private road constructed between Aberdare North Tunnel Colliery and Neath Washery	Still in existence	**Yes – will be utilised as part of the haul road**
Original colliery office	Demolished and removed to provide better car parking facilities for employees	No – beyond the boundary of the proposed haul road
New colliery office	Was left standing in 1988, however has since been removed from the site.	No – beyond the boundary of the proposed haul road
Workshop	Demolished and removed from site, however concrete slab remains	**Yes – slab will form part of the base for the haul road.**
Coal holding steel bins	Recovered and sold as scrap	No – beyond the boundary of the

Structures	Status	Impact by HEM Chitter and Tailings Reclamation Project?
		proposed haul road
Bath house	Was left standing in 1988, however has since been removed from the site.	No – beyond the boundary of the proposed haul road
Mine's ambulance room	Demolished and removed from site	No – beyond the boundary of the proposed haul road
Three large concrete water tanks	Demolished and removed from site	No – beyond the boundary of the proposed haul road

3.3 Neath

The Neath resource area consists of rejects and tailings produced from the Neath Colliery. A summary of the Colliery is provided below.

3.3.1.1 Neath Colliery

Neath Colliery operated from 1907 to 1951. Neath Open Cut operated from 1949 to 1959.

Three test bores were sunk in 1903 within Neath Colliery to confirm the presence of coal. All three bores proved coal seams. In 1906 the Wickham and Bullock Coal Company advised the Mines Department that the Neath Colliery would be developed and in 1907 the first train of coal was despatched.

Neath Colliery was accessed by five entry points, two shafts and three tunnels. The original entry into the colliery was via two shafts which were sunk in 1906. The down cast airway was the main shaft, the second shaft was the upcast shaft or return airway.

Two tunnels were driven in during 1914 and the third tunnel was driven in 1930. The tunnels were driven as a result of the sealing of the two shafts to extinguish the underground fire of 26th July 1914. The tunnels allowed entry for inspection of the damage caused by the underground fire.

From the time of the initial sinking of the shafts underground water was a problem. The operation of two steam driven pumps alleviated the problem.

Neath Colliery was mined using the board and pillar method of mining. Underground production from Neath Colliery ceased in 1949. Following the cessation of production N.H. Bowers Pty Ltd were engaged to commence open cut operations.

Open cut mining on the Neath lease-holding ceased in 1959. In the same year, Caledonian Collieries Limited acquired the assets, leases and pit tops belonging to the Cessnock Collieries Limited Company. At this time Aberdare North Tunnel which neighbours Neath Colliery decided to use the washery at Neath rather than transport its production to Aberdare Shaft Colliery for treatment, screening and loading into wooden hopper wagons.

Haulage underground in the early days was made by using pit horses, stables were provided underground and on the surface. A steam driven endless rope system operated from the surface via the air shaft from 1912. There are reports that the endless rope system was driven by electric motor during 1929.

The first electricity generating power plant was believed to be installed in 1908. During 1910 a larger electricity plant was installed due to increased electricity requirements. As steam needs increased more boilers were installed. By the end of 1943 only one boiler remained in use. A

further small generator was installed in 1923 to meet the increasing demands of coal cutting machines and underground lighting. In 1929, electric power supply from Caledonian Colliers was connected and soon after all generators were phased out and sold to Singleton Dairy Company.

The topography of Neath Colliery presented a problem for rail coal hopper wagons holding sidings. In 1906 a single track railway, the Neath Colliery Branch to join Neath Colliery to Aberdare Railway at Abermain. The first full train of coal was despatched in rail wooden coal hopper from Neath Colliery to Port Waratah for the coal markets and shipping on Tuesday 26th February 1907. The NSW Government banned the use of wooden rail hoppers in 1972, however this type of vehicle continued to be used to move Coal and Allied Coal to Hexham treatment and marshalling area, the activity was eventually phase out and steel type vehicles introduced in 1977. Steam locomotives were phased out by the government and haulage replaced by diesel locomotives in 1983.

In addition to the infrastructure described above, Neath Colliery consisted of the plant and equipment described below. A poppet head was constructed over the main shaft. A large workshop was constructed on site incorporating various tradesman workshops including the blacksmiths workshop, fitters workshop and carpenters workshop. The site also comprised a manager's residence constructed in 1906. A three skip tippler was installed to place coal production onto the conveyor. A brickyard was also built onsite to manufacture the bricks to construct the various structures on site. A dam was constructed to provide from the steam needs at the colliery.



Photograph 4: Neath Colliery, looking north, tailings dams have not been constructed, they are now located in the left of the photograph behind the pit top bulings. (Source: A History of the Greta Coal Measures, Jack Delany http://archive.amol.org.au/newcastle/greta/frames.html).

Chitter dumps were a prominent feature of Neath Colliery. Chitter, shale, inferior coal and pit-rubbish reject material from the picking belts presented a problem at Neath Colliery. Many

large "dump" heaps were made along the inside arc of the Neath Colliery rail sidings. Possibly because this was on the lower side of the slope, it made for convenient discharge and unloading.

By the late 1930's these chitter dumps and hills had reached mountainous proportions. Fortunately for Neath Colliery, up to this period no spontaneous combustion had taken place in these heaps. This material was sold to the Sydney electricity generation powerhouses. These powerhouses had been fitted with equipment and furnaces to handle and burn this type of coal. Over a lengthy period, the chitter dumps at Neath Colliery were loaded by a front-end loader straight into NSW Government Railways "U" Class 25 tons carrying capacity rail wagons. These were dispatched in train loads of 22 vehicles direct to Bunnerong Powerhouse.

At 1250 tonnes per day, 220 days per year and a 75% yield, the total amount of chitter and tailings produced from 1957 to 1988 would have been 2.13 MT. It is likely that most of this chitter and tailings remains at site in several emplacements adjacent to the washery area and in final voids of the open cuts. There could be a small additional amount from the picking belts and screens that operated prior to the washery, but most of this original material appears to have been sold to Bunnerong Power Station.

In 1957 Cessnock Collieries Pty Limited installed a simple washing plant at Neath Colliery pit top. Neath Washery used "Diester" washing tables and screens to handle and improve the quality of open-cut coal production. Although quite small, these tables were very effective in removing stone and other impediments. Coal being lighter, floated in water over the riffles or removing grid. The stone and heavier rubbish, by a form of gravitation, moved out sideways to drop out into a chute - a simple but effective operation.

In 1964 the Diester Table washery plant was considered inefficient and uneconomical and was replaced by Coal and Allied Limited with a second hand coal washing plant transferred to Neath Colliery from Waratah Colliery, Newcastle. This second-hand washing plant showed very good results, providing some 75% recovery from about 1250 tons treated daily.

A brand new washery plant, an "Acco Little Jig" manufactured in early 1968 replaced the second-hand unit installed in 1964. This new plant washed with a kind of wave action.

Up until 1988, coal production from Aberdare North Tunnel was washed at Neath Colliery Washery and transported to Coal and Allied Hexham Plant from blending or alternatively despatched direct to Port Waratah for shipment. When Aberdare North Tunnel closed at the end of April 1988, so too did the Neath Colliery Washery. Almost immediately all pit top structures were demolished. All colliery rail sidings and the Neath Branch railway track were removed and sold for scrap. The only remaining link with the mine’s past is the original colliery manager’s home which is current used and operated as the “Colliery House” bed and the home of a long time employee and colliery official of the Cessnock Colliery Group.

The above historical information was sourced from the History of the Greta Coal Measures accessed on the Newcastle Regional Museum website.

According to Garling (2002) after all infrastructure was removed from the site, reshaping and revegetation works were undertaken. A drain was installed to drain acid leachate from one section of the site into the old underground workings. A bore was dug to convey this leachate from a concrete drain into the workings.

Rehabilitation of the open cut site began in 1978 and proceeded over a number of years. Coal and Allied deposited coarse washery reject and slurry from the Neath Washery into some of the excavations. Two large excavations were used by Cessnock City Council for garbage disposal. The floor of one excavation was cleaned out and smoking coal excavated before covering the seam with clay. In the other excavation chitter was covered with inert material.

Generally Coal and Allied covered waste material with a clay to act as a sealant, and then applied a layer of soil containing various types of grass. Some of the rehabilitation did not include the provision of a clay layer as testing demonstrated that this would aid in the growth of grasses.

In January 1999 the Department of Mineral Resources was made aware of environmental concerns at the Neath Washery site by local community groups. They advised spontaneous combustion was occurring following a recent bushfire and apparently acid water was leaking from the emplacement area near the old washery site. The water was found to be polluting downstream watercourses that flow into Swamp Creek. As a result of inspections by the Department of Mineral Resources, the areas of spontaneous combustion were treated by wetting and compacting the disturbed areas and revegetated. A concrete and limestone drain was built and a bore dug in March 1999, to drain the acidic seepage. The bore drained into the old workings in a similar way to the bore originally built by Coal and Allied.

In June 2001, due to increasing community concerns, the Department of Mineral Resources built a diversion drain around the north and western sides of the tailings dams. The drain was to prevent water from running on to the tailings dams, and instead divert it to the clean water dam in the south-western corner of the site.

Table 4 summarises the infrastructure known to exist at the site, and their present status (if known).

Table 4: Summary of Known Neath Infrastructure and Current Status.

Structures	Status	Impact by HEM Chitter and Tailings Reclamation Project?
Two shafts (up shaft and down shaft)	Demolished in 1988 upon closure of the washery	No – beyond the boundary of the proposed project
Three tunnels	Demolished in 1988 upon closure of the washery	No – beyond the boundary of the proposed project
Pit horse stables	Demolished in 1988 upon closure of the washery	No – beyond the boundary of the proposed project
Electricity power plant	Demolished in 1988 upon closure of the washery	No – beyond the boundary of the proposed project
Neath Colliery Branch Railway	Demolished in 1988 upon closure of the washery	No – beyond the boundary of the proposed project – however rehabilitation activities proposed
Poppet head	Demolished in 1988 upon closure of the washery	No – beyond the boundary of the proposed project
Large workshop	Demolished in 1988 upon closure of the washery	No – beyond the boundary of the proposed project
Three skip tippler	Demolished in 1988 upon closure of the washery	No – beyond the boundary of the proposed project
Dam	Demolished in 1988 upon closure of the washery	No – beyond the boundary of the proposed project
Chitter dumps	Sold to Sydney generation electricity houses	Potentially within the boundary of the project, as the exact location is not known. However since the sale of the chitter it is believed the location of the dump sites have been used for various purposes such as tailings dams, therefore only a small amount of chitter would remain.

Structures	Status	Impact by HEM Chitter and Tailings Reclamation Project?
Washery	Demolished in 1988 upon closure of the washery	No – beyond the boundary of the proposed project
Managers Residence	Still standing – currently used as a B&B	No – beyond the boundary of the proposed project
Brickyard	Partially rehabilitated in 1988 upon closure of the washery	No – beyond the boundary of the proposed project
Tailings dams	Currently capped and remains insitu, however leaching salt and acid into the surrounding environment	**Yes – within project boundary however low heritage value**
Coal stockpile pad and chitter emplacement	Remains insitu, however leaching salt and acid into the surrounding environment	**Yes – within project boundary however low heritage value**

3.4 Richmond Main East

The history regarding the Richmond Main East emplacement is unknown. Its location adjacent to the Richmond Vale Railway and the presence of the occasional rotted sleeper and rusted fishplate on the top of the dump suggest the material was transported there by rail. It could be that the emplacement was created as a high level crossing for Wallis Creek as the grades and the location would certainly have enabled it to be used for this purpose. Suffice to say however that HEM does not know the source of the material.

HEM was made aware of the resource by a former Coal & Allied officer responsible for their derelict mines. The former Coal & Allied officer had been contacted by a local resident in the 1980s when a fire had been discovered in the emplacement. The local resident had presumed it was a Coal & Allied dump, but this could not be confirmed from any information within Coal & Allied records relating to the emplacement. Coal & Allied did however extinguish the fire in the emplacement at the time at their cost.

Due to the lack of information on this site it is not possible to provide a figure showing the location of infrastructure in relation to proposed HEM activities.

4 Assessment of Significance

4.1 Application of Significance Criteria

In order to make an assessment of whether or not the proposed works would have a negative, neutral or positive impact on the heritage significance of each of the three subject sites, it is necessary to ascertain the nature of the significance involved. This assessment is based on the seven separate criteria established by the NSW Heritage Office.

Criteria A – Historical Significance

The importance of an item in the course or pattern of the cultural or natural history of NSW or a local area.

Criteria B – Associational Significance

The existence of a strong or special association between an item and the life or works of a person or group of persons important in NSW or local cultural or natural history.

Criteria C – Aesthetic Significance

The importance of an item in demonstrating aesthetic characteristics and/or a high degree of creative or technical achievement in NSW or local area.

Criteria D – Social Significance

The existence of a strong or special association between an item and the social, cultural or spiritual essence of a particular community or cultural group within NSW or a local area.

Criteria E – Technical/Research Significance

The potential of an item to provide information that will contribute o an understanding of the cultural or natural history of NSW or a local area.

Criteria F – Rarity

The quality of an item to possess uncommon, rare or endangered aspects of the cultural or natural history of NSW or a local area.

Criteria G – Representativeness

The demonstration by an item of the principal characteristic of a class of cultural or natural place or cultural or natural environment within NSW or a local area.

Under the same criteria, where this is relevant, the individual contribution of separate elements of a place may be evaluated according to a five-staged grading system where:

Exceptional

Indicates that is a rare or outstanding element, contributing directly to the assessment of an item's significance at the appropriate level.

High

Indicates that an element exhibits an advanced degree of original fabric and is a key element in the assessment of an item's significance at the appropriate level.

Moderate

Indicates that an element has been modified or has degraded, with little individual heritage value, but that makes an interpretive contribution in the assessment an item's significance a the appropriate level.

Little

Indicates that an element has been modified or has degraded to a degree that detracts from the assessment of an item's significance at the appropriate level.

Intrusive

Indicates that an element is damaging in the assessment of an item's significance at the appropriate level.

4.2 Aberdare East

Criterion A Historical Significance – Aberdare Shaft Colliery is historically significant as it was associated with the growth of the South Maitland Coal fields in the first half of the Twentiety Century. The rail yard sidings also played an important role in the development of efficient traffic working and rail operations, the primary method of transport still used to transport coal from the coalfields to the coal ports.

Criterion B Associational Significance – has strong relationship with the persons involved in the initial development of the South Maitland Coalfield including the Caledonian Coal Company and Coal and Allied, still a predominant company in the region to date.

Criterion C Aesthetic Significance – the aesthetic significance of the site has deteriorated due to the demolition and removal of much of the infrastructure and buildings previously present onsite. The site represents a moderate degree of technical achievement in the local area through the mining methods and coal washing techniques employed, along with the development of the rail operations in the area.

Criterion D Social Significance – has strong social significance as the Aberdare East Colliery and Aberdare Shaft Colliery provided employment to the local community. The provision of the mine managers house and mining cottages provide further social significance.

Criteria E Technical/Research Significance – the site is generally an archaeological site, containing limited surface evidence of original activities. Due to the demolition activities undertaken in the 1980's, the site has limited potential to yield information about the technology, design and arrangement of the surface and subsurface facilities and activities.

Criteria F Rarity – The Aberdare Shaft Colliery and the Aberdare East Collieries are generally typical of the numerous pit tops in the locality that number in excess of 66. The rarity of individual aspects of these collieries are not possible to determine if the Aberdare Shaft Colliery and Aberdare East Colliery are rare without undertaking a full detailed historical study of coal mining in the Hunter Coalfields and greater NSW. However, it is possible to conclude that both collieries have been degraded to a degree that detracts from their potential significance as rare sites.

Criteria G Representativeness – Aberdare East Colliery and Aberdare Shaft Colliery are representative of the coal mining industry in NSW in the Twentieth Century.

4.3 Aberdare North Tunnel

Criterion A Historical Significance – Aberdare North Tunnel Colliery wasn't recognised as a separate entity until 1952, therefore the colliery itself is relatively young and of limited historical significance.

Criterion B Associational Significance – has strong relationship with the persons involved in the initial development of the South Maitland Coalfield including the Caledonian Coal Company and Coal and Allied, still a predominant company in the region to date.

Criterion C Aesthetic Significance – the aesthetic significance of the site has deteriorated due to the demolition and removal of much of all of the infrastructure and buildings previously present onsite. The site represents a moderate degree of technical achievement in the local area through the mining methods employed.

Criterion D Social Significance – has moderate social significance as Aberdare North Tunnel Colliery provided employment to the local community.

Criteria E Technical/Research Significance – the site is generally an archaeological site, containing limited surface evidence of original activities. Due to the demolition activities undertaken in 1988, the site has limited potential to yield information about the technology, design and arrangement of the surface and subsurface facilities and activities.

Criteria F Rarity – The Aberdare North Tunnel Colliery is generally typical of the numerous pit tops in the locality that number in excess of 66. The rarity of individual aspects of these collieries are not possible to determine if the Aberdare North Tunnel Colliery is rare without undertaking a full detailed historical study of coal mining in the Hunter Coalfields and greater NSW. However, it is possible to conclude that the colliery has been degraded to a degree that detracts from their potential significance as rare sites.

Criteria G Representativeness – Aberdare North Tunnel Colliery is representative of the coal mining industry in NSW in the late Twentieth Century.

4.4 Neath

Criterion A Historical Significance – Neath Colliery is historically significant as it was associated with the growth of the Greta South Maitland Coal fields in the first half of the Twentieth Century.

Criterion B Associational Significance – has strong relationship with the persons involved in the initial development of the South Maitland Coalfield including the Cessnock Collieries Limited, Caledonian Collieries Limited and Coal and Allied, still a predominant company in the region to date.

Criterion C Aesthetic Significance – the aesthetic significance of the site has deteriorated due to the demolition and removal of much of the infrastructure and buildings previously present onsite. The site represents a moderate degree of technical achievement in the local area through the mining methods and coal washing techniques employed.

Criterion D Social Significance – has strong social significance as Neath Colliery provided employment to the local community. The provision of the manager's residence provide further social significance.

Criteria E Technical/Research Significance – the site is generally an archaeological site, containing limited surface evidence of original activities. Due to the demolition activities

undertaken in 1988, the site has limited potential to yield information about the technology, design and arrangement of the surface and subsurface facilities and activities.

Criteria F Rarity – The Neath Colliery is generally typical of the numerous pit tops in the locality that number in excess of 66. The rarity of individual aspects of these collieries are not possible to determine if Neath Colliery is rare without undertaking a full detailed historical study of coal mining in the Hunter Coalfields and greater NSW. However, it is possible to conclude that Neath Collieries have been degraded to a degree that detracts from potential significance as a rare site.

Criteria G Representativeness – Neath Colliery is representative of the coal mining industry in NSW in the Twentieth Century.

4.5 Richmond Main East

Criterion A Historical Significance – it is not possible to assesses the historical significance of Richmond Main East as so little is known about the site. It is possible to conclude that Richmond Main East has been degraded to a degree that would detract from its potential historical significance.

Criterion B Associational Significance – it is not possible to assess the associational significance of Richmond Main East as so little is known about the site. Remnants at the site suggest it may have been used for the emplacement of coal which was transported by rail, and thus consistent with coal transportation methods used throughout the local area.

Criterion C Aesthetic Significance – the aesthetic significance of the site is limited. Little remains on the site with the exception of the occasional rotted sleeper and rusted fishplate.

Criterion D Social Significance – it is not possible to assess the social significance of Richmond Main East as so little is known about the site.

Criteria E Technical/Research Significance – the technical/research significance of the site is limited as so little is known about the site. The site is generally an archaeological site, containing limited surface evidence of original activities.

Criteria F Rarity – The Richmond Main East Colliery is generally typical of the numerous pit tops in the locality that number in excess of 66. The rarity of individual aspects of these collieries are not possible to determine if Richmond Main East is a rare site as so little is known about the site. However, it is possible to conclude that Richmond Main East has been degraded to a degree that would detract from its potential significance as a rare site.

Criteria G Representativeness – it is not possible to assess the representativeness of Richmond Main East as so little is known about the site. From remnants left at the site it is logical to assume that coal transportation techniques are representative of those used throughout the local area.

4.6 Statement of Cultural Significance

It is known that the three coal resource sites and the haul road site played a role in the development of the South Maitland Coal fields in the twentieth century, coal mining methods, transport methods and washing methods were consistent and representative of the methods used during this period and to some extent today. Three of the sites are known to have strong associational links with former predominant mining entities in the region and all four currently have ties with Coal and Allied, one of the predominant mining forces in the Hunter Valley today. However, the aesthetic and technical/research significance of each of the three sites

are limited due to the extensive demolition works undertaken towards the latter half of the twentieth century. Whilst the four sites do contain some elements of cultural significance, particularly historical, associational, social and representativeness as assessed above, the works proposed to be undertaken are unlikely to impact upon these elements provided that appropriate management and mitigation are applied.

5 Statement of Heritage Impact

The works proposed to be undertaken by HEM will not impact on the historical buildings identified that still stand today. To ensure these buildings are not impacted exclusion zones around these building will be established. It is known that many buildings and infrastructure were known to exist on the sites, their approximate locations have been gauged by old aerial photographs of the site and from old plans of the sites that are available. HEM is aware that there may be footings of buildings and infrastructure present at these locations that may hold cultural significance. These locations will be avoided and are not the target of HEM's rehabilitation works as it is unlikely that such buildings and infrastructure would have been constructed above chitter and tailings emplacements. The very fact that buildings and infrastructure were constructed virtually eliminates them as possible chitter and tailings emplacement areas, and therefore sites of interest for HEM. Whilst all care will be taken to avoid potential footing sites, work will stop and the NSW Heritage Office will be notified immediately in the unlikely event that footings or any other items of cultural significance are discovered.

The only areas likely to be impacted by HEM's rehabilitation works are chitter/coal emplacement areas and old tailings dams. Carbonaceous materials will be removed from such areas, transported to the Hebburn No. 3 washery, processed and sold for reuse. Each of the three emplacement sites will then be rehabilitated preventing problems that currently exist at the sites including the release of a variety of contaminants, principally salt and acid, into the environment compromising a variety of environmental values in the surrounding landscape. The emplacements are also capable of spontaneous combustion that represents a significant safety and environmental hazard.

It is concluded that these emplacement areas and tailings dams are of limited (if any) cultural significance, essentially they are the waste streams of coal mining processes undertaken in the first half of the twentieth century. In addition to this, it has been calculated that the age of the tailings and chitter/coal emplacements is generally less than 50 years and therefore, they are not classified as relics and are not subject to the provisions of the *Heritage Act 1977*. This age of the carbonaceous material has been derived by considering the years in which the Aberdare Shaft and Neath Colliery washeries were erected, both in the mid 1950's, therefore only a very small portion of such material would be subject to the Act. It would be virtually impossible to identify and isolate such material, given the low heritage value such an activity is not warranted, nor feasible.

The removal of the carbonaceous material presents the potential for the discovery of isolated items of cultural heritage that may have been buried with the waste stream. Should such items be discovered they will be collected and handed over to the local historical society or NSW Heritage Office. This activity in itself will help to preserve any cultural heritage that exists at the site by collecting items that would have otherwise remained buried and with time disintegrate.

In addition to coal/chitter emplacement and tailings dams Aberdare North Tunnel Colliery workshop concrete slab and private access road between this colliery and Neath Washery will be used for the HEM private haul road. The workshop was constructed in 1967 and the

private roads in 1959, therefore neither of these items are classified as relic under the provisions of the Heritage Act 1977.

Overall, the rehabilitation works proposed by HEM are unlikely to have potential impact on the cultural significance of the site. Known items of cultural significance (both standing and removed), and therefore sensitive sites and their locations will be fenced off and avoided. The rehabilitation of chitter/coal emplacements and tailings dams will help to improve the environmental properties of the site which may enhance the aesthetic significance. Rehabilitation works will enhance features of the mine through appropriate management and post rehabilitation design that will allow an interpretation of the site's history, at present some of the sites history is obscured by chitter and tailing dumps created during mine closure. Rehabilitation activities will also provide improved and safer accessibility to each of the sites. In addition to this the rehabilitation works may uncover items of cultural significance that would otherwise have remained buried.

Any potential minor impact on cultural significance is overridden by the need to rehabilitate the site to discontinue the current local and downstream environmental impacts caused by the leaching of salt and acid, and the risk to society and the environment of spontaneous combustion of remaining carbonaceous material.

6 References

Berry, J. P. (2002). The Geochemistry and Remediation of Greta Coal Measure Washery Waste and Seepage at Aberdare, NSW. Submitted in partial fulfilment of the requirements of a Bachelor of Applied Science, Lismore, Southern Cross University.

Cessnock City Council (1989). Cessnock Local Environment Plan 1989.

Garling, V.J. (2002). A Study of Acid Mine Drainage: Neath Washery a Case in Point. Submitted in partial fulfilment of the requirements of a Bachelor of Engineering (Mining), University of New South Wales.

History by Jack Delaney on Newcastle Regional Museum Website.

APPENDIX A

Results of database searches.

Australian Heritage Database

Search Results

edit search | new search | about the Australian Heritage Database | Heritage home | Australian Heritage Council home

2 results found.

Cessnock Showground Mount View Rd	Cessnock, NSW, Australia	(Indicative Place) Register of the National Estate
Pokolbin Valley Landscape Conservation Area Allandale Rd	Cessnock, NSW, Australia	(Indicative Place) Register of the National Estate

Report Produced: Wed Aug 1 14:47:59 2007

Click on the BACK button of your browser to return to the search.

Statutory Listed Items

Information and items listed in the State Heritage Inventory come from a number of sources. This means that there may be several entries for the same heritage item in the database. For clarity, the search results have been divided into two sections.

- Section 1. contains items listed by the **Heritage Council** under the NSW Heritage Act. This includes listing on the State Heritage Register, an Interim Heritage Order or protected under section 136 of the NSW Heritage Act. This information is provided by the NSW Heritage Office.
- Section 2. contains items listed by **Local Councils & Shires and State Government Agencies**. This section may also contain additional information on some of the items listed in the first section.

Section 1. Items listed under the NSW Heritage Act.

Click on an item name to view the full details.
The search results can be re-sorted by clicking on the **(sort)** option at the top of each column.

Item Name (sort)	Address (sort)	Suburb (sort)	LGA (sort)	Listed Under Heritage Act
Branxton Railway Station group	Main Northern railway	Branxton	Cessnock	Yes
Branxton Railway Station group movable relics	Main Northern railway	Branxton	Cessnock	Yes
Greta Railway Station group	Main Northern railway	Greta	Cessnock	Yes
Richmond Main Colliery	South Maitland Coalfields	Kurri Kurri	Cessnock	Yes
Rising Sun Inn (former)	95-97 Wollombi Road	Millfield	Cessnock	Yes

There were **5** records in this section matching your search criteria.

Section 2. Items listed by Local Government and State agencies.

Item Name (sort)	Address (sort)	Suburb (sort)	LGA (sort)	Information Source (sort)
Aberdare Central Colliery	Cessnock Street	Kitchener	Cessnock	GAZ
Aberdare Workshop	South Avenue (off)	Cessnock	Cessnock	GAZ
Abermain No 1 Colliery (Former) Precinct		Abermain	Cessnock	LGOV
Anglican Church Yard	Wollombi Road	Mulbring	Cessnock	GAZ
Ashmans Winery & Vineyard	Broke Road	Pokolbin	Cessnock	GAZ
Bank of NSW	New England Highway	Branxton	Cessnock	GAZ
Bellbird Hotel	Wollombi Road	Bellbird	Cessnock	GAZ

Branxton Conservation Area		Branxton	Cessnock	GAZ
Branxton Railway Station Group		Branxton	Cessnock	SGOV
Catholic Cemetery	Station Street	Branxton	Cessnock	GAZ
Cessnock Court House & Police Station Group	6 Maitland Road	Cessnock	Cessnock	LGOV
Cessnock Courthouse	6 Maitland Road	Cessnock	Cessnock	LGOV
Cessnock Fire Station	Edward Street	Cessnock	Cessnock	SGOV
Cessnock General Cemetery	Allandale Road, cnr Kerlew Street	Cessnock	Cessnock	LGOV
Cessnock Hotel	234 Wollombi Road	Cessnock	Cessnock	LGOV
Cessnock Hotel, incl above awning	234 Wollombi Road	Cessnock	Cessnock	GAZ
Cessnock Potteries	Allandale Road	Nulkaba	Cessnock	GAZ
Chelmsford Hotel	122 Lang Street	Kurri Kurri	Cessnock	GAZ
Commercial Bank	117 Vincent Street	Cessnock	Cessnock	GAZ
Commercial Bank	117 Vincent Street	Cessnock	Cessnock	LGOV
Convent of Mercy	Station Street	Branxton	Cessnock	GAZ
Convict Drinking Trough		Wollombi	Cessnock	GAZ
Courthouse & Police Station	Maitland Road	Cessnock	Cessnock	GAZ
Courthouse & Police Station, Former	Maitland Road	Wollombi	Cessnock	GAZ
Courthouse Group, Former	Cessnock Road	Branxton	Cessnock	GAZ
Courthouse, Former	New England Highway	Greta	Cessnock	GAZ
Denman Hotel	Cessnock Street	Abermain	Cessnock	GAZ
Drapery Shop	Maitland Road	Branxton	Cessnock	GAZ
Dunoon	Lovedale Road	Allandale	Cessnock	GAZ
Earthworks, structures & ancillary equipment	Hebburn Dam (from)	Elrington	Cessnock	LGOV
Earthworks, structures & ancillary equipment		South Maitland Railway	Cessnock	LGOV
Elrington Colliery		Kearsley	Cessnock	GAZ
General Cemetery	Allandale Road	Cessnock	Cessnock	GAZ
General Cemetery	New England Highway (off)	Branxton	Cessnock	GAZ
General Cemetery	Hospital Road	Kurri Kurri	Cessnock	GAZ
General Cemetery	Branxton Road	Nulkaba	Cessnock	GAZ
Glen Elgin Winery & Vineyard	Debeyers Road	Pokolbin	Cessnock	GAZ
Glenmore Burial Ground	Branxton Road (eastern side, 300m south of Palmers Lane)	Rothbury	Cessnock	LGOV

Great North Road, The	Between Devine's Hill and Mount Manning	Wiseman's Ferry	Cessnock	SGOV
Greta Conservation Area		Greta	Cessnock	GAZ
Greta Public School	Wyndham Street	Greta	Cessnock	GAZ
Greta Station Group		Greta	Cessnock	SGOV
Hebburn Dam		Abermain	Cessnock	LGOV
Hebburn No 1 Colliery (Former) Precinct	Embelton and Webb Streets (west ends)	Weston	Cessnock	LGOV
Hebburn No 2 Colliery (Former) Precinct	Scott Street and Hebburn Road	Weston	Cessnock	LGOV
Hebburn No.2 Colliery	Scott Street	Weston	Cessnock	GAZ
Hunter Valley Distillary	Hermitage Road	Pokolbin	Cessnock	GAZ
Ironbark Cottage at Peppertree Vineyard	Broke Road	Pokolbin	Cessnock	LGOV
Kurri Kurri Fire Station	107 Lang Street	Kurri Kurri	Cessnock	SGOV
Kurri Kurri Hotel	186 Lang Street	Kurri Kurri	Cessnock	GAZ
Kurri Kurri Hotel	186 Lang Street, cnr Hampden Street Opposite Rotary Park	Kurri Kurri	Cessnock	LGOV
Laguna House Group		Laguna	Cessnock	GAZ
Lock-up & Residence	Water Street	Greta	Cessnock	GAZ
Marthaville	200 Wollombi Road	Cessnock	Cessnock	GAZ
Marthaville	200 Wollombi Road	Cessnock	Cessnock	LGOV
Masonic Hall	High Street	Greta	Cessnock	GAZ
Median Strip incl War Memorial & Bandstand	High Street	Greta	Cessnock	GAZ
Mount Manning to Paynes Crossing	Old North Road		Cessnock	GAZ
Mulla Villa	Old North Road	Wollombi	Cessnock	GAZ
Neath Colliery	Kurri Road	Neath	Cessnock	GAZ
Neath Hotel	Northumberland Street	Neath	Cessnock	GAZ
Original Building	FOSTER STREET	CESSNOCK	Cessnock	SGOV
Original buildings	LANG STREET AND HOSPITAL ROAD	KURRI KURRI	Cessnock	SGOV
Peacock Hill Burial Ground	Branxton Road	Rothbury	Cessnock	GAZ
Pelaw Main Colliery	Hebburn Street	Pelaw Main	Cessnock	GAZ
Pelaw Main Colliery (Former) Precinct	Hebburn Street	Pelaw Main	Cessnock	LGOV
Pelton Colliery	Wollombi Road	Pelton	Cessnock	GAZ
Post Office	Maitland Road	Wollombi	Cessnock	GAZ
Public School	Old Sydney Road	Laguna	Cessnock	GAZ
Public School Group	Maitland Road	Wollombi	Cessnock	GAZ

Railway Tunnel, Former	George Booth Drive	Kurri Kurri	Cessnock	GAZ
Richmond Main Colliery		Kurri Kurri	Cessnock	LGOV
Richmond Main Colliery Precinct		Richmond Vale	Cessnock	LGOV
Richmond Main Colliery System	South Maitland Coalfields	Kurri Kurri	Cessnock	LGOV
Rising Sun Inn	Wollombi Road	Millfield	Cessnock	LGOV
Royal Oak Hotel	221 Vincent Street, cnr Snape Street	Cessnock	Cessnock	LGOV
Shops Group	50, 52, 56, 58, 64, 66 and 70 Maitland Street	Branxton	Cessnock	GAZ
South Maitland Mines Rescue Station including houses	Bathurst Street	Abermain	Cessnock	GAZ
South Maitland Railway		South Maitland	Cessnock	GAZ
St John the Evangelist Anglican Church	Maitland Road	Wollombi	Cessnock	GAZ
St John's Anglican Church	New England Highway	Branxton	Cessnock	GAZ
St Michael the Archangel Roman Catholic Church	Maitland Road	Wollombi	Cessnock	GAZ
St Patrick's Group	Allandale Road	Nulkaba	Cessnock	GAZ
Stanford Main No.2 Colliery	Millfield Road	Paxton	Cessnock	GAZ
Station Hotel	Victoria Street	Kurri Kurri	Cessnock	GAZ
Two Storey Store House		Paynes Crossing	Cessnock	GAZ
United Services Hotel (Former)	167 Vincent Street	Cessnock	Cessnock	LGOV
Uniting Church	High Street	Greta	Cessnock	GAZ
Water Tower	Scott Street	Weston	Cessnock	GAZ
Wilderness Cemetery	Wilderness Road	Rothbury	Cessnock	GAZ
Wilderness Cemetery	Wilderness Road, adjacent to Four Winds	Rothbury	Cessnock	LGOV
Wollombi Conservation Area		Wollombi	Cessnock	GAZ
Wollombi General Cemetery	Maitland Road	Wollombi	Cessnock	GAZ

There were **93** records in this section matching your search criteria.

There was a total of **98** records matching your search criteria.

Key:
LGA = Local Government Area
GAZ= NSW Government Gazette (statutory listings prior to 1997), HGA = Heritage Grant Application, HS = Heritage Study, LGOV = Local Government, SGOV = State Government Agency.

Note: The Heritage Office seeks to keep the State Heritage Inventory (SHI) up to date, however the latest listings in Local and Regional Environmental Plans (LEPs and REPs) may not yet be included. Always check with the relevant Local Council or Shire for the most recent listings.

Items listed on the State Heritage Register

The search results can be re-sorted by clicking on the **(sort)** option at the top of each column.

Item Name (sort)	Address (sort)	Suburb (sort)	LGA (sort)	SHR Number (sort)
Richmond Main Colliery	South Maitland Coalfields	Kurri Kurri	Cessnock	00016

There was a total of 1 record matching your search criteria.

Note: The Heritage Office seeks to keep the State Heritage Register (SHR) up to date, however the latest listings may not yet be included. Always check with the NSW Heritage Office for the most recent listings.

Hunter Regional Environmental Plan 1989 (Heritage)

Schedule 1 Items of State environmental heritage

(Clauses 4, 5, 8)

Cessnock

Old North Road (1827–1831): Section from Mount Manning to Paynes Crossing including retaining walls, buttresses, culverts, drainage ditches and remains of abutments and pillars for bridges.

Wollombi

Maitland Road

- Former Courthouse & Police Station

Kurri Kurri

- Richmond Main Colliery

Paxton

- Stanford Main No 2 Colliery (includes cottages/equipment)

Dungog

Tocal

Dungog Road

- Tocal Homestead (c1839)

Gloucester

Copeland

- Mountain Maid Gold Mine

Scone

Bunnan

Trunk Road

- 'The Cuan' (No 62)

Scone

- Glenrock Station

Kingdon Street

- Former Courthouse (later Old Court Theatre)

Gundy Road

- 'Belltrees' & Outbuildings

Moobi Road

- 'Invermein' House. Petrified Stump (tree stump in situ)

New England Highway

- St Aubins House & Outbuildings

Segenhoe Road

- 'Segenhoe' and Outbuildings

Top of page

Hunter Regional Environmental Plan 1989 (Heritage)

Schedule 2 Items of regional environmental heritage

(Clauses 4, 5, 9)

Cessnock

South Maitland Railway

Abermain

Bathurst Street

- South Maitland Mines Rescue Station, (including houses)

Branxton

Cessnock Road

- Former Courthouse Group

Cliff & Maitland Road

- Drapery Shop

Maitland Street

- Shops Group (includes Nos 50, 52, 56, 58, 64, 66 and 70 Shop) (Nos 68 & 69 house)

New England Highway

- St John's Church

Off New England Highway

- General Cemetery

Station Street

- Catholic Cemetery
- Convent of Mercy

Cessnock

Maitland Road

- Courthouse

Wollombi Road

- 'Marthaville' (No 200)

Greta

Anvile & Water Streets

- Lock-up & Residence

High Street

- Median Strip including War Memorial & Bandstand

New England Highway

- Former Courthouse

Kurri Kurri

Coronation & Victoria Street

- Station Hotel

George Booth Drive

- Former Railway Tunnel

Hospital Road

- General Cemetery

Lang Street

- Kurri Kurri Hotel

Laguna

- Laguna House Group

Millfield

Wollombi Road

- Former Rising Sun Inn

Mulbring

Old Maitland Road

- Anglican Church Yard

Nulkaba

Allandale Road

- Cessnock Potteries

Branxton Road

- General Cemetery

Paynes Crossing

- 2 Storey Store House

Pelaw Main

Hebburn Street

- Pelaw Main Colliery

Pokolbin

Broke Road

- 'Ashmans' Winery & Vineyard

Rothbury

Wilderness Road

- Wilderness Cemetery

Branxton Road

- Peacock Hill Burial Ground

Wollombi

Maitland Road

- Post Office
- Public School Group
- St John the Evangelist Church
- Wollombi General Cemetery

Old North Road

- Mulla Villa

Dungog

Allynbrook

- Marys-on-Allyn

Brandon Grove

- General Cemetery
- St Peter's Anglican Church NW of Bendolba

Clarence Town

Cemetery Road

- General Cemetery

Grey Street

- Former Courthouse

Limeburners Creek Road

- Clarence Town Bridge

King Street

- Hua Tsa

Walba Park

- Robards Slaughterhouse

Gresford

- Cawarra Est Group

Dungog

Cemetary Road

- General Cemetery

Dowling & Hooke Streets

- CBC Bank and Stables

Dowling Street

- School of Arts

Lord Street

- Courthouse
- Police Lock-up
- Police Keepers Residence

Wirragulla

- Hooke Family Cemetery

East Gresford

Clements Road

- 'Lewinsbrook'

Park Street

- Catholic Cemetery

Lostock

- St John's Anglican Church Cemetery

Paterson

Johnson Street

- Former Courthouse
- Paterson Road
- Paterson Bridge

Maitland Road

- Corn Staddle

Duke Street

- St Paul's Church and Cemetery

Dungog Road, Tocal

- 'Bona Vista'

Salisbury

- General Cemetery

Vacy

Paterson River

- Vacy Bridge

Gloucester

Barrington

Barrington East Road

- Pioneer Cemetery

Barrington-Copeland Road

- No 2 General Cemetery

Gloucester

Bucketts Way

- 'Gloucester Cottage' or (The Homestead)

Church Street

- Court House Group
- Court House (No 19)

Merriwa

Cassilis

Branksome Street

- Police Station Group, comprising Court House, Police Station, Police Residence
- Royal Hotel and Outbuildings
- 'Quindalup' School House Group
- 'Collaroy' Group

Scott Street

- Old General Cemetery

Cassilis Station

Merriwa

Bow Street

- Holy Trinity Group

Macartney Street

- St Annes Group

Vannacher Street
comprising St Annes Roman Catholic Church, Convent and Presbytery

- Court House & Police Station

Muswellbrook

Bengalla

Bengalla Road

- 'Keys Family' Private Cemetery

Denman

'Olinda'

- 'Merton' Cemetery

Palace Street

- St Matthias Church

Palace & Ogilvie Streets

- Royal Hotel

Mangoola Road

- 'Pickering'

Martindale Road

- 'Martindale'

Woodlands Road

- 'Woodlands' Stud

Kayuga

Kayuga Road

- Old Kayuga Cemetery

Muswellbrook

Brook Street & Hunter Terrace

- St Albans Precinct (incl 15 Hunter Terrace & 27 Brovic Street)

Bridge Street

- Eatons Group (Nos 164–66, 172, 174, 178, 180–188)
- Loxton House (142)
- Wiedmann Cottage (132)

Brentwood & Brecht Streets

- 'Birralee'

Brook Street

- St James Church

Denman Road

- 'Balmoral'
- 'Edinglassie'
- 'Rouse-Lench'

Hill Street

- St Johns Precinct
- Presbyterian Manse (106)

Kayuga Road

- Muswellbrook Bridge
- 'Negoa' Homestead

Sowerby Street

- 'Atherstone' (5)

Tindale Street

- St Marys School

McCulleys Gap Road

- St Heliers

Via Sandy Hollow

- 'Baerami' Homestead

Scone

Aberdeen

McQueen Street

- Aberdeen Beef Co. Pty. Ltd.

New England Highway

- Fitzgerald Bridge
- Segenhoe Inn

Rouchel Road

- Segenhoe Flour Mill
- 'Kelvinside' & Outbuildings

Bunnan

- 'Bundarraga' & Outbuildings

Scone Merriwa Road

- St Judes Anglican Churchyard

Gundy

Church Street

- Presbyterian Cemetery
- St Matthews Anglican Cemetery

Gundy Road

- 'Bellevue' and Barn

Moonan Brook

6km East of Moonan Flat

- General Cemetery

Parkville

- 'Cressfield'

Rockhill

Rouchel Road

- Kennedy Family Cemetery

Scone

Hill & Liverpool Streets

- St Lukes Group

Kelly Street

- 'St Aubins Arms' (245)

New England Highway

- Catholic Cemetery

Park & Short Streets

- St Marys Roman Catholic Church

Rotary Park

- Alan Cunningham Memorial
- Monument for Commonwealth

Upper Dartbrook Road

- 'Thornthwaite'

Off Merriwa Road

- 'Yarrandi'

Sparkes Creek

- General Cemetery
- 'The Hawthornes' incl Outbuildings

Wingen

- 'Murulla' Station

Top of page

Schedule 3

Hunter Regional Environmental Plan 1989 (Heritage)

Schedule 3 Items of local environmental heritage

(Clauses 5, 6, 11)

Cessnock

Abermain

Cessnock Street

- Denman Hotel

Allandale

Lovedale & Harpers Hill Road

- 'Dunoon'

Bellbird

Wollombi Road

- Bellbird Hotel

Branxton

New England Highway

- Bank of NSW

Cessnock

Off South Avenue

- Aberdare Workshop

Vincent Street

- Commercial Bank (117)

Wollombi Road

- Cessnock Hotel (234)

Greta

High Street

- Masonic Hall
- Methodist Church

Wyndham Street

- Greta Public School

Kearsley

- Elrington Colliery

Kitchener

Cessnock Street

- Aberdare Central Colliery

Kurri Kurri

Land & Victoria Street

- Chelmsford Hotel

Laguna

Old Sydney Road

- Public School

Neath

Cessnock & Northumberland Streets

- Neath Hotel

Kurri Road

- Neath Colliery

Nulkaba

Allandale Road

- St Patricks Group

Pelton

Wollombi Road

- Pelton Colliery

Pokolbin

Debeyers Road

- 'Glen Elgin' Winery & Vineyard

Hermitage Road

- Hunter Valley Distillary

Weston

Scott & Station Streets

- Water Tower
- Hebburn No 2 Colliery

Wollombi

- Convict Drinking Trough

Maitland Road

- St Michael the Archangel Church

Gloucester

Faulkland

- 'Faulkland'

Rawdon Vale

The Moppy Road

- Bonny Doon

Gloucester

Church & Tyrell Streets

- Former Council Chambers (now Historical Museum)

Merriwa

Cassilis

Merriwa Road

- Farmhouse and Cottage Group
- 'Dalkeith'

Munamurra Road

- Woolshed

Gungal

Denman Road

- Grave of Peter George

Merriwa

Bettington & Bow Streets

- Fitzroy Hotel
- Colonial Cottage

Bettington & Vennacher Streets

- Royal Hotel

Bettington Street

- Astros Theatre Facade
- 'Brindley Park'
- 'Terragong'

Muswellbrook

Baerami

Main Road

- School of Arts

Denman

Jerrys Plains Road

- 'Merton'

Palace Street

- Former Court House & Police Station
- Former Police Residence
- Portable Timber Lockup
- Catholic Church

Kerrabee

Main Road

- Slab Cottage

Bridge Street

Muswellbrook

- Post Office
- Masonic Hall (75)

- Methodist Church
- Former Campbell & Co Store (54)
- Shop Front (34)

Cook & Carl Street

- 'Koobahla Villa'

Grass Tree Road

- Stone Bridge

Hunter Terrace

- 'Brighton' Villa (12)

Lorn & Maitland Road

- 'Hennor'

Market Street

- Railway Station

Sowerby Street

- Former Hospital (37)

Sydney Street

- Barber Shop (5)
- Former Royal Hotel (1)

Victoria Street

- Railway Depot

William Street

- Police Station

Bengalla Road

- 'Overdene'

Scone

Aberdeen

Allen Bridge Road

- Allen Bridge

New England Highway

- Former M. Campbell & Co., Store

Rouchel Road

- Former Butter Factory

Scone

Guernsey & Willow Street

- Former Willow Tree Hotel
- Former Boorers Mill
- Mill Cottage

Hill & Kingdon Street

- Former Grammar School (Nth-West Corner)

Kelly Street

- Campbells Corner (177–181)

Kingdon Street

- Former Lockup
- Former School of Arts

New England Highway

- 'Turanville'

Smith Street

- Hospital
- 'Nandowra'
- 'Satur'

Wingen

Abbott Street

- 'Petwyn Vale'

New England Highway

- House/Post Office
- Cliffdale Wyoming Stud

(f) to provide for a full range of business and service opportunities in the major business centres and support zones,

(g) to promote the arrangements and design of development in business centres and support zones in a manner which is compatible with adjoining residential areas,

(h) to enable the improvement of the local road network in the city area and to minimise conflicts between through and local traffic, while maintaining convenient access to business facilities for through traffic, and

(i) to conserve and enhance the environmental heritage of the city of Cessnock.

Schedule 2 (Repealed)

Schedule 3 Items of the environmental heritage

(Clause 5)

1 Cessnock Hotel (above awning)—Lot B, DP 369757, No 234 Wollombi Road, (opposite Vincent Street), Cessnock.

2 Commercial Bank—Lot 31, DP 588605, No 117 Vincent Street, Cessnock.

3 Royal Oak Hotel—Corner Lots 1 and 2, Section D, DP 4653, No 221 Vincent Street, south west corner of Vincent and Snape Streets, Cessnock.

4 United Services Hotel—Lot 100, DP 712730, No 167 Vincent Street, (corner Hall Street), Cessnock.

5 Court House—Lot 2, Section 6, Maitland Road, near Millfield Street, Cessnock.

6 "Marthaville"—Lot A, DP 390312, single storey dwelling, No 200 Wollombi Road, Cessnock.

7 Chelmsford Hotel—Corner Lot 6, Section 20, No 122 Lang Street, (south west corner of Lang Street and Victoria Street), Kurri Kurri.

8 Kurri Kurri Hotel—Lot 16, Section 20, No 186 Lang Street, (north east corner of Hampden Street and Lang Street), Kurri Kurri.

9 Rising Sun Inn—Lots 20, 21 and 25, DP 13266, Wollombi Road, Millfield.

10 Richmond Main Colliery—Former Richmond Vale Colliery, Kurri Kurri.

11 Ironbark Cottage—Broke Road, at Peppertree Vineyard, Pokolbin.

12 General Cemetery—Allandale Road, Cessnock.

13 Wilderness Cemetery—Wilderness Road, Rothbury.

14 Burial Ground—Peacocks Hill, Debeyers Road, Rothbury.

15 Former Bickmore's Store—corner Lot A, DP 340739, No 84 Lang Street, Kurri Kurri.

16 Hebburn Dam.

17 All earthworks, structures and ancillary equipment along the railway formation from Hebburn Dam to Elrington including a corridor 40 metres wide centred on the railway trackbed centreline.

18 All earthworks, structures and ancillary equipment along the South Maitland Railway including a corridor of land 100 metres wide centred on the railway trackbed centreline.

19 All earthworks, structures and ancillary equipment along the Richmond Vale Railway formation

including a corridor of land 100 metres wide centred on the railway trackbed centreline.

20 Pelaw Main Colliery Precinct.

21 Abermain No 1 Colliery Precinct.

22 Hebburn No 1 Colliery Precinct.

23 Hebburn No 2 Colliery Precinct.

24 Richmond Main Colliery Precinct.

Schedule 4 (Repealed)

Schedule 5 Development for certain additional purposes

(Clause 45)

1 Special Lease No 41/2, Section 8, corner Edgeworth and Vincent Streets, Aberdare—sheltered workshop.

2 Land in Heaton State Forest No 122, Mount Sugarloaf Range, Parish of Mulbring, County of Northumberland—two way radio (country) transmission tower and ancillary building where both the tower and ancillary building will be either constructed of dark coloured materials with a matt finish or painted in dark colours with a matt finish, so as to blend with the environment.

3 Unnumbered lot, DP 959255, in the vicinity of Scott, Morgan and Mayne Streets, North Rothbury, as shown edged heavy black on the map marked Cessnock Local Environmental Plan 1989 (Amendment No 5)—subdivision creating 3 lots, each lot having a minimum area of 2000 square metres and the erection of a dwelling-house on each lot so created.

4 Part of Lot 811, DP 728985, Hart Road, Loxford, Parish of Heddon, as shown edged heavy black on the map marked "Cessnock Local Environmental Plan 1989 (Amendment No 7)"—construction of a scrap aluminium recycling facility.

5 Land fronting George Booth Drive, Richmond Vale, Parish of Stockrington, as shown edged heavy black on Sheet 1 of the map marked "Cessnock Local Environmental Plan 1989 (Amendment No 13)"—explosives research and production facility involving:

(a) the construction and use of offices, laboratories and workshops for the purposes of research into, and development of, explosives and associated manufacturing processes, methods of application of explosives, related advanced engineering processes and blasting physics, and

(b) the production, storage and testing of explosives.

6 Lot 50, DP 746450, No 317 Maitland Road, Cessnock and Lot 51, DP 746450, No 311 Maitland Road, Cessnock—the display and sale of new and used motor vehicles.

7 Lot 5, DP 749628, Valley View Place, Nulkaba—subdivision creating 3 lots and the erection of a dwelling-house on each lot so created.

8 Lot 931, DP 816814, John Renshaw Drive, Blackhill, Parish of Stockrington, as shown edged heavy black on the map marked "Cessnock Local Environmental Plan 1989 (Amendment No 43)"—waste water treatment facility.

9 Lot 41 DP 996992, Lot 548 DP 720699, Lot 48 DP 755215, Pt DP 755215, Pt Lot 59 DP 755215, Pt Lot 547 DP 755215 and closed road, Old Maitland Road and Maitland Road, Cessnock, as shown edged heavy black on the map marked "Cessnock Local Environmental Plan 1989 (Amendment No 51)"—waste management facilities or works, where any such facility accepts only waste collected in the Cessnock local government area.