

S U B M I S S I O N S R E P O R T



Integra Open Cut Project

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Appendices

Appendix A Operational Noise and Blasting Assessment

Appendix B Offset Strategy

1 Introduction

An Environmental Assessment (EA) was prepared for Integra Coal Operations Pty Ltd (Integra) to assess the environmental impacts of the proposed Open Cut Project (MP 08_0102). The Environmental Assessment, which was prepared in accordance with the Environmental Planning and Assessment Act 1979 (the EP&A Act) and the Environmental Planning and Assessment Regulation 2000 (the EP&A Regulation), was placed on public exhibition between 1st July 2009 and 3rd August 2009.

This Submissions Report supports the Environmental Assessment for the proposed Open Cut Project by providing responses to matters raised regarding the document as exhibited.

From the public exhibition of the EA, the Department of Planning (DoP) received submissions from the following Government agencies and members of the public.

Government:

- Roads and Traffic Authority
- Department of Primary Industries
- Department of Environment, Climate Change and Water (DECCW)
- DECCW (NSW Office of Water)
- Hunter-Central Rivers Catchment Management Authority
- Singleton Shire Council

Public:

- Trevor & Cindy Burgess
- BR & MK Bridge
- BW & RA Cherry
- St Clements Anglican Church
- Deidre Olofsson
- Thelma & Meindert de Jong
- JH & MR Moore
- John & Judith McInerney
- Bailey Family
- Gillian Holmes
- Gary & Wendy Cooper
- Cindy Whitney
- IM Tisdell
- Bruce & Rosalie Richards
- WG Bowman
- R & D Hall

These were forwarded to Integra between 3rd and 25th August 2009.

Chapter 2 of this document provides a summary of the issues raised by each Government agency or individual and a record of where each issue raised is addressed in this Report. **Chapters 3, 4 and 5** then provide responses to the issues raised by each Government agency and in the public submissions respectively, including those raised by WG Bowman and R & D Hall. It should be noted, however, that the provision of the responses to the Bowman and Hall submissions, both of which were received by the Department of Planning following the closure of the exhibition period, should not be taken as a view on Integra's part that these individuals constitute "objectors" under s.75L of the EP&A Act 1979.

Chapter 6 presents the Revised Statement of Commitments for the Project which incorporates the commitments which remain unchanged from those presented in the Environmental Assessment, together with amended or additional commitments made by the Proponent and presented within **Chapters 3, 4 and 5** of this document.

The responses presented in **Chapters 3 and 4** of this document have been prepared and/or collated by URS Australia Pty Ltd (URS), with the assistance of relevant Integra / Vale personnel and specialist consultancies. PAE Holmes and Heggies Pty Ltd were primarily responsible for the responses to questions / comments regarding air quality and noise respectively which were of a more technical nature. Responses to issues regarding groundwater were provided by Geoterra Pty Ltd while Geoff Cunningham Natural Resource Consultants provided assistance regarding the evaluation of land as a potential offset for clearing the native vegetation identified in the EA. The responses presented in **Chapter 5** were prepared by Integra / VALE personnel, with the assistance of PAE Holmes regarding matters pertaining to air quality (**Sections 5.4.1 to 5.4.9** inclusive).

Integra would, at the outset, like to acknowledge the interest in the Open Cut Project by the community surrounding the Open Cut Project Area and would like to thank those who showed a genuine interest in the Project and subsequently took the time to review the EA and provide submissions to DoP. Integra acknowledges that a component of the community surrounding the Open Cut Project Area is concerned about the impact that the proposal, together with that from other existing coal mining operations, would have on them personally, the community in general and the environment. However, Integra remains optimistic that any issues of concern or disagreement will be able to be addressed through appropriate conditioning in a Project Approval or resolved through open and honest dialogue during the Project's operations.

2 Summary of Submissions

Table 2-1 categorises the issues raised in the submissions on the Environmental Assessment received from the Government agencies and identifies the relevant section of this report where each issue is addressed.

Table 2-1 Summary of Government Agency Submissions

Environmental Aspect	Government Agency Submissions	Submissions Report Section
Noise and Blasting	Department of Environment, Climate Change and Water	Section 3.5.1 and 3.5.2
Air Quality	Department of Environment, Climate Change and Water	Section 3.5
	Singleton Shire Council	Section 3.7
Traffic	NSW Roads and Traffic Authority	Section 3.2
Soils and geology	NSW Department of Primary Industries (DoP)	Section 3.3
Biodiversity	Department of Environment, Climate Change and Water	Section 3.5.4
	NSW Department of Primary Industries (DoP)	Section 3.3
	Hunter-Central Rivers Catchment Management Authority	Section 3.6
Heritage	Department of Environment, Climate Change and Water	Section 3.5.5
Hydrology and Surface Water	Department of Environment, Climate Change and Water (Office of Water)	Section 3.4
Mining Operations	NSW Department of Primary Industries (DoP)	Section 3.3
Rehabilitation	NSW Department of Primary Industries (DoP)	Section 3.3
	Department of Environment, Climate Change and Water (Office of Water)	Section 3.4
Socio-Economic	NSW Department of Primary Industries (DoP)	Section 3.3
	Singleton Shire Council	Section 3.7

Similarly, **Table 2-2** categorises the comments / issues raised by members of the public in their submissions and identifies the sections of this report where the submissions are addressed. Given the proximity of the Dulwich residence to the planned extension of mining, the issues raised by R & D Hall are addressed separately in **Chapter 5**.

Table 2-2 Summary of Public Submissions

Environmental Aspect	Category	Public Submissions	Submissions Report Section
Noise and Blasting	General	T&C Burgess; M Bridge; B&R Cherry; St Clements Church c/o Thelma de Jong; D Olofsson; T&M de Jong; J & R Moore; J & J McInerney; Bailey family; G Holmes; G & W Cooper.	Section 4.2.1
	Noise Monitoring	Bailey Family.	Section 4.2.2
	Sleep Disturbance	Bailey Family; J & J McInerney; B&R Cherry; J&M Moore; J Watling & B Richards.	Section 4.2.3
	Ambient Noise Data	G&W Cooper; J Watling & B Richards.	Section 4.2.4
	Blasting	D Olofsson; B&R Cherry; J Watling & B Richards; T&C Burgess; IM Tisdell.	Section 4.2.5
Air Quality	General	T&C Burgess; M Bridge; B. W. & R. A. Cherry; St Clements Church c/o T de Jong; D Olofsson; T & M de Jong; J & R Moore; J & J McInerney; Bailey family; G Holmes; G & W Cooper.	Section 4.3
	Air Quality Monitoring	Bailey Family; G&W Cooper; J & J McInerney.	Section 4.3.1
	Tankwater Quality	T&C Burgess; G&W Cooper; J & J McInerney.	Section 4.3.2
	Health Effects	J&M Moore; B&R Cherry; W Bowman.	Section 4.3.3
	Health Effects – Dairy Farms	J Watling & B Richards.	Section 4.3.4
	Cumulative Impacts	J Watling & B Richards; M Bridge; J & J McInerney; W Bowman.	Section 4.3.5
	Greenhouse Effects	D Olofsson.	Section 4.3.6
Traffic	Traffic Flow Increases	G&W Cooper; B&R Cherry; D&M Bridge.	Section 4.4
Heritage	Damage from Blasting	St Clements Church c/o T de Jong.	Section 4.5
Property Values	Impact on Property Values	J & J McInerney; G Holmes; G & W Cooper; IM Tisdell; C Whitney.	Section 4.6
Hydrology and Surface Water	Water Quality and Levels	D&M Bridge; JH & MR Moore; J & J McInerney; W Bowman.	Section 4.7
Socio-Economic	Economic Benefits of the Proposal	M Page.	Section 4.8

3 Response to Government Agency Submissions

3.1 Introduction

This Chapter provides responses to each of the Government agency submissions. Given that submissions from individual agencies may have addressed more than one aspect of the Integra Open Cut Project, where relevant, responses have been provided by issue raised.

3.2 Roads and Traffic Authority

No issues were raised within the RTA submission which required a response from Integra.

3.3 Department of Primary Industries

The Department of Primary Industries submission provided comments from their Mineral Resources and Agricultural Divisions in relation to the application, land capability, and rehabilitation. However, the submission did not identify any issue requiring a specific response from Integra. Rather, the submission simply identified that Department's expectations over the life of the Project. Integra concurs fully with the comments provided and, where appropriate, has amended or included additional commitments in the Revised Statement of Commitments to reflect those comments.

3.4 Department of Environment, Climate Change and Water – Office of Water

Issue 1: Requirements of the Hunter Unregulated River and Alluvial Water Sharing Plan (HURAWSP) Hunter Unregulated River and Alluvial Water Sharing Plan (HURRWSP)

Comment

The New South Wales Office of Water (NOW) has reviewed the Environmental Assessment (EA) for the proposed Integra Coal open cut extension project. OoW provides the following comments in light of its statutory role under the Water Act 1912 (WA) and Water Management Act 2000 (WMA).

NOW provided requirements for assessment in the EA for the proposal on 16 June 2008. Consistent with the outcomes set in NOW's correspondence, NOW requires that the proposal must achieve:

- 1. no hydraulic connection between the open cut pit and surface water sources, including connected alluvium is to occur*
- 2. no impact is to occur on adjacent licensed water users, basic landholder rights, or minimum base flows in the Glennies Creek regulated river, or groundwater-dependent ecosystems*
- 3. no excavation is to occur within 150 metres of the agreed alluvial boundary to the Glennies Creek water source*
- 4. all lateral displacement drawdown in the connected alluvium must be accounted for under dealings as set out in the Hunter Unregulated Rivers and Alluvium Water Sharing Plan*

These requirements are mandatory requirements of the Hunter Unregulated River and Alluvial Water Sharing Plan (HURAWSP), which came into force on 1 August 2009. NOW required the plan to be included in Director General's Requirements to the EA; neither the Hunter Regulated River Water Sharing Plan (HRRWSP) nor the Hunter Unregulated River and Alluvial Water Sharing Plan were included in the document referral table in Department of Planning's Director General's Requirements. This shortcoming impacts upon the adequacy of the EA to address statutory obligations in force under NSW water legislation.

Response

Integra Coal Operations Pty Ltd will adhere to the operating rules of the Hunter Regulated River Water Sharing Plan (HRRWSP) and the Hunter Unregulated River Water Sharing Plan (HURRWSP), thereby ensuring that the operation of the proposed extended Pit will protect Glennies Creek and its associated well connected alluvial water sources. This response is reflected in revised Statement of Commitments in **Chapter 6**.

Issue 2: Verification of EA Predictions**Comment**

The proposed extension to the Integra open cut provides a precautionary setback of 150 metres from the mapped edge of the closely connected alluvium to the regulated Glennies Creek (Zone 3 of the Hunter River water source, governed under the HRRWSP). This complies with DWE guidelines and DWE's general requirement to avoid connection between the mining operation and the regulated river and its connected alluvium. The imposition of a precautionary barrier between mining excavation and the mapped edge of connected alluvium is a necessary measure to provide the minimum level of protection to the regulated river system, which is a critical water source to all water requirements in Zones 2 and 3 of the HRRWSP area. Disturbance to the integrity of the regulated water source, and the alluvial groundwater source to which it is connected is a statutory requirement under the Water Management Act 2000, and the HRRWSP and HURAWSP which implements the principles and statutory protective requirements under the above water sharing plans.

NOW maintains a position of protection to the HRRWSP and associated HURAWSP water sources and requires that this position is reflected in conditions of project approval. Although the EA refers to some requirements under the HRRWSP, the HURAWSP is only briefly mentioned in the EA, and no test as to the adequacy of the open cut design against the operating rules of the HURAWSP is made. This must be addressed by the applicant, by means of ongoing verification of EA predictions and contingency measures to address any variation from predictions made, in accordance with the groundwater management section of the Statement of Commitments (C1-C9).

Response

Ongoing verification of the EA predictions and contingency measures will be attained by development and adherence to a surface water and groundwater monitoring and management plan (SW&GWMP) that will be prepared, in consultation with NOW, following receipt of approval for the Project. Integra Coal Operations Pty Ltd will adhere to the operating rules of the Hunter Regulated River Water Sharing Plan (HRRWSP) and the Hunter Unregulated River Water Sharing Plan (HURRWSP). This is reflected in the revised Statement of Commitments in **Chapter 6**.

Issue 3: Geological Structure**Comment**

NOW is concerned that the groundwater modelling conducted to the proposal does not assess the likelihood of geological structure creating conduit flowpaths between the connected alluvium and the mining excavation. The site is constrained by the uplift block of the Cranky Corner Basin to the east and the Hunter Thrust Fault to the north and north east. These regional structures are reflected in localised structural deformations; the proposed mine is located between the axis of the Camberwell Anticline and the Rixs Ck Syncline; complex geological conditions may create fracture pathways which are not assessed in the EA apart from the indicative mapping in Figure 2, Section 2.5 of Appendix C of the EA. NOW is concerned that reactivation of faulting may occur as occurred at the nearby Ashton Coal Barrett

open cut pit, may lead to induced losses of alluvial groundwater from the connected Glennies Creek alluvium.

Response

The western periphery of the proposed extended Pit may intersect a potential southerly extension of an unnamed NNE trending fault which has been mapped approximately 2km to the north in the drift developed for the Integra Underground. At that point, the fault exhibited a 4m throw.

The actual presence, location and throw of the fault in the vicinity of the extended Pit is at this stage unconfirmed. Geological mapping will be used to assess the presence of the fault and, if identified, its significance during excavation of the western periphery of the pit. In addition, if the fault is present in the pit, it will be investigated to assess whether it can provide a connective hydrological pathway between the pit and the Glennies Creek alluvium through re-activation of the fault. If appropriate, the hydrological significance of the fault will be assessed through incorporating its hydrological properties into the existing FEFLOW groundwater model. This is reflected in the revised Statement of Commitments in **Chapter 6**.

Issue 4: Influence of Geological Structure on Groundwater Transmission

Comment

NOW requires detailed assessment of the influence of geological structure on groundwater transmission through field verification of the FeFlow groundwater modelling undertaken for this EA, and cut off thresholds established to delimit mining-induced depressurisation impacts in the connected Glennies Creek alluvium, in accordance with operational rules of the HURAWSP in consultation with NOW.

Response

Cut off thresholds that relate to potential mining induced depressurisation impacts in the connected Glennies Creek Alluvium will be established and documented in the SW&GWMP. This is reflected in the revised Statement of Commitments (**Chapter 6**). It should be noted however, that based on the results of pump out tests, groundwater level and alluvial groundwater salinity monitoring conducted to date, the Glennies Creek alluvium directly to the west of the proposed extended Pit is not interpreted to be highly connected to Glennies Creek.

Issue 5: Rehabilitation Strategy

Comment

NOW requires a rehabilitation strategy for remnant river red gum and other groundwater dependent ecosystems along Glennies Creek and Station Creek to be incorporated into the biodiversity offset package within the Statement of Commitments (E10). This is to incorporate revegetation establishment procedures developed by DECCW and the Hunter Central Rivers Catchment Management Authority. The rehabilitation strategy must incorporate trigger thresholds for the groundwater management response outlined in C3, C4 of the Statement of Commitments. These commitments must be updated to reflect the operating rules of the HURAWSP within any approved groundwater management plan required under project approval to the proposal.

Response

Rehabilitation of groundwater dependent ecosystems in general will be incorporated as part of the Offset Strategy and was identified in Section 9.5.3 of the Environmental Assessment and Commitment E10. The groundwater Statement of Commitments have been updated accordingly (**Chapter 6**).

With regard to the specific requirement for a rehabilitation strategy for River Red Gum, it should be noted that no River Red Gum has been identified within the Study Area shown on Figure 9.3 of the EA, nor

elsewhere in the Project Area or the offset areas previously nominated by Integra. Further, this species is not identified as occurring naturally within the local area on the Government's Plantnet website. A rehabilitation strategy for this species in the Station Creek and Glennies Creek components of the Project Area is therefore considered to be inappropriate.

3.5 Department of Environment, Climate Change and Water

3.5.1 Noise

3.5.1.1 Introduction

Heggies Pty Ltd (Heggies) prepared the specialist Noise and Blasting Assessment (NIA) component of the EA. In response to DECCW's submission, a meeting (DECCW Meeting) was held on 19 August 2009 with representatives from ICO, URS, Heggies, DoP and DECCW in attendance to confirm and clarify DECCW's requests. In order to clearly present updates made as a result of the responses to DECCW's requests, the NIA has been updated and is provided as **Appendix A** of this Submissions Report. In this Section (**Section 3.5.1**), references to sections of the revised NIA and to sections of this report are in bold; references to sections of the original EA as exhibited are in normal text.

This Section has been prepared by Heggies, on behalf of ICO, in response to the DECCW's submission and additional information requested at the DECCW Meeting related to the noise and blasting aspects of the Open Cut Project's EA.

ICO accepts that both the regulator (DECCW) and in turn the consent authority (DoP) will use the information presented in the NIA to set noise limits applicable to the Open Cut Project. The responses presented in this Section provide the additional information and clarification required by regulator to set noise limits applicable to the Open Cut Project.

3.5.1.2 Issues and Responses

Identification of Noise Sensitive Receivers

Issue 1

One hundred and ten surrounding private (non-mine owned) residences potentially affected by noise from the proposal have been identified in the Noise Impact Assessment (NIA). The NIA has also considered mine owned premises and private vacant land. DECCW review has only considered existing private residences. The residences have been grouped into 18 Noise Assessment Groups (NAG) with a representative residence selected for the purposes of defining the noise environment of each NAG. DECCW has not attempted to confirm the accuracy or completeness of the identified noise sensitive receiver locations.

Response

Noted.

Existing Ambient Noise Monitoring

Issue 2

Unattended existing ambient noise monitoring was undertaken in 2005 and 2007 at 18 locations. Operator attended monitoring was also undertaken at the 18 unattended monitoring locations for the day, evening and night periods. The results are presented in the NIA in Tables 8 and 9.

Response

Noted.

Issue 3

The ambient monitoring results representing NAG's 1, 2, 3, 4, 6, 9, 10, 11, 12, A, B, C, D, and F exhibit higher evening and night-time Rating Background Levels (RBLs) than the corresponding daytime RBLs. The Industrial Noise Policy (INP) Application Notes generally recommend that the intrusive limit for evening and night be set no higher than for the daytime. However the application note indicates that; "Alternative approaches to these recommendations may be adopted if appropriately justified". Section 4.4 of the NIA presents justification, stating that this trend is indicative of the area over all seasons. This argument appears well supported, however, it is recommended that excursions above daytime RBLs be capped at the overall median of the data set, as expressed in Table 18 in the NIA. This results in RBLs for evening being no higher than 3 dB than daytime, and RBL for night-time being no higher than 1 dB than daytime, for NAGs exhibiting the trend.

Response

Accepted.

To clearly present the revised assessment, the NIA has been amended and is attached as **Appendix A**.

Issue 4

DECCW supports, as proposed, the adopting of NAG B ambient noise monitoring results to derive assessment criteria for NAG C due to the large variation in noise levels for NAG C when compared to adjoining areas.

Response

Noted.

Issue 5

DECCW notes and supports the approach of calculating "existing industrial noise levels" based on approved noise limits for existing industrial premises/development.

Response

Noted.

Project Specific Noise Levels (PSNLs)**Issue 6**

The project specific noise level for a particular receiver is the more stringent of the intrusive and amenity criteria. The approach adopted in the NIA has been to undertake both an intrusive and amenity assessment separately. DECCW does not object to this approach, but does not necessarily agree with aspects of both the intrusive and amenity criteria derivation process, as outlined below:

[Refer to Issues 7, 8 and 9]

Response

Noted.

Issue 7

DECCW accepts evening intrusive criteria that are no greater than 3 dB above the corresponding daytime criteria; and night-time criteria that are no greater than 1 dB above the corresponding daytime criteria. However, this approach is only relevant to NAGs where ambient noise monitoring suggests a positive trend from day to evening to night that exceeds the 3/1dB margins outlined above. Additional assessment against these recommended intrusive criteria is required.

Response

Accepted.

The 'additional' assessment has been undertaken, resulting in only one non-mine owned residence (Residence 80) moving from the 'minor exceedance' Management Zone to the 'marginal exceedance' Management Zone. The outcome for all the other non-mine owned residences remains the same.

To clearly present the revised assessment the NIA has been updated and is attached as **Appendix A**.

Issue 8

DECCW generally accepts the presented amenity criteria derived using the "acceptable noise levels" from Table 2.1 in the INP. However, the amenity criteria have not been used to inform an assessment of noise impacts. The number of receivers predicted to experience noise levels above the amenity criteria should be identified. DECCWs assessment would indicate that upwards of 40 private residences will experience predicted noise levels that exceed the night-time amenity criteria.

DECCW Meeting Clarification

The DECCW requested that the amenity noise levels from the existing Cumulative Noise (Excluding the Open Cut Project), the Open Cut Project (alone) and the Cumulative Noise Including the Open Cut Project be presented.

Response

As is typical of 24-hour mining operations, the greatest potential noise impacts from the Open Cut Project are expected to occur during the night-time period. No additional residences are impacted during the daytime and evening periods.

The noise predictions indicate that emissions from the Open Cut Project are highest during the night-time period. Accordingly, **Table 3-1** identifies all known non-mined owned residences where the Acceptable Amenity Project Specific Noise Level ("Acceptable Amenity PSNL") is predicted to be exceeded during the night-time period for the Open Cut Project Full Pit Operations.

Table 3-1 Non-mined owned residences where the Acceptable Amenity PSNL is predicted to be exceeded during the night-time period for the Open Cut Project Full Pit Operations

Noise Assessment Group (NAG)	Residence Reference	Landowner's Name	INP Acceptable / Maximum Amenity Criteria	Cumulative Noise Excluding Open Cut Project ¹	Acceptable Amenity PSNL	Open Cut Project - Noise Emission Level ²	Cumulative Noise Including Open Cut Project ³
1	80	G Donnellan	40 / 45	43	33	38 ⁵	44
3	87	B & R Richards	40 / 45	42	32	43 ⁶	46
	106	B & R Richards	40 / 45	41	32	43 ⁶	45
4	88	M & T De Jong	40 / 45	41	32	35 ⁴	42
	91	T & D Olofsson	40 / 45	41	32	36 ⁴	42
	94	L & S Foord	40 / 45	41	32	35 ⁴	42
	95	J & T Clarke	40 / 45	41	32	35 ⁴	42
	96	S J Robertson	40 / 45	41	32	36 ⁴	42
	99	A J Bennett	40 / 45	41	32	33	41
	100	C L Stapleton	40 / 45	41	32	33	41
	105	J & G McInerney	40 / 45	41	32	37 ⁵	42
5	161	V Lopes	40 / 45	41	32	36 ⁴	42
	103	S Turner	40 / 45	40	32	31	41
	104	Church Property - Diocese of Newcastle	40 / 45	40	32	33	41
	111	T Burgess	40 / 45	40	32	43 ⁵	45
	112	S & C Ernst	40 / 45	40	32	41 ⁴	43
	118	B & R Richards	40 / 45	40	32	38	42
	120	M & J Chisholm	40 / 45	40	32	37	42
	121	A Nowland; E Moore; J Dunn	40 / 45	40	32	35	41
	123	C Standing	40 / 45	40	32	34	41
	125	R M Lethbridge	40 / 45	40	32	35	41
	126	R & C Bailey	40 / 45	40	32	34	41
	129	N & M Smiles	40 / 45	39	34	37	41

Noise Assessment Group (NAG)	Residence Reference	Landowner's Name	INP Acceptable / Maximum Amenity Criteria	Cumulative Noise Excluding Open Cut Project ¹	Acceptable Amenity PSNL	Open Cut Project - Noise Emission Level ²	Cumulative Noise Including Open Cut Project ³
	139	M Eveleigh, K Penfold & R Eveleigh	40 / 45	40	32	32	41
	154	M & M Beasley	40 / 45	40	32	39	43
	156	R Ninness	40 / 45	40	32	39	43
	157	K & D Miller	40 / 45	40	32	37	42
	159	M Peachey	40 / 45	40	32	38	42
6	132	W H Bowman; M Bowman; W G Bowman; G R Elder	40 / 45	38	36	34	39
	133	A Bowman	40 / 45	38	36	32	39
	137	A Bowman	40 / 45	37	37	31	38
7	108	I M Tisdell	40 / 45	41	32	48 ⁶	49
	109	I M Tisdell	40 / 45	41	32	49 ⁶	50
	110	G J Hall	40 / 45	40	32	48 ⁶	48
	153 "Dulwich"	R & D Hall	40 / 45	45	35	50 ⁶	51
8	142	Singleton Heights (township)	40 / 45	35	38	24	36
9	2	Singleton Council	40 / 45	37	37	33	39
	3	Christopher Ross Whiting	40 / 45	37	37	35	39
	4	Leonard Cox	40 / 45	37	37	35	39
	143	G Pitt	40 / 45	37	37	31	38
	144	W & H Huls	40 / 45	37	37	32	38
	145	A & S Murray	40 / 45	37	37	32	38
	146	R & A Howard	40 / 45	37	37	31	38
	147	S Farrugia	40 / 45	37	37	32	38
	148	D & L Mellows	40 / 45	37	37	31	38
	149	R & L Gulliver	40 / 45	37	37	29	37
	150	R Bourke	40 / 45	37	37	32	38
	151	C & T Wallace	40 / 45	37	37	32	38

Noise Assessment Group (NAG)	Residence Reference	Landowner's Name	INP Acceptable / Maximum Amenity Criteria	Cumulative Noise Excluding Open Cut Project ¹	Acceptable Amenity PSNL	Open Cut Project - Noise Emission Level ²	Cumulative Noise Including Open Cut Project ³
	152	K & J Badior	40 / 45	37	37	32	38
10	5	Darren Philip Cox	40 / 45	37	37	36 ⁴	40
	6	W G Cox	40 / 45	37	37	37 ⁵	40
	8	D K Geelan	40 / 45	37	37	38 ⁵	41
	9	W & N Pendered	40 / 45	39	34	38 ⁵	41
	10	E & B Kleinman	40 / 45	39	34	37 ⁵	41
	11	F Ferraro	40 / 45	37	37	37 ⁵	40
	13	P & K Russell	40 / 45	38	36	39 ⁵	41
11	7	N J Smith	40 / 45	37	37	35	39
	12	W Garland	40 / 45	36	38	36	39
	14	M Hoggan	40 / 45	37	37	38 ⁴	40
	15	G & J Barnett	40 / 45	37	37	36	39
	16	A Lambkin	40 / 45	38	36	38 ⁴	41
	17	W Cooper	40 / 45	37	37	32	38
	18	W & G Cooper	40 / 45	37	37	29	38
	19	S Andrews	40 / 45	37	37	33	38
	20	A Garvie	40 / 45	37	37	32	38
	21	S Andrews	40 / 45	37	37	32	38
12	50	D & M Bridge	40 / 45	40	32	32	41
	51	M & S Boyce	40 / 45	40	32	31	41
	52	B & J Moran	40 / 45	40	32	27	40
	53	K & J Badior	40 / 45	41	32	32	41
	54	G Holmes	40 / 45	41	32	33 ⁴	41
	55	TBC	40 / 45	41	32	28	41
	56	B & D Wilson	40 / 45	41	32	30	41
	57	TBC	40 / 45	41	32	32	42
	62	D Moran	40 / 45	41	32	34 ⁴	42
A	22	S Andrews	40 / 45	37	37	32	38
	23	R & K Bell	40 / 45	38	36	33	39
	24	G Lambkin	40 / 45	37	37	28	38
	25	J & C Whitney	40 / 45	37	37	30	38
	26	B & R Frazer	40 / 45	37	37	29	38
	27	D Hamilton	40 / 45	37	37	29	38

Noise Assessment Group (NAG)	Residence Reference	Landowner's Name	INP Acceptable / Maximum Amenity Criteria	Cumulative Noise Excluding Open Cut Project ¹	Acceptable Amenity PSNL	Open Cut Project - Noise Emission Level ²	Cumulative Noise Including Open Cut Project ³
	28	D Hamilton	40 / 45	37	37	28	37
	29	D Cope	40 / 45	38	36	30	38
	30	A Cox	40 / 45	37	37	30	38
	31	D Kacunic & C Jensen	40 / 45	38	36	30	38
	32	TBC	40 / 45	38	36	30	38
	34	T & G Breen	40 / 45	38	36	31 ⁴	39
	35	R & W Gardner	40 / 45	39	34	30 ⁴	39
	36	D Baker	40 / 45	38	36	29	39
	37	Helen Leila May Castledine	40 / 45	39	34	22	39
	38	M & R Porter	40 / 45	39	34	30	40
	39	E & J Upward	40 / 45	39	34	21	39
	40	E & J Upward	40 / 45	39	34	21	39
	41	H M Upward & Sons	40 / 45	39	34	21	39
	42	J A Welsh	40 / 45	40	32	30	40
	43	Deidre Margaret Kay	40 / 45	39	34	31	40
C	47	B & R Cherry	40 / 45	40	32	32	41
	63	J & M Moore	40 / 45	41	32	34 ⁴	41
	64	W & A Gardner	40 / 45	41	32	35 ⁵	42
D	44	G & K Cheetham	40 / 45	39	34	30	40
	48	G & K Cheetham	40 / 45	40	32	29	40
	49	G & K Cheetham	40 / 45	40	32	32	41
F	65	P Hedges	40 / 45	42	32	32	42
	66	P Hedges	40 / 45	41	32	31	42
	67	G M Watson	40 / 45	42	32	32	42
	68	S J McInerney	40 / 45	42	32	35	43
	71	A C Noble	40 / 45	43	33	37	44
	72	A Noble	40 / 45	43	33	37	44
	73	A Noble	40 / 45	43	33	37	44

Noise Assessment Group (NAG)	Residence Reference	Landowner's Name	INP Acceptable / Maximum Amenity Criteria	Cumulative Noise Excluding Open Cut Project ¹	Acceptable Amenity PSNL	Open Cut Project - Noise Emission Level ²	Cumulative Noise Including Open Cut Project ³
	76	A Noble	40 / 45	43	33	38 ⁴	44

- Note 1: Levels shown in **bold and red** indicate an exceedance of the INP Maximum Amenity Criterion due to the existing industrial noise emissions from surrounding mining operations and in the absence of all Open Cut Project Operations. Levels shown in **bold and blue** indicate an exceedance of the INP Acceptable Amenity Criterion due to the existing industrial noise emissions from surrounding mining operations and in the absence of all Open Cut Project Operations. Levels shown in **bold and black** indicate that the existing industrial noise emissions from surrounding mining operations and in the absence of all Open Cut Project Operations are already at the INP Acceptable Amenity Criterion level.
- Note 2: Levels shown in **bold** indicate that the noise emissions from the Open Cut Project Operations are above the INP Acceptable Amenity PSNL. Levels shown in **bold and blue** indicate that the noise emissions from the Open Cut Project Operations are above the outright INP Acceptable Amenity criterion. Levels shown in **bold and red** indicate that the noise emissions from the Open Cut Project Operations are above the outright INP Maximum Amenity criterion.
- Note 3: Levels shown in **bold and red** indicate an exceedance of the INP Maximum Amenity Criterion due to the cumulative existing industrial noise emissions from surrounding mining operations and the Open Cut Project Operations. Levels shown in **bold and blue** indicate an exceedance of the INP Acceptable Amenity Criterion due to the cumulative existing industrial noise emissions from surrounding mining operations and the Open Cut Project Operations. Levels shown in **bold and black** indicate that the cumulative existing industrial noise emissions from surrounding mining operations and Open Cut Project Operations are at the INP Acceptable Amenity Criterion level. **Shaded** cells indicate that there would be a noticeable (5 dBA or more) increase in the approved ambient mining amenity noise level as a result of the contribution from the Open Cut Operations.
- Note 4: Residence is also identified as being in the Minor Noise Management Zone (as defined by the DECCW) due to the intrusive noise emissions from the Open Cut Project Operations.
- Note 5: Residence is also identified as being in the Marginal Noise Management Zone (as defined by the DECCW) due to the intrusive noise emissions from the Open Cut Project Operations.
- Note 6: Residence is also identified as being in the Noise Affection Zone due to the intrusive noise emissions from the Open Cut Project Operations.

Table 3-1 confirms that 45 non-mine owned residences are predicted to experience noise levels from the Open Cut Project which are above the Acceptable Amenity PSNL. However, out of the 45 residences, only five residences are expected to experience a noticeable (5 dBA or more) increase in the existing "Cumulative Noise Level Excluding the Open Cut Project" as a result of the contribution from the Open Cut Operations.

Noise Assessment Criteria and Audibility

It should be noted that the noise assessment criteria (both intrusive and amenity) do not correspond to levels which would be inaudible. Rather, the noise assessment criteria correspond to a noise level which will generally be discernible from the ambient noise environment but at a level which would result in an "acceptable" level of impact.

Accordingly, at the majority of noise sensitive receivers surrounding the Open Cut Project, noise emissions from the Open Cut Project are likely to be audible either routinely or from time to time, noting that:

- residences in close proximity to the Open Cut Project but further from other mining operations are likely to clearly discern noise emissions from the Open Cut Project;
- residences between the Open Cut Project and other mining operations may be able to discern noise emissions from the Open Cut Project on some occasions and not others, but are likely to hear 'mine noise' at all times;
- residences in close proximity to other mining operations but further from the Open Cut Project are unlikely to discern noise emissions from the Open Cut Project; and

- it is typical for mine noise to be audible (on occasions) at residences within 5 km of a mining operation.

Issue 9

DECCW does not fully accept the approach presented in the NIA to assign receivers into noise management and noise affectation zones with respect to PSNL informed by the amenity criteria. Whilst DECCW does not become involved in determining affectation (acquisition) thresholds, DECCW does rely on Department of Planning (DoP) to manage impacts above levels that DECCW would normally license to. Therefore, it is logical that DECCWs upper EPL limits align with DoP acquisition approaches. **Table 3-2** outlines DECCWs recommended approach for assigning receivers into noise management and noise affectation zones, with the affectation zone representing levels that DECCW would not normally consider licensing to.

Table 3-2 Noise Management and Noise Affectation

Criteria	Noise Management Zone		Noise Affectation Zone
	Minor exceedance	Marginal exceedance	Significant exceedance
Intrusive	1-2 dB noise intrusive criteria	3-5 dB above intrusive criteria	>5 dB above intrusive criteria
Amenity	Where project related noise results in a total industrial noise exceeding the INP Table 2.1 acceptable noise level by up to 2 (dB)A)	Where project related noise results in a total industrial noise exceeding the INP Table 2.1 acceptable noise level by between 3 to 5 dB(A)	Where project related noise results in a total industrial noise exceeding the INP Table 2.1 maximum noise level

Response

It is noted that the DECCW does not prescribe an assessment methodology for the determination or allocation of amenity-derived Management and Affectation Zones whereas the methodology for assessing exceedance of the intrusive PSNLs is well established and consistent with that presented in DECCW's **Table 3-2**. Consequently a similar methodology for assessing exceedances of the amenity PSNLs had not been attempted prior to the Open Cut Project EA. Accordingly, in developing the methodology for assessing the potential noise impacts from the Open Cut Project, Heggies undertook an iterative evaluation of a number of potential amenity assessment methodologies, one of which included an assessment methodology similar to that proposed by the DECCW in **Table 3-2**.

The objectives of the amenity assessment methodology adopted by Heggies for the Open Cut Project NIA were that it:

- be relatively straightforward to implement;
- be relatively consistent with the approach applied in assessing intrusive PSNLs;
- ensure that there are no 'gaps' between zones;
- ensure that the range of noise levels within each zone is not too broad; and
- the threshold for the Noise Affectation Zone be determined with reference to the Maximum Amenity noise levels presented in the INP.

The ultimate amenity assessment methodology considered by Heggies and subsequently adopted for the Open Cut Project NIA is based on the Maximum Amenity PSNL for both the Affectation Zone and Management Zones. This methodology ensured the following outcomes.

- Straightforward to implement - only one amenity PSNL is required for each residence.
- Relatively consistent with the approach applied in assessing intrusive PSNLs – Affection Zone defined by a maximum threshold noise level and Management Zones (Minor and Marginal) based on a total 5 dBA range below the maximum threshold noise level.
- There are no ‘gaps’ between zones.
- The range of noise levels within the Management Zone is not too broad and, at 5 dBA, the range is consistent with the 5 dBA Management Zone range applied in assessing intrusive PSNLs.
- The threshold for the Noise Affection Zone is determined with reference to the Maximum Amenity noise levels presented in Table 2.1 of the INP, but with the application of the modifications specified in Table 2.2 of the INP. Applying the modification factors specified in Table 2.2 of the INP to arrive at the Amenity PSNL ensures that the total (cumulative) industrial noise level will not increase when above the Maximum Amenity noise levels presented in Table 2.1 of the INP.

Implementation of the amenity assessment methodology proposed by the DECCW in **Table 3-2** has the following outcomes.

- The threshold for the Noise Affection Zone is determined with reference to the Maximum Amenity noise levels presented in Table 2.1 of the INP.
- Application of the modifications specified in Table 2.2 of the INP would be used to derive the Acceptable and Maximum Amenity PSNLs to determine if the *“project related noise results in a total industrial noise exceeding the INP Table 2.1 acceptable noise level by up to 2 (dB)A”* for minor exceedance Noise Management Zone, *“project related noise results in a total industrial noise exceeding the INP Table 2.1 acceptable noise level by between 3 to 5 dB(A)”* for marginal exceedance Noise Management Zone and *“project related noise results in a total industrial noise exceeding the INP table 2.1 maximum noise level”* for Noise Affection Zone.
- The noise level range for any one residence within the minor exceedance Noise Management Zone is 0 dBA to 3 dBA.
- The noise level range for any one residence within the marginal exceedance Noise Management Zone is 2 dBA to 6 dBA.
- Between the minor exceedance Noise Management Zone and the marginal exceedance Noise Management Zone there is gap of 0 dBA to 3 dBA for any one residence.
- The noise level range for any one residence within the combined Noise Management Zone is 2 dBA to 10 dBA.
- An overly complicated assessment methodology with no practical difference in assessment outcomes (when compared to Heggies Assessment Methodology).

Table 3-3 compares the outcomes of the Heggies and the proposed DECCW Assessment Methodologies for the night-time Open Cut Project operations if the ‘gap’ in the amenity assessment methodology proposed by the DECCW in **Table 3-2** above is conservatively ‘filled’ by extending the lower threshold of the marginal exceedance Noise Management Zone down to the upper threshold of the minor exceedance Noise Management Zone.

Table 3-3 Comparison of outcomes between Heggies and DECCW methodologies for night-time Open Cut Project operations

Noise Assessment Group (NAG)	Residence Reference	Landowner's Name	INP Acceptable / Maximum Amenity Criteria	Acceptable Amenity PSNL	Maximum Amenity PSNL	Open Cut Project - Noise Emission Level ^{1,2,3}	
						Heggies Method	DECCW Method
1	80	G Donnellan	40 / 45	33	41	38 ⁵	38 ⁵
3	87	B & R Richards	40 / 45	32	42	43 ⁶	43 ⁶
	106	B & R Richards	40 / 45	32	43	43 ⁶	43 ⁶
4	88	M & T De Jong	40 / 45	32	43	35 ⁴	35 ⁴
	91	T & D Olofsson	40 / 45	32	43	36 ⁴	36 ⁴
	94	L & S Foord	40 / 45	32	43	35 ⁴	35 ⁴
	95	J & T Clarke	40 / 45	32	43	35 ⁴	35 ⁴
	96	S J Robertson	40 / 45	32	43	36 ⁴	36 ⁴
	99	A J Bennett	40 / 45	32	43	33	33
	100	C L Stapleton	40 / 45	32	43	33	33
	105	J & G McInerney	40 / 45	32	43	37 ⁵	37 ⁵
5	161	V Lopes	40 / 45	32	43	36 ⁴	36 ⁴
	103	S Turner	40 / 45	32	43	31	31
	104	Church Property - Diocese of Newcastle	40 / 45	32	43	33	33
	111	T Burgess	40 / 45	32	43	43 ⁵	43 ⁵
	112	S & C Ernst	40 / 45	32	43	41 ⁴	41 ⁴
	118	B & R Richards	40 / 45	32	43	38	38
	120	M & J Chisholm	40 / 45	32	43	37	37
	121	A Nowland; E Moore; J Dunn	40 / 45	32	43	35	35
	123	C Standing	40 / 45	32	43	34	34
	125	R M Lethbridge	40 / 45	32	43	35	35
	126	R & C Bailey	40 / 45	32	43	34	34
	129	N & M Smiles	40 / 45	34	44	37	37
	139	M Eveleigh, K	40 / 45	32	43	32	32

Noise Assessment Group (NAG)	Residence Reference	Landowner's Name	INP Acceptable / Maximum Amenity Criteria	Acceptable Amenity PSNL	Maximum Amenity PSNL	Open Cut Project - Noise Emission Level ^{1,2,3}	
						Heggies Method	DECCW Method
		Penfold & R Eveleigh					
	154	M & M Beasley	40 / 45	32	43	39	39
	156	R Ninness	40 / 45	32	43	39	39
	157	K & D Miller	40 / 45	32	43	37	37
	159	M Peachey	40 / 45	32	43	38	38
6	132	W H Bowman; M Bowman; W G Bowman; G R Elder	40 / 45	36	45	34	34
	133	A Bowman	40 / 45	36	45	32	32
	137	A Bowman	40 / 45	37	45	31	31
7	108	I M Tisdell	40 / 45	32	43	48 ⁶	48 ⁶
	109	I M Tisdell	40 / 45	32	43	49 ⁶	49 ⁶
	110	G J Hall	40 / 45	32	43	48 ⁶	48 ⁶
	153 "Dulwich"	R & D Hall	40 / 45	35	37	50 ⁶	50 ⁶
8	142	Singleton Heights (township)	40 / 45	38	45	24	24
9	2	Singleton Council	40 / 45	37	45	33	33
	3	Christopher Ross Whiting	40 / 45	37	45	35	35
	4	Leonard Cox	40 / 45	37	45	35	35
	143	G Pitt	40 / 45	37	45	31	31
	144	W & H Huls	40 / 45	37	45	32	32
	145	A & S Murray	40 / 45	37	45	32	32
	146	R & A Howard	40 / 45	37	45	31	31
	147	S Farrugia	40 / 45	37	45	32	32
	148	D & L Mellows	40 / 45	37	45	31	31
	149	R & L Gulliver	40 / 45	37	45	29	29
	150	R Bourke	40 / 45	37	45	32	32
	151	C & T Wallace	40 / 45	37	45	32	32

Noise Assessment Group (NAG)	Residence Reference	Landowner's Name	INP Acceptable / Maximum Amenity Criteria	Acceptable Amenity PSNL	Maximum Amenity PSNL	Open Cut Project - Noise Emission Level ^{1,2,3}	
						Heggies Method	DECCW Method
	152	K & J Badior	40 / 45	37	45	32	32
10	5	Darren Philip Cox	40 / 45	37	45	36 ⁴	36 ⁴
	6	W G Cox	40 / 45	37	45	37 ⁵	37 ⁵
	8	D K Geelan	40 / 45	37	45	38 ⁵	38 ⁵
	9	W & N Pendered	40 / 45	34	44	38 ⁵	38 ⁵
	10	E & B Kleinman	40 / 45	34	44	37 ⁵	37 ⁵
	11	F Ferraro	40 / 45	37	45	37 ⁵	37 ⁵
	13	P & K Russell	40 / 45	36	45	39 ⁵	39 ⁵
11	7	N J Smith	40 / 45	37	45	35	35
	12	W Garland	40 / 45	38	45	36	36
	14	M Hoggan	40 / 45	37	45	38 ⁴	38 ⁴
	15	G & J Barnett	40 / 45	37	45	36	36
	16	A Lambkin	40 / 45	36	45	38 ⁴	38 ⁴
	17	W Cooper	40 / 45	37	45	32	32
	18	W & G Cooper	40 / 45	37	45	29	29
	19	S Andrews	40 / 45	37	45	33	33
	20	A Garvie	40 / 45	37	45	32	32
	21	S Andrews	40 / 45	37	45	32	32
12	50	D & M Bridge	40 / 45	32	43	32	32
	51	M & S Boyce	40 / 45	32	43	31	31
	52	B & J Moran	40 / 45	32	43	27	27
	53	K & J Badior	40 / 45	32	43	32	32
	54	G Holmes	40 / 45	32	43	33 ⁴	33 ⁴
	55	TBC ³	40 / 45	32	43	28	28
	56	B & D Wilson	40 / 45	32	43	30	30
	57	TBC ³	40 / 45	32	43	32	32
	62	D Moran	40 / 45	32	43	34 ⁴	34 ⁴
A	22	S Andrews	40 / 45	37	45	32	32
	23	R & K Bell	40 / 45	36	45	33	33
	24	G Lambkin	40 / 45	37	45	28	28
	25	J & C Whitney	40 / 45	37	45	30	30
	26	B & R Frazer	40 / 45	37	45	29	29

Noise Assessment Group (NAG)	Residence Reference	Landowner's Name	INP Acceptable / Maximum Amenity Criteria	Acceptable Amenity PSNL	Maximum Amenity PSNL	Open Cut Project - Noise Emission Level ^{1,2,3}	
						Heggies Method	DECCW Method
	27	D Hamilton	40 / 45	37	45	29	29
	28	D Hamilton	40 / 45	37	45	28	28
	29	D Cope	40 / 45	36	45	30	30
	30	A Cox	40 / 45	37	45	30	30
	31	D Kacunic & C Jensen	40 / 45	36	45	30	30
	32	TBC ³	40 / 45	36	45	30	30
	34	T & G Breen	40 / 45	36	45	31 ⁴	31 ⁴
	35	R & W Gardner	40 / 45	34	44	30 ⁴	30 ⁴
	36	D Baker	40 / 45	36	45	29	29
	37	Helen Leila May Castledine	40 / 45	34	44	22	22
	38	M & R Porter	40 / 45	34	44	30	30
	39	E & J Upward	40 / 45	34	44	21	21
	40	E & J Upward	40 / 45	34	44	21	21
	41	H M Upward & Sons	40 / 45	34	44	21	21
	42	J A Welsh	40 / 45	32	43	30	30
	43	Deidre Margaret Kay	40 / 45	34	44	31	31
C	47	B & R Cherry	40 / 45	32	43	32	32
	63	J & M Moore	40 / 45	32	43	34 ⁴	34 ⁴
	64	W & A Gardner	40 / 45	32	43	35 ⁵	35 ⁵
D	44	G & K Cheetham	40 / 45	34	44	30	30
	48	G & K Cheetham	40 / 45	32	43	29	29
	49	G & K Cheetham	40 / 45	32	43	32	32
F	65	P Hedges	40 / 45	32	42	32	32
	66	P Hedges	40 / 45	32	43	31	31
	67	G M Watson	40 / 45	32	42	32	32
	68	S J McInerney	40 / 45	32	42	35	35
	71	A C Noble	40 / 45	33	41	37	37
	72	A Noble	40 / 45	33	41	37 ⁴	37 ⁴

Noise Assessment Group (NAG)	Residence Reference	Landowner's Name	INP Acceptable / Maximum Amenity Criteria	Acceptable Amenity PSNL	Maximum Amenity PSNL	Open Cut Project - Noise Emission Level ^{1,2,3}	
						Heggies Method	DECCW Method
	73	A Noble	40 / 45	33	41	37	37
	76	A Noble	40 / 45	33	41	38	38

Note 1: Levels shown in **bold and red** indicates that the residence would be assigned to the Noise Affection Zone.

Note 2: Levels shown in **bold and blue** indicates that the residence would be assigned to the Marginal exceedance Noise Management Zone (as defined by the DECCW).

Note 3: Levels shown in **bold and black** indicates that the residence would be assigned to the Minor exceedance Noise Management Zone (as defined by the DECCW).

Note 4: Residence is also identified as being in the Minor Noise Management Zone (as defined by the DECCW) due to the intrusive noise emissions from the Open Cut Project Operations.

Note 5: Residence is also identified as being in the Marginal Noise Management Zone (as defined by the DECCW) due to the intrusive noise emissions from the Open Cut Project Operations.

Note 6: Residence is also identified as being in the Noise Affection Zone due to the intrusive noise emissions from the Open Cut Project Operations.

The differences in the outcomes of the two assessment methodologies are summarised as follows.

- There is no difference in residences assigned to the Noise Affection Zone.
- The DECCW's Assessment Methodology assigns four residences within NAG F (Residences 71, 72, 73 and 76) and one residence within NAG 1 (Residence 80) to the marginal exceedance Noise Management Zone. However, it is noted that the noise contribution from the Open Cut Project is 5 dBA to 6 dBA lower than the noise contribution from other mining operations at these residences (refer to the noise emission level contributions presented in columns 5 and 7 of the table included in Heggies' response to **Issue 8**).
- The DECCW's Assessment Methodology assigns 25 additional residences to the Minor exceedance Noise Management Zone (when compared to Heggies Assessment Methodology). However, there is no practical change in the assessment or regulatory outcome for these residences.

In view of the above, Heggies considers the assessment methodology adopted in the NIA to be the most appropriate methodology currently identified for assessing the potential noise impacts from the Open Cut Project.

It is also noted that the DECCW accepts the assessment against both the amenity and intrusive PSNLs undertaken in the NIA and that the more stringent of the two criteria will be the controlling criterion at each residence.

Assessment Process

Issue 10

The INP requires that feasible and reasonable noise mitigation measures be considered to attempt to satisfy the PSNL. In this case, approximately 25 sensitive receivers are predicted to exceed the night-time intrusive criteria and 40 sensitive receivers are predicted to exceed the night-time amenity criteria. Given the number of receivers predicted to exceed the PSNL, the assessment of feasible and reasonable noise mitigation measures needs to be rigorous in order to satisfy regulatory authorities that the predicted levels are the best achievable outcome. The NIA provides limited text on page 45 relating to Noise Mitigation Measures.

Additional and detailed justification is required to demonstrate that all “feasible” mitigation measures have been identified and considered, and that those measures found to be “reasonable” have been included in the noise modelling, and committed to as part of the project.

Response

The predictive modelling involved the investigation of feasible and reasonable noise mitigation measures, particularly in relation to the night-time operations. These mitigation measures were assumed to be implemented for the purposes of the predictive modelling. A number of iterative steps were taken to develop the noise mitigation measures for the Open Cut Project, as follows.

- Preliminary noise modelling of scenarios representative of the maximum noise emissions from the Open Cut Project to identify areas of noise management and noise affectation - where it was apparent that an unacceptably high number of residences would be assigned to the Noise Affectation Zone.
- Consideration of limiting operational hours to the daytime and evening periods, 7 days per week. This potential measure, though feasible, was not considered reasonable for a number of operational and hence economic reasons including the following.
 - 1) No night-time operations would reduce the annual production output by approximately 36% from that achievable from the same equipment and 24/7 operations.
 - 2) As the Integra Open Cut operations exhibit a high proportion of fixed costs, a reduced annual output would result in the cash flow from capital being generated over a longer period. This, in turn, would have an adverse impact on the Project's Net Present Value (NPV) to the point where it no longer satisfied the criteria for Project viability; the Project would not receive the required capital funding to proceed and the mining operations at the Integra Open Cut would have to be terminated. The environmental, social and economic consequences of this outcome, ie not proceeding, are described in EA.
- Consideration of various combinations of noise management and mitigation measures to assess their relative effectiveness, followed by ICO's adoption of the feasible and reasonable noise management and mitigation measures to appreciably reduce noise emissions associated with the Open Cut Project.

Noise Mitigation

- Source Noise Control - a comprehensive plant noise investigation to determine the current lowest demonstrated 'achievable' and maintainable plant sound power levels, including consultation with the acoustic consultants and mine operators of Mt Arthur Coal Mine and Bengalla Coal Mine operations.

- The DECCW notes in **Issue 13** that “the sound power levels used appear reasonable”.

Noise Management

- Noise Propagation Control - effects of mine planning and operations on minimising noise emissions, including haul road positioning to minimise grades and hence noise from trucks under maximum power; preferentially positioning north-south haul roads to east of the active mining area (i.e. away from the nearest residences); bunding of the western haul road; pit design to minimize haul distances and to enable the earliest feasible dumping of overburden within the Extended Pit.
- Receiver Noise Control – ICO is committed to the process of negotiated arrangements with individual landowners and the implementation of receiver/dwelling based noise controls in accordance with agreed project approval conditions.

Sleep Disturbance Criteria

Issue 11

The NIA acknowledges the current screening level sleep disturbance assessment criteria contained in the “Application Notes - NSW Industrial Noise Policy”. However, a specific and quantitative assessment of the potential for sleep disturbance has not been undertaken on the basis that; “A review of noise events from comparable coal mining operations shows that the LA1(1minute) levels from mobile equipment (i.e. dozers, haul trucks, trains etc) are typically no greater than 10 dB(A) above the LAeq(15minute),dB(A) intrusive level”.

This approach essentially suggests that sleep disturbance assessments are not required for mining activities. DECCW does not accept this position and recommends that the screening levels sleep disturbance criteria are applied as recommended limits.

Response

Heggies disagrees with the DECCW’s “suggestion” in relation to this matter. To the contrary, the approach adopted in the NIA enables the noise assessment process to focus on the setting and impact assessment of INP-based intrusive noise and amenity levels which aim to minimise annoyance at noise sensitive receiver locations.

The INP does not specifically address sleep disturbance from high noise level events. The DECCW’s INP Application Notes suggests the use of the NSW Environmental Criteria for Road Traffic Noise (ECRTN 1999, Appendix B Section B5) sleep disturbance criterion of the LA1(60second) not exceeding the **prevailing ambient LA90(15minute) at the time** by more than 15 dBA as a guide to identify the likelihood of sleep disturbance. It should be noted, however, that the **prevailing ambient LA90(15minute) at the time** is likely to be appreciably higher than the background noise level (in the absence of the Project).

Furthermore, the ECRTN’s review of sleep disturbance research concludes that:

- (i) the maximum *internal* noise levels below 50 dBA to 55 dBA are unlikely to cause awakening reactions; and
- (ii) one or two noise events per night, with maximum internal noise level of 65 dBA to 70 dBA, are not likely to affect health and wellbeing significantly.

As consent and licence conditions generally include external noise levels, an internal noise level can be conservatively transposed to an external noise level by adding 10 dBA to the measured or predicted noise level (or 12.5 dBA when assessed 1m from the dwelling facade).

It follows, that a **conservative external** LA1(60second) free field noise limit of 50 dBA to 55 dBA would be consistent with the DECCW's research in relation to this matter.

Meteorological Conditions

Issue 12

An assessment of existing wind and inversion conditions was undertaken based on meteorological information from the Camberwell Mine Weather Station for the period 2001-2004. The assessment has indicated that light winds (0.5-3 m/s) are not a significant feature of the area in accordance with the guidelines in the INP.

The assessment has demonstrated that temperature inversions are a significant feature of the area, i.e. greater than 30% of winter nights. Therefore temperature inversions have been included in the noise modelling. However a 2 m/s drainage wind flow has not been included in the modelling of inversion conditions on the basis that light winds are not a significant feature of the area for winter nights.

The noise limits that DECCW are likely to recommend will apply under all meteorological condition except for any one of the following:

- (a) Wind speeds greater than 3 m/s at 10 metres above ground level; or*
- (b) Stability category F temperature inversion conditions and wind speeds greater than 2 m/s at 10 metres above ground level; or,*
- (c) Stability category G temperature inversion conditions.*

Therefore the proponent will need to revise its predictive noise assessment to include the following meteorological conditions:

- 3m/s source to receiver winds; and*
- F stability class at night with a 2 m/s source to receiver wind.*

DECCW Meeting Clarification

It was agreed that remodelling and assessment under the default (and non-prevailing) weather conditions was not required, however, the DECCW requested additional analysis of the weather data set obtained from the adjoining Ashton Coal Mine operation as a mechanism to confirm (or otherwise) the finding in the Open Cut Project NIA that light winds (0.5 m/s to 3 m/s) are not a significant feature of the Project Area as determined in accordance with the guidelines in the INP.

Response

Additional Weather Analysis

Heggies conducted an assessment of the historical wind conditions recorded at the ICO onsite meteorological station which is located approximately at the centre of the proposed Open Cut Project mining operations. The assessment was guided by the Quadrant Wind Velocity Analysis Method specified in both ISO 9613-1:1993 "Acoustics - Attenuation of sound during propagation outdoors - Part 1: Calculation of the absorption of sound by the atmosphere" and ISO 1996-2:2007 "Acoustics - Description, measurement and assessment of environmental noise - Part 2: Determination of environmental noise levels". The Quadrant Wind Velocity Analysis Method considers all wind within $\pm 45^\circ$ of each of the 16 compass directions. The wind data was analysed to determine the frequency of occurrence of winds considered relevant for assessing potential noise impacts in accordance with the DECCW's INP for each of the four seasons and for each assessment period (day, evening and night). The assessment found

that wind conditions between 0.5 m/s and 3 m/s (light winds) are not a significant feature of the Open Cut Project Area in accordance with the DECCW's INP, where a light wind is considered to be a significant feature of the area if it occurs for a significant period of time (ie greater than 30% of any one assessment period during any one season).

The Ashton weather data set was processed by PAEHolmes using a Vector Method and subsequently included in a recent noise assessment undertaken by Spectrum Acoustics Pty Limited. The Ashton weather station is located on an exposed NE-SW trending ridgeline to the south of the existing Ashton mining operations and immediately to the northwest of Camberwell Village, and adjacent to Glennies Creek Road. The Vector Method employed by PAEHolmes considers wind speeds up to 5 m/s and wind directions within $\pm 67.5^\circ$ for each of the 16 compass directions. Note, the Vector Method utilised by PAEHolmes does not determine the actual 'vector' components of the wind but simply broadens the scalar velocity inclusion level to up to 5 m/s for winds within a $\pm 78.75^\circ$ sector of the direction being considered. Further, the winds are analysed on a seasonal basis with no separation into the day, evening and night periods. The assessment identified significant wind conditions from N, NE, ENE, E, ESE, SE, SSE, S, SW, WSW and W, with the highest percentage of winds from the SSE.

An assessment of the Ashton weather data set using the Quadrant Wind Velocity Analysis Method advocated by Heggies produced wind trends comparable to those shown using the PAEHolmes Vector Method. The Heggies method tended to show higher frequencies of occurrence for individual periods (day, evening or night) by comparison with the PAEHolmes Vector Method did for the entire 24-hour day. In addition, the range of significant wind directions was not as broad using the Heggies method, for example, during summer the Heggies method found significant wind conditions from the E, ESE, SE and SSE, whereas the PAEHolmes Vector Method found significant wind conditions from the NE, ENE, E, ESE, SE, SSE and S. The reason that the PAEHolmes Vector Method identifies a broader range of significant wind directions is due to the different weather data set considered in the analysis ie the weather data set includes a larger range of wind speeds (up to 5 m/s) and a broader wind direction sector ($\pm 78.75^\circ$) for each compass direction.

Advitech undertook analysis of the Glendell weather station data as part of the Noise Impact Assessment for the Mt Owen Operation Project. The assessment found significant wind conditions from N, E, SE, S, W and NW, with the highest percentage of winds from the N.

A review of the findings presented in the studies referenced above confirms that:

- where the project site is not located near any dominant topographical feature(s) the prevailing Hunter Valley northwest and southeast winds will also be significant at the project site; and
- where the project site is located near any dominant topographical feature(s) the prevailing Hunter Valley northwest and southeast winds may or may not be significant at the project site, other wind directions may be significant at the project site or no wind directions may be significant at the project site.

With particular reference to the Ashton weather station, the following dominant topographical features would influence the local prevailing weather conditions.

- The NE-SW trending ridgeline on which the weather station is located.
- The 'basin' of Camberwell Village to the southeast of the weather station.
- The E-W trending Ashton waste emplacement immediately to the northeast of the weather station.
- The NE-SW trending valley to the south of the weather station.
- The open Hunter Valley river plain to the southwest of the weather station.
- The NW-SE trending valley to the east of the weather station (and Camberwell Village).

It is apparent that these dominant topographical features cause a high occurrence of significant winds which correspond to the various 'funnelling' effects on the prevailing Hunter Valley northwest and southeast winds.

The Open Cut Project Site, however, receives significant shielding from the prevailing Hunter Valley northwest and southeast winds offered by the significant NW-SE ridgeline running parallel to the New England Highway from the Singleton Heights to Camberwell Village. The effect being that the broader Hunter Valley prevailing winds are reduced at the Open Cut Project Area and consequently results in no occurrence of significant winds at the Open Cut Project Area.

The above review confirms that the finding of no significant wind conditions in the Open Cut Project NIA is not a function of analysis methodology. Rather, it shows that the occurrence, or otherwise, of significant wind conditions are significantly influenced by local site topography.

In all cases, the wind measured at the source would be the most pertinent measurement location for determining the effects of wind on noise propagation. Accordingly, the ICO onsite weather station was the most appropriate source of weather data and consequently was used in the Open Cut Project NIA for determining the significant weather conditions relevant to the Open Cut Project.

DECCW's Recommended Noise Conditions

Further to light winds not being a significant feature of the area during winter nights, the Open Cut Project source to receiver drainage-flow winds would not develop due to the receivers either being at higher elevations than the operating plant and equipment and/or intervening topography which prevent the formation of source to receiver drainage-flow winds. Particular consideration was given to the Camberwell Village which consists of residences which are at lower elevation than some of the proposed operating elevations of plant and equipment on the Open Cut Project, however, easterly winds were found not be significant during the winter night-time period and further the intervening significant topography (forming part the B & R Richards land holdings in NAG 3) would prevent Open Cut Project source to receiver drainage-flow winds from occurring.

Also, the NIA was prepared in accordance with the procedures specified in the DECCW's INP. Accordingly, the licence and consent noise limits should be determined with reference to the predicted noise emission levels presented in the NIA and this response together with the corresponding atmospheric conditions under which the noise limits apply.

In accordance with INP Chapter 9 Consent/Licence Conditions which states - the agreed (noise) limits in the Consent or Licence apply under the meteorological conditions determined by the policy to be relevant to the assessment site – we believe the recommended noise limits apply under all meteorological conditions except for any one of the following:

- a) Wind speeds greater than 0.5 m/s at 10 metres above ground level; or
- b) Stability category F temperature inversion conditions and wind speeds greater than 0.5 m/s at 10 metres above ground level; or,
- c) Stability category G temperature inversion conditions.

Predicted Noise Levels and Impacts

Issue 13

Noise modelling has been undertaken using suitable noise modelling software; “Environmental Noise Model” (ENM) produced by RTA Technology. The noise modelling has looked at two basic mining scenarios identified as part pit (without Dulwich) and full pit (with Dulwich). The following operational scenarios were further considered for each mining scenario.

- *Part Pit: Part Pit Year 3 and Part Pit Year 6.*
- *Full Pit: Full Pit Year 1, Full Pit Year 4, Full Pit Year 6 and Full Pit Year 8.*

Although DECCW has not undertaken a detailed assessment of the noise modelling for this proposal, the following basic checks were however performed;

- *The sound power levels used appear reasonable, and in some cases conservatively high (see NIA Table 2).*
- *The placement of noise sources in the model does not appear to be unreasonable. DECCW notes that in early operating stage scenarios, that plant has been located on the surface to represent a reasonable worst case (see NIA (**Appendix A**), Appendix E).*
- *DECCW is however concerned that no operating stage scenarios have included the operation of locomotives (train sets) when operating off the NSW Rail network, and within the project area. DECCW recommends that the proponent be required to amend the modelling scenarios to include train operating/loading activities.*
- *The noise modelling has been limited to the open cut extension area. Noise emissions for the remainder of the project have been taken from the North Open Cut (Glennies Creek) EA. DECCW's review of the Glennies Creek EA included the following;*
- *“The text in the NIA indicates that the operational noise modelling includes the Camberwell CHPP and the rail load out facility. However the diagram in Appendix B5 -“Noise Emission Sources” does not show noise sources at the CHPP or the rail load out facility. DECCW has undertaken the assessment on the basis that all noise sources identified in the NIA have been considered i.e. consistent with the text”.*
- *Revised modelling of the project is required before the predicted noise levels can be used to assess the impacts of the proposal, and develop recommended noise limits.*

Response

- All sound power levels used in the NIA represent the current lowest demonstrated ‘achievable’ and maintainable plant sound power levels.
- The operation of the locomotives and train loading activities were included in the noise modelling, however, the locomotives were inadvertently not indicated on the operational scenario drawings presented Appendix E of the NIA. Appendix E of the NIA has been revised to include the train loading operation and is included in the revised NIA provided as **Appendix A**.
- The noise modelling results presented in the NIA includes the noise emission contribution from all acoustically significant plant and equipment proposed to be in operation on the Open Cut Project, including CHPP and rail loadout facility.

Blast Vibration and Overpressure

Issue 14

The predicted blast emission levels are likely to significantly exceed DECCW blast criteria in NAG 7. However the residences in NAG 7 are within the noise affectation zone for operational noise, and are therefore likely to be subject to an offer of acquisition.

The NIA indicates that; “due to blasting restrictions imposed by ARTC when blasting in the vicinity of the Main Northern Railway Line (typically permitted on one day per fortnight only), a maximum of five blasts per day may be required during the scheduled track possessions or as a consequence of extended adverse weather conditions”.

The ANZECC guidelines recommend that blasting generally be limited to once per day. However the constraints noted in the EA, such as the need for a main line track possession, the frequency that track possessions may be granted, the limited window of opportunity that a track possession provides and the increased potential for weather to be an issue when the opportunity to blast is constrained by these other factors, may represent compelling arguments for alternative blast frequency requirements.

It is recommended that Integra be invited to supply additional justification to support blast frequencies of greater than once per day, and that they also be invited to provide conceptual measures to mitigate/ manage impacts associated with multiple blasts per day.

Response

A response to this issue has been prepared by ICO and is presented in **Section 3.5.2**.

3.5.1.3 Summary of Noise Emission Levels

In order to assist in setting noise limits for the Open Cut Project, presented in **Table 3-4** is a summary of the highest predicted intrusive and amenity noise emission levels from Open Cut Project. Note these emissions have been predicted under the weather conditions determined to be relevant to the Open Cut Project Area, namely:

- Daytime - wind speeds of up to 0.5 m/s at 10 m above the ground
- Evening - wind speeds of up to 0.5 m/s at 10 m above the ground
- Night-time - wind speeds of up to 0.5 m/s at 10 m above the ground and temperature inversion conditions of up to 3°C/100 m

Table 3-4 Summary of the highest predicted intrusive and amenity noise emission levels from Open Cut Project

Noise Assessment Group (NAG)	Residence Reference	Landowner's Name	Predicted LAeq(15minute) Intrusive Noise Emissions			Predicted LAeq(period) Noise Amenity Emissions		
			Day	Evening	Night	Day	Evening	Night
1	80	G Donnellan	34	35	41	31	32	38
3	87	B & R Richards	41	42	46	38	39	43
	106	B & R Richards	40	41	46	37	38	43
4	88	M & T De Jong	28	28	38	25	25	35
	91	T & D Olofsson	29	30	39	26	27	36
	94	L & S Foord	27	28	38	24	25	35
	95	J & T Clarke	29	30	39	26	27	36

Noise Assessment Group (NAG)	Residence Reference	Landowner's Name	Predicted LAeq(15minute) Intrusive Noise Emissions			Predicted LAeq(period) Noise Amenity Emissions		
			Day	Evening	Night	Day	Evening	Night
	96	S J Robertson	31	32	40	28	29	37
	99	A J Bennett	27	27	37	24	24	34
	100	C L Stapleton	26	27	37	23	24	34
	105	J & G McInerney	29	30	40	26	27	37
	161	V Lopes	31	32	40	28	29	37
5	103	S Turner	26	26	34	23	23	31
	104	Church Property - Diocese of Newcastle	26	26	36	23	23	33
	111	T Burgess	40	41	47	37	38	44
	112	S & C Ernst	36	37	44	33	34	41
	118	B & R Richards	33	33	41	30	30	38
	120	M & J Chisholm	33	34	40	30	31	37
	121	A Nowland; E Moore; J Dunn	29	29	38	26	26	35
	123	C Standing	26	26	37	23	23	34
	125	R M Lethbridge	29	29	38	26	26	35
	126	R & C Bailey	27	27	37	24	24	34
	129	N & M Smiles	30	31	40	27	28	37
	139	M Eveleigh, K Penfold & R Eveleigh	22	23	35	19	20	32
	154	M & M Beasley	36	36	42	33	33	39
	156	R Ninness	35	36	42	32	33	39
	157	K & D Miller	33	34	40	30	31	37
	159	M Peachey	33	33	41	30	30	38
6	132	W H Bowman; M Bowman; W G Bowman; G R Elder	25	25	37	22	22	34
	133	A Bowman	24	24	36	21	21	33
	137	A Bowman	20	20	34	17	17	31
7	108	I M Tisdell	48	49	52	45	46	49
	109	I M Tisdell	49	50	54	46	47	51
	110	G J Hall	47	48	53	44	45	50
	153 "Dulwich"	R & D Hall	51	51	53	48	48	50
8	142	Singleton Heights (township)	16	16	27	13	13	24
9	2	Singleton Council	29	30	36	26	27	33
	3	Christopher Ross Whiting	27	28	38	24	25	35
	4	Leonard Cox	28	29	38	25	26	35
	143	G Pitt	18	19	34	15	16	31
	144	W & H Huls	20	21	35	17	18	32
	145	A & S Murray	21	21	35	18	18	32

Noise Assessment Group (NAG)	Residence Reference	Landowner's Name	Predicted LAeq(15minute) Intrusive Noise Emissions			Predicted LAeq(period) Noise Amenity Emissions		
			Day	Evening	Night	Day	Evening	Night
	146	R & A Howard	19	20	34	16	17	31
	147	S Farrugia	20	21	35	17	18	32
	148	D & L Mellows	20	21	34	17	18	31
	149	R & L Gulliver	21	21	32	18	18	29
	150	R Bourke	21	22	35	18	19	32
	151	C & T Wallace	21	22	35	18	19	32
	152	K & J Badior	24	25	35	21	22	32
10	5	Darren Philip Cox	30	30	39	27	27	36
	6	W G Cox	30	31	40	27	28	37
	8	D K Geelan	31	31	41	28	28	38
	9	W & N Pendered	30	30	41	27	27	38
	10	E & B Kleinman	29	30	40	26	27	37
	11	F Ferraro	30	30	40	27	27	37
	13	P & K Russell	31	32	42	28	29	39
11	7	N J Smith	30	30	38	27	27	35
	12	W Garland	29	30	39	26	27	36
	14	M Hoggan	31	32	41	28	29	38
	15	G & J Barnett	30	31	39	27	28	36
	16	A Lambkin	31	32	41	28	29	38
	17	W Cooper	27	28	35	24	25	32
	18	W & G Cooper	27	28	32	24	25	29
	19	S Andrews	34	35	36	31	32	33
	20	A Garvie	36	37	35	33	34	32
	21	S Andrews	36	37	35	33	34	32
12	50	D & M Bridge	31	32	35	28	29	32
	51	M & S Boyce	31	32	34	28	29	31
	52	B & J Moran	28	29	30	25	26	27
	53	K & J Badior	30	31	35	27	28	32
	54	G Holmes	32	32	36	29	29	33
	55	TBC	29	30	31	26	27	28
	56	B & D Wilson	29	30	33	26	27	30
	57	TBC	29	30	35	26	27	32
	62	D Moran	33	34	37	30	31	34
A	22	S Andrews	36	37	35	33	34	32
	23	R & K Bell	36	37	36	33	34	33
	24	G Lambkin	30	30	31	27	27	28
	25	J & C Whitney	31	32	33	28	29	30
	26	B & R Frazer	30	31	32	27	28	29
	27	D Hamilton	29	31	32	26	28	29
	28	D Hamilton	26	27	31	23	24	28
	29	D Cope	28	29	33	25	26	30
	30	A Cox	32	33	33	29	30	30
	31	D Kacunic & C Jensen	35	36	33	32	33	30

Noise Assessment Group (NAG)	Residence Reference	Landowner's Name	Predicted LAeq(15minute) Intrusive Noise Emissions			Predicted LAeq(period) Noise Amenity Emissions		
			Day	Evening	Night	Day	Evening	Night
	32	TBC	36	37	33	33	34	30
	34	T & G Breen	38	39	34	35	36	31
	35	R & W Gardner	38	39	33	35	36	30
	36	D Baker	28	28	32	25	25	29
	37	Helen Leila May Castledine	23	24	25	20	21	22
	38	M & R Porter	28	29	33	25	26	30
	39	E & J Upward	24	25	24	21	22	21
	40	E & J Upward	23	23	24	20	20	21
	41	H M Upward & Sons	18	18	24	15	15	21
	42	J A Welsh	29	30	33	26	27	30
	43	Deidre Margaret Kay	33	34	34	30	31	31
C	47	B & R Cherry	34	35	35	31	32	32
	63	J & M Moore	32	33	37	29	30	34
	64	W & A Gardner	33	34	38	30	31	35
D	44	G & K Cheetham	32	33	33	29	30	30
	48	G & K Cheetham	30	30	32	27	27	29
	49	G & K Cheetham	31	32	35	28	29	32
F	65	P Hedges	33	34	35	30	31	32
	66	P Hedges	33	34	34	30	31	31
	67	G M Watson	33	34	35	30	31	32
	68	S J McInerney	36	37	38	33	34	35
	71	A C Noble	38	39	40	35	36	37
	72	A Noble	38	39	40	35	36	37
	73	A Noble	39	40	40	36	37	37
	76	A Noble	38	39	41	35	36	38

3.5.2 Blasting

Comment

The predicted blast emission levels are likely to significantly exceed DECCW blast criteria in NAG 7. However the residences in NAG \ 7 are within the noise affectation zone for operational noise, and are therefore likely to be subject to an offer of acquisition.

The NIA indicates that; “due to blasting restrictions imposed by ARTC when blasting in the vicinity of the Main Northern Railway Line (typically permitted on one day per fortnight only), a maximum of five blasts per day may be required during the scheduled track possessions or as a consequence of extended adverse weather conditions”.

The ANZECC guidelines recommend that blasting generally be limited to once per day. However the constraints noted in the EA, such as the need for a main line track possession, the frequency that track possessions may be granted, the limited window of opportunity that a track possession provides and the

increased potential for weather to be an issue when the opportunity to blast is constrained by these other factors, may represent compelling arguments for alternative blast frequency requirements.

It is recommended that Integra be invited to supply additional justification to support blast frequencies of greater than once per day, and that they also be invited to provide conceptual measures to mitigate/manage impacts associated with multiple blasts per day.

Response

Drilling and blast designs within the westerly extension to the existing South Pit (the Mine Area) would be aimed at optimizing fragmentation of the overburden while protecting surrounding sensitive receivers and infrastructure, including culturally sensitive sites. Blast size and frequency would continue as currently practised, with multiple blasts per weekday an imperative for the ongoing success of the operation. Any restrictions on blast frequency from that proposed will necessitate an increase in blast size to maintain sufficient blasted ground with the associated potential for noise and vibration issues. Blasting is only undertaken infrequently on Saturdays due to crew rostering and, in accordance with the conditions within DA 86/2889 and EPL 3390, not on Sundays or public holidays.

As the proposed Pit is a down dip extension of the Existing South Pit, it is characterised by up to six 10 - 40 metre intervals of overburden and interburden across the deposit, with up to twenty thinner interburden layers (partings) stacked vertically from the surface to the base of the mining horizon. In general, all overburden and interburden requires blasting (including interburden plies to a thickness of 0.7m) due to the hard nature of the rock and the OH&S issues associated with ripping by bulldozers and, depending on the thickness of the blasted interval, would be removed by electric shovel, excavators and/or front-end loaders and loaded into 190 tonne capacity rear dump trucks. Integra operates a fleet of 23 dump trucks at any one time.

The thin (<2m) partings blasts are generally small in area, occur in several locations within the pit at the same time and may require multiple daily shots to produce sufficient blasted material to maintain ROM coal production at the required levels. To meet budgeted production requirements and maintain the operation's economic viability, it is imperative that a large enough inventory of blasted ground (both in terms of volume and work area) is available to efficiently use both the digging equipment and dump trucks. However, within an area such as the existing South Pit and the planned Extended South Pit, the actual areas available for advance drilling and blasting are limited by virtue of the requirement for multiple working faces.

Table 3-5 identifies the number of production blasts required annually to service each item of digging equipment based on the average blast area, average depth of material blasted and the quantity of material to be handled by each item to achieve budgeted production.

Table 3-5 Production Blast Size and Number by Equipment

Digging Equipment (1 off)	Allocated Overburden and Interburden (coal ply number)	Depth Range (Metres)	Nominal Blast Pattern Sizes (Metres)	Blast Area (m ²)	Annual Quantity (bcm)	Number of blasts per year per digger
Electric Shovel (1 off)	360, 350, 320, 310, 271, 260, 240, 190, 140, 105, 75	Minimum 8m to 40m	6 x 8 5 x 8 5 x 7	9600	8,600,000	30 to 80
27 cubic metre Excavator (1 off)	360, 350, 340, 320, 271, 260, 240, 230, 220, 190, 160, 140, 130, 105, 75	Minimum 4m to 40m	6 x 8 5 x 8 5 x 7 5 x 6	6400 to 9600	8,100,000	50 to 250
19 cubic metre Excavator (1 off)	320-280, 230, 220, 210, 180, 170, 160, 140, 130, 105, 90, 80, 60	Minimum 2m to 40m	5 x 6 5 x 5 4 x 4	6400 to 7500	5,700,000	50 to 250
Front-End Loader (2 off)	Loaders are used on all materials	0.7m to 10m Maximum	5 x 5 4 x 4	6400	50,000 to 2,800,000	30 to 140

In addition to the production blasts identified in **Table 3-5**, pre-split blasting to produce a stable highwall and to control the hazard of working below a rock wall, is also carried out on all final highwalls. On average this equates to an additional 8 to 12 blasts per year.

Currently, due to a reduction in MIC and powder factor to meet ground vibration limits at nearby residences, an additional 8 to 12 blasts per year are required on blast pattern boundaries and to effectively fragment hard rock at the base of blast holes lying above thin coal seams. This poor fragmentation occurs in confined areas and under adverse rock strength conditions. Hard rock located directly above the coal seams occurs above the 271, 260, 240, 190, 140, 130, 105 and 75 coal plies and is described in geological terms as medium to high strength sandstones and conglomerates which are characteristic of the local geology.

Table 3-6 presents the number of blasts required per year within the Mine Area, with the number of blasts required calculated by adopting a typical depth per pattern and blasted volume per shot divided by the quantity of overburden scheduled in that depth range per year. This, in turn, is based on the materials handling requirements/capabilities for each item of digging equipment as presented in **Table 3-5**.

Table 3-6 Predicted Number of Blasts per Year based on Annual Volumes

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9
Blasted Volume Per Year	17,306,189	20,875,717	21,288,639	21,624,170	20,163,680	22,854,851	21,665,760	19,033,509	13,826,650
Waste > 1.5m. and <= 2.5m. Typical pattern 4 x 4									
No of Holes Per Blast	400	500	500	500	500	500	500	500	500
Area in sq. metres	6,400								
Volume in BCM	12,796	15,916	15,608	16,363	16,470	16,594	16,180	15,696	14,467
Blasts per Year	104	74	85	141	116	92	43	53	29
Waste > 2.5m. and <= 10m. Typical pattern 5 x 6									
No of Holes Per Blast	250	250	250	250	250	250	250	250	250
Area in sq. metres	7,500								
Volume	51,903	47,329	50,038	50,718	45,597	41,257	47,160	40,274	52,637
Blasts per Year	187	143	110	135	182	257	200	157	50
Waste > 10m. Typical Pattern 6 x 8									
No of Holes Per Blast	200	200	200	200	200	200	200	200	200
Area in sq. metres	9,600								
Volume	215,999	208,282	183,920	188,094	200,692	194,590	213,931	231,270	194,545
Blasts per Year	29	62	78	66	49	55	54	51	55
Total Number of Production Blasts Per Year	320	279	274	342	348	404	296	262	134
Additional Pre Split And Secondary Blasts Per Year	20	20	20	20	20	20	20	20	20
Total Number of Blasts Per Year	340	299	294	362	368	424	316	282	154

Note: Waste is equivalent to Partings, Interburden or Overburden

The proposed Mine Area lies adjacent to the Main Northern railway line over a distance of 1.2km. Blasting procedures have been developed for blasting within 200m to 500m and closer than 200m to the Main Northern Railway line. Due to blasting restrictions imposed by ARTC when blasting in the vicinity of the Main Northern Railway line (typically permitted on one day per fortnight only), a maximum of six blasts per day may need to be undertaken during the scheduled track possessions. Maximising blasting opportunities during the limited track possessions is also imperative given the requirement for two weeks' advance notification of an intended possession.

An additional self-imposed limitation on blasting during adverse weather conditions is currently applied on-site, with blasting deferred in the event of high wind speed and cloud cover conditions. This nominally results in 60 days per year where blasting is deferred and multiple blasts need to be fired when conditions are more favourable, i.e. to enable continuity in production.

Based on the information provided above, and with between 14 and 23 Mbcm of overburden/interburden to be blasted annually within the Mine Area, an average of seven to eight blasts would be required per week, with a maximum of 10 blasts per week to be initiated (see **Table 3-7**).

Table 3-7 Predicted Average Blast Frequency on a Daily and Weekly Basis

(Based on 192 Available Blast Days Per Year).

Average Number of Blasts	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9
Per Day	1.8	1.6	1.5	1.9	1.9	2.0	1.6	1.5	0.8
Per Week	9	8	8	9	10	10	8	7	4

Table 3-8 presents a statistical summary of blasting frequency on a yearly basis in the South Pit over the period 2005 to 2008, i.e. a period representative of the frequency of blasting proposed in the Mine Area due to the proximity of the Northern Railway line and Dulwich, the presence of which require modification of blasting designs to afford them an appropriate level of protection. A review of **Tables 3-7** and **3-8** shows that the anticipated blasting frequency in the Mine Area is the same as that which has occurred in the past three years in the South Pit.

Table 3-8 Integra South Pit Open Cut Annual Blasting Statistics: 2005 to 2008

AEMR Report Period	Average Number of Blasts Per Day	Max Number of Blasts Per Day	Average Number of Blasts Per Week	Max Number of Blasts Per Week
2005 to 2006	1.43	4	6.7	7
2006 to 2007	1.52	5	7.7	10
2007 to 2008	1.44	4	7.1	8

Sources: Camberwell Coal Annual Environment Management Report: 2006, Appendix 3: Environmental Monitoring Data, Integra Coal Annual Environment Management Reports: 2007, 2008, Appendix 6 Blast Monitoring Data.

With the most likely commencement of mining in the middle of the western side of the existing South Pit and mining then progressing in a northerly then southerly direction, there will be a requirement for drilling and blasting of two separate mining areas within the Full Pit Extent (in years 4 to 7), and within the Part Pit Extent (in Years 3 to 6). Having two working areas up to 1.5km apart will require separate blasts in these areas. As no additional equipment is planned to be used in these years, production would be adversely affected if blasting was restricted to a single blast per day over the two separate working areas: such a restriction would increase the frequency of digging equipment down-time due to the unavailability of blasted ground. The separation distance between the two active areas would also reduce the Company's ability to move digging equipment quickly in order to share the available blasted ground inventory, thereby adding an additional inefficiency and cost in the relocation of equipment to keep the operation moving.

Table 3-9 presents the indicative design parameters for overburden and interburden blasts within the Mine Area based on those employed in the Existing South Pit operations. However, each blast would be designed to ensure that the relevant project specific blast assessment criteria are met at all surrounding residences.

Table 3-9 Indicative Overburden Blast Parameters

Parameter	Quantity or Range
Blasthole Diameter	127 mm to 229 mm
Blasthole Depth	2m to 20m
Blasthole Burden x Spacing	4m x 4m to 6m x 8m
Depth of Stemming	1.5m to 4m
Bulk Explosive Type	ANFO and/or HANFO and/or slurry
Powder Factor	0.47 kg/bcm to 0.88 kg/bcm
Maximum Instantaneous Charge (MIC)	30 kg to 850 kg
Maximum Charge per Hole	15 kg to 850 kg
Initiation System	Nonel or Electronic

Consistent with the existing approved operations at the Integra Open Cut, approval is sought for blasting between the hours of 9.00am and 5.00pm, Monday to Saturday, except where, due to a misfire or other exceptional and/or safety-related circumstance, blasting is required after 5.00pm. There would be no blasting within 500m of the New England Highway.

Blasting within the northern half of the proposed Pit will necessitate the closure of Middle Falbrook Road for between five and ten minutes per blast, with the location of the closure and the potential for such closure to impact on local traffic depending primarily on the ownership status of the Dulwich residence at

the time. In the vicinity of the proposed extension to the South Pit, Middle Falbrook Road is not a through road and, south of the Integra Underground surface facilities, only provides access to Dulwich and project-related residences.

Should Dulwich not be acquired prior to the requirement for road closures which would potentially affect access to that property, a process for notification would be reached by agreement with the residents. The notification process may include a blast warning sign south of the Integra Underground operation, voice or SMS notification, as well as the positioning of blast sentries in accordance with the Integra Open Cut Explosives Hazard Management Plan.

For the current South Pit operations, controlled blasting has been carried out at a distance of 220m from the Dulwich property boundary and at a distance of 50m from the Main Northern Railway line easement, with the measures currently available to and employed by the blast design engineer to control the impact of blasting, i.e. ground vibration, overpressure and flyrock, on these key properties including:

- modelling of the predicted noise and overpressure using a site-specific blasting model developed by Terrock Consulting Engineers (Richards B. R and Moore A.J, 2006- 2008). The model is continually refined on the basis of monitoring results and new blast information;
- use of inert decking within the explosive column to manage MIC or charge mass;
- using smaller diameter blast holes;
- splitting overburden into two passes where the total thickness is greater than 10 metres;
- creation of a buffer of shot ground between the potentially affected property and production blasts;
- selection of a less dense explosive type;
- blast initiation sequences designed to direct vibration away from the sensitive receiver;
- orientation of blast hole direction to blast across dominate rock joints and thereby ensure effective fragmentation at a reduced powder factor;
- direction of free faces away from the Dulwich residence to eliminate the risk of flyrock from burden controlled conditions or face burst projecting 'wild' rock towards the residence;
- control of cratering conditions around blast hole collars by using imported single sized aggregate as blast hole stemming and a minimum stemming depth of 15 times the hole diameter; and
- control of stemming ejection by setting minimum stemming heights nominally 4 to 5 metres in 229mm diameter blast holes (Terrock Consulting Engineers, Richards B. R and Moore A.J, June 2008).

Terrock Consulting Engineers have predicted that, if their model is followed, the likelihood of flyrock landing in the rail corridor at a distance of 200m is 1 in 11 years or 1.82×10^{-6} per blasthole. The actual performance of these control measures is evidenced by the fact that as of 31/8/09, there had been no incident of flyrock projection beyond 50m from more than 43,200 blast holes

Integra will continue to progressively evaluate and improve its blasting designs in order to control impacts on the Main Northern Railway line and the Dulwich residence and to ensure blasting impacts are managed within the ARTC agreement and DECCW guidelines for noise and vibration at residences.

Further comments pertaining to blasting and Dulwich are presented in **Chapter 5**.

3.5.3 Air Quality

Holmes Air Sciences (now PAEHolmes) prepared an air quality assessment in June 2009 for URS Australia Pty Ltd on behalf of Integra Coal (Holmes Air Sciences, 2009) to assess the impact of the proposed operations at Integra Open Cut. This section provides response to the Air Quality issues raised by DECCW in their letter of 11th August 2009.

Issue 1: Assessment Criteria

Comment

“Table 12-8 of the EA indicates that air quality impacts at up to 60 non-mine owned residences are predicted to be above the DECCW’s assessment criteria for PM₁₀, TSP and/or deposited dust at some time during mine life. However Table 12-9 indicates that DECCW criteria will be exceeded at only three residences. This discrepancy results because the PM₁₀ Impact Assessment Criteria stated at Table 12-1 of the EA are not “DECC Impact Assessment Criteria” but are based on the acquisition criteria specified by consent condition number 24 of project Approval 06-0073 which specifies short term acquisition criteria for particulate matter as follows:

Consent Condition 24 (PA06_0073)

Pollutant	Averaging Period	Criterion	Percentile ¹	Basis
Particulate matter <10µm (PM ₁₀)	24 hour	150 µg/m ³	99 ²	Total ³
Particulate matter <10µm (PM ₁₀)	24 hour	24 µg/m ³	98.6	Total ⁴

¹. Based on the number of block 24 hour averages in an annual period

². Excludes extraordinary events such as bushfires, prescribed burning, dust storms, sea fog, fire incidents, illegal activities or any other activity agreed by the Director General in Consultation with DECC

³. Background PM₁₀ concentrations due to all other sources plus the incremental increase in PM₁₀ concentrations due to the mine alone

⁴. Incremental increase in PM₁₀ concentrations due to the mine alone.”

Response

It is noted that a transcription error has occurred in Table 12-1 of the Environmental Assessment (EA). The 24-hour average PM₁₀ concentration of 50 µg/m³ at the 98.6th percentile shown in Table 12-1 is not a DECCW criterion. However, the correct criteria are applied in the assessment of impacts shown in the EA. The criteria adopted in the EA are presented in Table 4 of the Air Quality Impact Assessment at Appendix G of the EA.

For clarity, **Table 3-10** presents the 24-hour average PM₁₀ criteria applied in Air Quality Impact Assessment.

Table 3-10 24-hour average PM₁₀ criterion applicable to assessment

Pollutant	Averaging period	Criterion (µg/m ³)	Percentile	Agency
PM ₁₀	24-hour	50	100	DECCW (Increment)*
		150	100	US EPA (Cumulative)**
		50	98.6	Department of Planning (Increment)***

* Increment for mining and quarrying operations operating with Best Practice

** Cumulative for mining and quarrying operations operating with Best Practice

*** Department of Planning Acquisition criteria

Section 9.3 to Section 9.9 of the Air Quality Impact Assessment (Appendix G of the EA) present a detailed analysis of the predicted impacts at the sensitive receptors, as compared with the DECCW increment criterion of 50 µg/m³ at the 100th percentile (and the other relevant DECCW assessment criteria). These results are summarised in Table 21 and Table 22 of the Air Quality Impact Assessment and are repeated in Table 12-8 of Chapter 12 in the main body of the EA.

Section 9.10 of the Air Quality Impact Assessment (Appendix G of the EA) presents a detailed analysis of the predicted impacts at the sensitive receptors, as compared with the Department of Planning acquisition criterion of 50 µg/m³ at the 98.6th percentile. These results are summarised in Table 23 of the Air Quality Impact Assessment (Appendix G of the EA) and repeated in Table 12.9 of Chapter 12 in the main body of the EA. Table 12-9 in the EA was provided to assist the Department of Planning (DoP) regarding the acquisition criteria. As the text above this table refers the reader to Table 12-1 of the EA, it is understood that some confusion has resulted.

We note that the DECCW's reference to Consent Condition 24 (PA06_0073) appears to incorrectly state the criterion for 24-hour PM₁₀. A criterion level of 24 µg/m³ is presented in the DECCW comment (as reproduced above) whereas the criterion value is 50 µg/m³, at a 98.6 percentile.

Issue 2: Adopted Assessment Criteria

Comment

“DECCW does not agree with the adopted impact assessment criteria, and has assessed the modelled impacts against the impact assessment criteria specified in the “Approved methods for the modelling and assessment of air pollutants in NSW” (DECCW, 2005) (“the Approved Methods”) as follows:

- *The non-mine owned residence which are predicted to exceed DECCW’s impact assessment criteria as a result of this project alone are:*
 - *Full Pit Extent: Residences 87, 106, 108, 109, 110, 111, 112 and 153;*
 - *Part Pit Extent: Residences 87, 106, 108, 109, 110, 111 and 153.”*

Response

We note that DECCW has listed up to eight (8) properties that are predicted to exceed DECCW’s impact assessment criteria as a result of the project alone. However, as shown in the Air Quality Impact Assessment (Appendix G of the EA), and in Table 12-9 of Chapter 12 in the main body of the EA, up to nine (9) residences would be impacted. These are:

- Full Pit Extent: Residences 87, 106, 108, 109, 110, 111, 112, 129 and 153;
- Part Pit Extent: Residences 87, 106, 108, 109, 110, 111 and 153.

Comment

- *“The non-mine owned residences which are predicted to exceed DECCW’s impact assessment criteria as a result of cumulative emissions are:*
 - *Both full Pit and Part Pit Extent: Residences 87, 88, 91, 94, 95 99, 105, 108, 109, 153 and 161.*

Significant adverse air quality impacts are likely to occur at these receptors and if Project Approval is granted, DECCW will be unable to manage dust impacts at these residences via conditions of Environment Protection Licences.”

Response

The significance of potential air quality impacts for all receptors can be estimated by reference to Section 9.3 to Section 9.10 in the Air Quality Impact Assessment (Appendix G of the EA). For convenience **Table 3-11** and **Table 3-12** summarise the relevant data for all receptors that may exceed DECCW criteria for 24-hour average PM₁₀.

Note that both the maximum predicted concentration and the number of days that the DECCW criteria may be exceeded are presented side by side to enable a reasonable estimate of the significance of the impact to be made.

Table 3-11 Summary of maximum predicted 24-hour PM₁₀ concentrations – Full Pit Extent (µg/m³)

ID	Year 1		Year 4		Year 6		Year 8	
	Maximum 24-hr PM ₁₀	No. of days > 50 µg/m ³	Maximum 24-hr PM ₁₀	No. of days > 50 µg/m ³	Maximum 24-hr PM ₁₀	No. of days > 50 µg/m ³	Maximum 24-hr PM ₁₀	No. of days > 50 µg/m ³
87	46	0	60	2	31	0	40	0
106	36	0	43	0	32	0	53	1
108	82	3	88	1	73	2	105	11
109	102	3	111	10	88	7	109	24
110	70	3	82	1	47	0	81	5
111	61	1	68	1	45	0	61	1
112	36	0	54	1	37	0	32	0
129	32	0	51	1	33	0	36	0
153	123	56	Property would be part of the active pit under this scenario					

Table 3-12 Summary of maximum predicted 24-hour PM₁₀ concentrations

ID	Year 1		Year 3		Year 6	
	Maximum 24-hr PM ₁₀	No. of days > 50 µg/m ³	Maximum 24-hr PM ₁₀	No. of days > 50 µg/m ³	Maximum 24-hr PM ₁₀	No. of days > 50 µg/m ³
87	46	0	52	1	36	0
106	36	0	34	0	48	0
108	82	3	81	1	99	7
109	102	3	89	2	92	14
110	70	3	73	1	76	3
111	61	1	60	1	53	3
112	36	0	34	0	36	1
129	32	0	38	0	30	0
153	123	56	195	144	57	1

Clearly only residences 108, 109 and 153 are significantly affected. The other residences are not predicted to exceed levels above DECCW criterion more than 5 days in any year. Some residences are only predicted to experience an exceedance of one day in all the years modelled, for example, residences 106, 112 and 119.

Table 3-13 and **Table 3-14** present a summary of the predicted annual average PM₁₀ concentrations. The increment due to the project alone and the cumulative impacts are compared side-by-side.

Table 3-13 Summary of predicted annual average PM₁₀ concentrations – Full Pit Extent (µg/m³)

ID	Year 1		Year 4		Year 6		Year 8	
	Increment	Cumulative	Increment	Cumulative	Increment	Cumulative	Increment	Cumulative
87	8	33	9	28	7	27	9	26
88	3	33	4	23	3	22	4	21
91	3	32	4	22	3	22	4	21
94	3	31	3	21	3	21	4	20
95	3	31	3	22	3	21	4	20
99	3	31	3	21	3	21	4	20
105	4	31	4	23	4	57	5	22
108	8	29	12	30	12	30	16	32
109	8	28	13	31	11	29	16	33
153	35	55	Property would be part of the active pit under this scenario					
161	3	31	4	22	3	22	4	20

Table 3-14 Summary of predicted annual average PM₁₀ concentrations – Part Pit Extent (µg/m³)

ID	Year 1		Year 3		Year 6	
	Increment	Cumulative	Increment	Cumulative	Increment	Cumulative
87	8	33	8	28	8	27
88	3	33	3	22	2	23
91	3	32	3	22	4	22
94	3	31	3	21	3	21
95	3	31	3	21	3	22
99	3	31	3	21	3	21
105	4	31	4	23	4	23
108	8	29	10	28	14	32
109	8	28	12	28	14	32
153	35	55	50	68	11	29
161	3	31	3	22	4	22

The predicted degree of cumulative impact is up to 10% above the criterion of 30 µg/m³, which is less than the general degree of precision afforded by dispersion modelling at the present time. Thus although it is predicted, it is not certain whether any impact would actually occur, and less certain that the impact would be significant. The large changes in mining activities in this area due to anticipated changes to several mine operations add to the potential uncertainty in the predicted impacts. However, in most cases, the predicted levels are above the criterion in Year 1 only and/or the proposal would contribute less than 10% of the criterion level.

It is also worth noting that the US EPA revoked their annual PM₁₀ standard (which was set at a 50 µg/m³) in 2006 due to a lack of evidence linking health problems to long-term exposure to coarse particle pollution.

The proponent has committed to monitor dust levels at potentially affected receptors and to take appropriate actions to ameliorate any actual impacts should it arise. Section 10.3 of the Air Quality

Impact Assessment (Appendix G of the EA), and Section 12.7.1 of Chapter 12 in the main body of the EA clearly identify the monitoring the proponent is committed to.

3.5.4 Threatened Species

Comment

The assessment states that the vegetation (Central Hunter Ironbark – Spotted Gum – Grey Box Forest) is already highly degraded and therefore of little value. However, this vegetation community has been recognised recently by the Scientific Committee who has made a Preliminary Determination to support a proposal to list the Central Hunter Ironbark – Spotted Gum – Grey Box Forest in the NSW North Coast and Sydney Basin Bioregions, as an Endangered Ecological Community (EEC) in Part 3 of Schedule 1 of the TSC Act.

DECCW recommends that the proposal provide suitable offsets and compensatory habitat measures in accordance with DECCW guidelines 'Principles for the use of biodiversity offsets in NSW' (DECCW, 2008) for this community and areas of threatened fauna habitat.

Response

To address DECCW offsetting principals and ensure that the Open Cut Project satisfies the 'maintain and improve' test, an Offset Strategy has been prepared and is provided in **Appendix B**.

3.5.5 Heritage

Comment

DECCW acknowledges that the Aboriginal consultation and cultural heritage surveys have been comprehensive and in accordance with the Director Generals Requirements and DECCW guidelines.

The applicant has indicated that no additional open cut operations will occur in the north-west area outside the proposed open cut are but within the mapped extension area until further archaeological survey work is conducted. This will provide interim protection to the significant sites (scarred trees) already known from that location.

The Statements of Commitment have been amended to ensure "in perpetuity" protection of any Keeping Places, for example, along Martins Creek, which are identified with the agreement of the Aboriginal community in the proposed Aboriginal Cultural Heritage Management Plan.

Response

Noted.

3.6 Hunter-Central Rivers Catchment Management Authority

The Hunter-Central Rivers CMA raised a number of issues in relation to biodiversity.

Comment

Hunter Central Rivers CAP: The impact of the proposal on the Hunter-Central Rivers Catchment Action Plan (CAP) needs to be considered. The Hunter Central Rivers CAP *"... is a whole-of-government approach to natural resource management which has been endorsed by the NSW Government. This should be taken into consideration in all planning decisions that have an impact on natural resources."*

Response

The CAP and other regional management plans have been duly considered in the development of the EA. The project's offset package as presented in the EA and in the document entitled "Integra Open Cut Project Biodiversity Offset Strategy" as presented as part of the DECCW response is directly in line with two of the management targets for 2015 outlined in CAP, i.e. achieving protection of an additional 31,000ha of native vegetation and regenerating 25,500ha of native vegetation.

Comment

Native Vegetation: *"the CAP guiding principle, where mining activities significantly impact natural resources, offsets should be considered with the intention of improving or maintaining environmental outcome, is strongly underpinned by the objects of the Native Vegetation Act, 2003 (NV Act) which includes prevention of broad-scale clearing unless it improves or maintains environmental outcomes. It is acknowledged that this proposal is being assessed under Part 3A of the Environmental Planning and Assessment Act, 1979 and that the NV Act does not apply in this circumstance. Nevertheless, the CMA considers that the principles of the CAP and the Act should still apply. Specifically, the CMA's position is that vegetation in over cleared landscapes and endangered ecological communities can not be offset."*

Response

The CMA are correct in their statement that the Native Vegetation Act does not apply to Part 3A proposals. However the principals of 'improve and maintain' have been clearly addressed in the EA (Chapter 9 Biodiversity) and document (Integra Open Cut Project Biodiversity Offset Strategy (**Appendix B**)).

In summary, the project will require the clearing of 19ha of ironbark woodland. However to ensure that biodiversity values are 'maintained' within the area a 35ha Narrow-leaf Ironbark – Grey Box Forest offset is being proposed (as outlined in the Integra Open Cut Project Biodiversity Offset Strategy (**Appendix B**)) to be managed for conservation in perpetuity. In addition to this, an area of degraded riparian vegetation along Glennies and Station Creeks will be rehabilitated (subject to receipt of all necessary approvals) and managed for conservation, contributing to the biodiversity value of the site. Improvement in these habitats will enhance corridor links and habitat protection within the area.

Comment

Regional Significance of Native Vegetation: *"Mitchell Landscapes are an ecosystem classification based on an unpublished report to NPWS (Mitchell, 2002). The Integra Open Cut proposal is predominantly within the Central Hunter Foothills landscape that is estimated to be 75% cleared - this is considered to be an "over cleared" landscape. It is the CMA's position that these landscapes are regionally significant, provide no opportunities for offsets and should not be cleared any further."*

Response

The regional significance of vegetation within the Open Cut Project Area has been considered in the EA (Appendix E Biodiversity and Chapter 9 Biodiversity). As far as possible the development footprint avoids clearing of native vegetation and Integra will offset any unavoidable clearing with suitable vegetation within the region to ensure regional biodiversity values are maintained (as outlined in the Integra Open Cut Project Biodiversity Offset Strategy (**Appendix B**)).

Comment

Endangered Ecological Communities: *"The environmental assessment indicates 19 ha of Ironbark Woodland (consistent with Central Hunter Ironbark – Spotted Gum – Grey Box woodland) will be cleared."*

This vegetation community has been preliminarily determined as an endangered ecological community (EEC) listed under the Threatened Species Conservation Act 1995 (TSC Act). It is the CMA's position that no loss of any EEC is acceptable and that these communities (not in low condition) cannot be offset. It is worth noting that since this community was mapped for the "Vegetation of the Central Hunter Valley" report by Peake, approximately 300ha has been cleared through mining (6% reduction), 130ha associated with this mining operation alone."

Response

Clearing of this vegetation community has been avoided where possible. However, due to the location of the coal reserve it cannot not be avoided entirely. To ensure that the project 'improves or maintains' biodiversity values an appropriate offset package has been detailed in the EA and the Integra Open Cut Project Biodiversity Offset Strategy. Adoption of the identified offset package will ensure there is not net loss in biodiversity values across the site and an appropriate area of woodland vegetation with a higher biodiversity value will be conserved in perpetuity. The offset package includes:

- revegetation of suitable components of the Open Cut Area. As identified in the EA, it is presently proposed that the rehabilitated site will include limited pastoral use (grazing) with the majority of the site being returned to woodland grassland ecosystems with predominately endemic species. Species lists for planting will be detailed in the final Rehabilitation and Mine Closure Plan.
- conservation and rehabilitation of the degraded riparian and forest habitat along Glennies and Station Creeks with a consequent improvement in the biodiversity values of these riparian habitats in the short to medium term. Improvement in these habitats will also enhance corridor links between the rehabilitated / remediated Open Cut Area and the riparian vegetation area along Glennies Creek;
- identification and permanent conservation of a suitable woodland offset in the locality (This has been detailed in the Integra Open Cut Biodiversity Offset Strategy (**Appendix B**)).

Comment

Offsets: The CMA raises a number of issues in relation to the offset methodology and the proposed offset area.

Response

The CMA are correct in identifying that Biobanking is now available and can be used to determine the level of offset required to ensure developments do not result in a net loss of biodiversity values. However, the scheme is voluntary and the 'threatened species assessment' process used in this EA is still recognised as a valid option for assessing and offsetting the impact of developments on biodiversity.

As stated in the EA, the offset strategy is consistent with DECCW's principals for the use of offsets in NSW. Integra have continued to consult with DECCW and have identified a potential offset area. An updated Offset Strategy which incorporates this additional area and clearly identifies its biodiversity benefits in terms of species / community occurrence; habitat quality etc is provided as part of DECCW submission.

Once the offset area has been acquired, Integra will discuss appropriate methods of securing the property such as a Voluntary Conservation Agreement or Biobanking Agreement with DECCW.

The offset strategy identified addresses the improve and maintain test at all scales, in that:

- the woodland vegetation that will be used to offset the clearing of 19ha of Ironbark Woodland will be 35ha of Narrow-leaf Ironbark – Grey box Forest which is of greater regional significance.

- the proposed woodland offset are will increase the amount of protected woodland within the region by 35 ha.
- Rehabilitation of the Open Cut area and riparian vegetation along Glennies and Station Creek will improve connectivity within the region.

As discussed above, in the EA and in the updated Offset Strategy, the management of the site will improve conservation values of the site over time.

3.7 Singleton Shire Council

Singleton Shire Council noted the positive socio-economic benefits associated with the ongoing operation of the Integra Open Cut and identified concern that no response is made to address ongoing community concern regarding the extent to which air quality impacts upon public health in relation to the broader population.

Identification of positive socio-economic benefits is noted. With regard to community concern in relation to air quality impacts within the broader population, whilst it is an amenity issue, deposited dust from coal mining has no known association with health impacts. The Australian Coal Association Research Program (ACARP) funded a three-year monitoring program to characterise the concentration and composition of fine particles (PM_{2.5} and PM₁) in the Hunter Valley (ACARP 2007 and 2008). Continuous monitoring took place at two representative population sites in the Hunter Valley (Muswellbrook and Singleton), and at two sites immediately adjacent to mining operations ('Glenville' and Rix's Creek). Elemental composition of the samples collected showed that the PM₁ fraction had a greater proportion of combustion related emissions (that is, emissions from motor vehicles and power generation) and less contribution from local soils (that is, emissions that result from mining and agriculture). Refer also to the results of research (**Section 4.3.2** of this Report) undertaken in 2008 by Associate Professor Barry Noller who found that air and water lead levels in the village of Camberwell and in proximity to Muswellbrook are significantly below the relevant national standards.

ICO acknowledges that there is community concern around the issues of dust. Furthermore, ICO and the mining industry in general shares the community's desire for better scientific understanding of any impacts to enable more informed discussion and as a member of the NSW Minerals Council, partner with NSW Health where possible to address any health concerns that may arise regarding mining activities. Refer also to **Section 4.3 Response to Public Submissions - Air Quality**.

4 Response to Public and General Interest Group Submissions

4.1 Introduction

This Chapter presents responses to the public and specialist interest groups submissions. Submissions have been grouped and responded to by environmental aspect.

Many of the public submissions express opposition to the existence of the coal industry in the Singleton and Camberwell area and more broadly in the Hunter Valley. Whilst these submissions have been considered, it should be noted that a number of the comments are not related to the content of the EA placed on Exhibition.

A number of public submissions highlight a concern regarding cumulative impacts of the project. It should be noted that the EA assesses the cumulative impact of the Open Cut Project in addition to neighbouring mines in the area, in particular with regard to cumulative air quality and noise emissions.

A number of submissions include opinions and comments beyond the scope of the project Environmental Assessment. Examples include two submissions which call for amendments to the Mining Act, and two submissions which point to inadequacies in EPA penalties issued to companies when dust or noise criteria are exceeded.

The remainder of this Chapter of the Submissions Report provides responses to those issues raised in relation to the content of the Open Cut Project EA.

4.2 Noise and Blasting

Public submissions received in relation to noise and blasting incorporated issues in relation to monitoring of noise impacts, sleep disturbance, ambient noise data and blasting impacts. Each of these issues is discussed below.

4.2.1 General Comments

A number of general comments in relation to noise and vibration were received. These comments are not related to the content of the EA. Examples include statements such as the identification of activities being undertaken at other mines in the locality and the acceptability of mining as a land use. Whilst these comments are noted, as they do not relate to the content of the EA, it is considered that specific response as part of this Report is not warranted.

4.2.2 Noise Monitoring

Submissions Received

One submission was received which included issues in relation to the noise monitoring undertaken for the EA and the on-going monitoring of operational noise.

Response

Noise Monitoring for the Environmental Assessment

The noise monitoring to characterise and quantify the existing acoustic environment in the area surrounding the Open Cut Project Area was guided by the requirements identified in the INP AS 1056 and comprised extensive unattended and operator-attended monitoring. Attended and unattended noise

surveys were initially undertaken in March 2005 to characterise and quantify the acoustic environment in the area surrounding the North Open Cut area, with similar surveys undertaken in the area surrounding the Open Cut Project Area in August 2007. In addition, in order to supplement the attended noise logger measurements and to assist in identifying the character and duration of ambient noise sources, between one and three operator-attended daytime, evening and night-time surveys were conducted within each Noise Assessment Group (NAG) in March 2006 and August 2007. In addition, monitoring is undertaken by private individuals and is independent from ICO operations. Integra support the use of occupier-initiated monitoring as a means of investigating complaints.

Monitoring of Operational Noise

Both a Noise Management Plan and Noise Monitoring Programme will be prepared by ICO for the Open Cut Project in accordance with consent and licence requirements to satisfaction of DoP and DECCW, respectively.

4.2.3 Sleep Disturbance

Submissions Received

Five submissions included issues in relation to sleep disturbance and night-time operations.

Response

Section 11.4 of the Environmental Assessment outlines the methodology used to determine the sleep disturbance impact of the Open Cut Project. As outlined in the EA, the most recent criteria for sleep disturbance are those contained in the DECC's Application notes – NSW INP 2008. The results of the Noise and Vibration investigation found that compliance with the sleep disturbance criteria would be achieved at all non-mine owned residences which have not been identified as being in either the noise management or noise affectation zones. Sleep disturbance is also discussed in the response to DECCW issues raised (see Section 3.5.1.2 Issue 11).

Section 11.11 of the EA identifies the noise mitigation measures which would be employed to mitigate the impact of noise during the evening and night-time periods. Such measures include the restriction of evening and night time mining operations, where practicable, to deeper sections of the proposed pit; preferentially placing waste rock within deeper portions of the in-pit waste rock emplacement area during night time operations whenever possible; limiting development activities such as tree clearing and soil stripping to day times whenever possible.

With regard to limiting night-time operations, this issue is discussed under **Issue 10** within the submission to DECCW (refer **Chapter 3 Response to Government Agency Submissions**).

4.2.4 Ambient Noise Data

Submissions Received

Two submissions commented on the baseline noise data. The contribution to the ambient noise data from mining and from other sources (including agricultural noise, wind and insects) was questioned.

Response

Ambient noise surveys to characterise and quantify the existing acoustical environment in the area surrounding the Open Cut Project Area were conducted in August 2007 to supplement the March 2005 surveys which were undertaken for the North Open Cut EA. The noise impact assessment presented within the EA is based on an extensive noise investigation in compliance with AS 1055-1989 "Acoustics-Description and Measurement of Environmental Noise" and the DECCW's NSW Industrial Noise Policy (INP) 2000.

Existing noise associated with a rural environment is identified as a characteristic of the area. Appendix D1 of the Noise and Blasting Report (**Appendix A**) provides tables which include a description of noise emissions and typical maximum levels recorded for each of the Noise Assessment groupings investigated as part of the assessment.

4.2.5 Blasting

Submissions Received

Blasting was raised in five submissions, two of which associated blasting with damage to property.

Response

Chapter 11 of the EA identifies that all blasts would be designed to ensure that blasting related impacts at all non-mine owned residences would be within ANZEC guidelines. The impact assessment concluded that at an MIC of 30kg, blast emissions at all residences are predicted to comply with the ANZEC guidelines, except for the nearest property (property number 153). The predicted levels of ground vibration at all nearby residences comply with the ANZEC general human comfort criterion (of 5 mm/s) and consequently with the ANZEC maximum human comfort criterion, as well as the British Standard 7385 structural damage criterion of 15 mm/s (at 4 Hz) under the indicative MIC range identified in the EA, except at the nearest residence (receptor number 153).

It should be noted that in everyday life, an active family will produce strains similar to those produced by blast vibration levels in the range of 1mm/sec to 12mm/sec. **Table 4-1** gives details of these comparisons. Thunder and strong wind gusts are natural forces which may cause effects at residences comparative to high overpressure levels from blasting.

Table 4-1 Comparison of Internal Strains in Buildings

Loading Phenomena	Induced Strain $\mu\text{m/m}$	Corresponding Blast Vibration Level (mm/s)
Daily Environmental Changes	149 to 385	30.0 to 76.0
Household Activities		
Walking	9	0.8
Heel Drops	16	0.8
Jumping	37	7.1
Door Slams	49	12.7
Driving Nails	89	22.4

(Source: US Bureau of Mines 1984)

As outlined in the EA Section 11.11.3, Integra strives to continuously improve its blasting practices. In accordance with existing blasting practices, all blasts within the Open Cut Area are and would continue to be monitored and the results used to further develop and refine the existing site laws for both ground

vibration and airblast emissions. It is Integra's current standard practice to provide notification on the morning prior to a blast to local residents and others who request to be included on the notification list. Practices such as community notification prior to blasts would continue. This is included in the Draft Statement of Commitments (Chapter 17) of the EA (refer G12).

Further information on blasting is provided within the submission to DECCW (refer **Chapter 3 Response to Government Agency Submissions**).

4.3 Air Quality

Public submissions received in relation to air quality incorporated issues in relation to air quality monitoring, tankwater quality, health impacts on both humans and livestock, cumulative air quality impacts, and greenhouse effects. Each of these issues is discussed below.

General Comments

A number of general comments in relation to air quality were received. These comments are not related to the content of the EA. Examples include statements such as identifying that residents of Singleton are requesting health studies be undertaken into respiratory problems such as asthma, sinusitis and allergies, and statements on the acceptability of mining as a land use. Whilst these comments are noted, as they do not relate to the content of the EA, it is considered that specific response as part of this Report is not warranted.

4.3.1 Air Quality Monitoring

Submissions Received

Three submissions were received which included issues in relation to the air quality monitoring network operated by Integra.

Response

Integra currently operates an extensive air quality monitoring network which consists of:

- Ten dust deposition gauges
- Three high volume air samplers measuring TSP
- Two high volume air samplers measuring PM₁₀
- One real time PM₁₀ monitor

The location of these monitors was determined based on the previously approved operations at Integra and will be refined to ensure environmental performance of the proposed operations can be verified.

Ashton Coal also currently operates an extensive monitoring network in and around Camberwell Village. This includes three real-time PM₁₀ monitors - Tapered Element Oscillating Microbalances (TEOMs) located in Camberwell Village itself. Integra proposes to formulate an agreement with Ashton enabling access to this data. This will enable real-time monitoring of the impacts of its operations to the west of the site (particularly Camberwell village) and the management of operations to ensure compliance with the approval limits.

Integra also propose to install a TEOM in the vicinity of Receptor numbers 108 – 112 assuming the adoption of an approach similar to that approved for the North open Cut. Should the 24-hour average concentrations of PM₁₀ approach the cumulative assessment criteria of 150 µg/m³ the Operations

Manager (Open Cut) would review the current Open Cut operations and take remedial action to ensure the impact at the receptors is kept below the criteria.

The concentration of particulates received at sensitive receptors was raised by Receptor Number 47 (B & R Cherry). In order to measure the concentrations received at representative sensitive receptors, Integra would continue to employ its existing monitoring network as outlined above. This network includes a real-time PM₁₀ monitor (TEOM) installed at the Gardner residence (Receptor Number 64) (approximately 800m to the west of Receptor Number 47) in accordance with North Open Cut Approval (DA06_0073).

4.3.2 Tankwater Quality

Submissions Received

Three submissions were received which raised concerns regarding the deposition of particulate matter into rainwater tanks and perceived subsequent effect on drinking water and household water supply.

Response

Recent research conducted in Queensland (in close proximity to the Dalrymple Bay Coal Terminal) investigated the potential health risks as a result of elements contained in coal dust deposited on rooftops entering rainwater tanks systems used for potable supply (Lucas *et. al.*, 2009).

Leaching tests were conducted on numerous coal types to identify the potential for trace element release into rainwater in the tank. In addition, rainwater samples were collected from both the rainwater tanks and taps of three homes within the dust deposition zone of Dalrymple Bay area.

The leaching tests indicated that negligible amounts of trace elements in coal dust were released in the rainwater, and all trace elements were below the Australian Drinking Water Guidelines (ADWG). The ADWG provide the threshold levels considered safe for human consumption.

The analysis of the rainwater from homes also showed that no trace element exceeded the ADWG.

The research concluded:

“.....tank and tap samples were all below ADWG and indicated a minimal likelihood of coal dust being an issue with respect to human health”

Additional research conducted in 2008 by Associate Professor Barry Noller from the Centre for Mined Land Rehabilitation, University of Queensland was undertaken in order to investigate the relationship between mining and levels of lead in the air and in rainwater tanks. The village of Camberwell and an outlying rural area of Muswellbrook were chosen for the study because of their close proximity to coal mining operations and local homes. 36 houses were involved in the sampling study.

This research involved an extensive sampling program covering local rainwater tanks, soils, airborne particles and house dust. The key findings were:

- no tank water exceeded Australian Drinking Water Guidelines for lead;
- there was no significant difference in drinking water lead levels between houses close to coal mining operations and those obtained from background sites including Newcastle town water;
- some tanks contained elevated lead levels in historical sludge, however, this was not contaminating the tank water;
- lead levels in mined overburden, coal and topsoil were low and within normal background lead levels;

- airborne particles (or Atmospheric Total Suspended Particulates) taken by High Volume Air Samplers indicated there is no significant transfer of lead from mine overburden material; and
- out of all dust sampling undertaken within houses, only two window tracks were found to contain elevated lead levels (possibly from historic house dust or lead in petrol).

The results of the study show there is no demonstrated health risk from lead associated with coal mining in the Hunter Valley. The review found that air and water lead levels are significantly below the relevant national standards.

It is noted, however that all rainwater tanks should be maintained in accordance with the advice outlined in NSW Health's Rainwater Tanks brochure to ensure water is safe for drinking. The brochure can be obtained from NSW Health's local public health unit or their website:

http://www.health.nsw.gov.au/pubs/2007/pdf/rainwater_tanks.pdf

The NSW Health fact sheets on health related topics can be accessed at:

<http://www.health.nsw.gov.au/factsheets/>

Regardless of the above, it is good practice for any rain water system in any location to install a simple first flush system to prevent particulate matter (or any other undesirable materials) that have collected on the roof being washed into the rain water tank. If requested in writing, Integra would install a first flush system to the rain water tanks of any resident that is concerned about the impact of dust fallout on the water quality within the mine's zone of influence up to a distance of 5km from the Open Cut Project boundary. This commitment is included within the updated Statement of Commitments.

Reference

Lucas S A, Coombes P J, Planner J and Welchman S (2009)

"Rainfall harvesting and coal dust: the potential health impacts of trace elements in coal dust in rainwater", Air Quality and Climate Change Vol. 43 No. 2 May 2009 pp23-30.

4.3.3 Health Effects

Submissions Received

Three submissions were received regarding perceived health effects which respondents attributed as the result of mining activities. Respiratory problems including asthma, sinusitis, constant cough, allergies and cancer were cited as a cause for concern. It was also stated that Singleton LGA has one of the highest number of people with cancer of any region in NSW. Respondents believed this to be the result of air pollution caused by mines and coal fired power stations concentrated in the Muswellbrook/Singleton Shires.

Response

Whilst it is an amenity issue, deposited dust from coal mining has no known association with health impacts. The Australian Coal Association Research Program (ACARP) funded a three-year monitoring program to characterise the concentration and composition of fine particles (PM_{2.5} and PM₁) in the Hunter Valley (ACARP 2007 and 2008).

Continuous monitoring took place at two representative population sites in the Hunter Valley (Muswellbrook and Singleton), and at two sites immediately adjacent to mining operations ('Glenville', and Rix's Creek). The 'Glenville' property is identified as Receptor Number 106 in the EA, and is located between Ashton mine and the current Integra operations.

Elemental composition of the samples collected showed that the PM₁ fraction had a greater proportion of combustion related emissions (that is, emissions from motor vehicles and power generation) and less contribution from local soils (that is, emissions that result from mining and agriculture).

Refer also to the results of research undertaken in 2008 by Associate Professor Barry Noller who found that air and water lead levels in the village of Camberwell and in proximity to Muswellbrook are significantly below the relevant national standards.

Table 4-2 compares the rate of hospitalisations and death due to asthma and chronic obstructive pulmonary disease (COPD), and death as a result of per 100,000 persons population in the Hunter & New England Health Area (which includes Singleton LGA) with NSW as a whole (NSW Health, 2008). These data show that the incidences of hospitalisation and death due to asthma or COPD are lower in the Hunter & New England Health Area (which includes Singleton LGA) than in NSW as a whole. There is a slightly higher incidence of hospitalisation due to COPD and deaths due to lung cancer.

**Table 4-2 Hospitalisations and Deaths due to Asthma, COPD and Lung Cancer
(Rates per 100,000 Population)**

Area Health Service	Asthma		COPD		Lung Cancer
	Hospitalisations	Deaths	Hospitalisations	Deaths	Deaths
	Rate per 100,000 persons population				
Hunter & New England AHS	169.9	1.63	227.5	26.4	34.9
NSW	198.0	1.72	236.3	24.0	34.0

ICO is committed to hazard identification and control and mining practices that reduce the risk of health impacts on the community in which it operates. ICO acknowledges that there is community concern around the issues of dust. Furthermore, ICO and the mining industry in general shares the community's desire for better scientific understanding of any impacts to enable more informed discussion and as a member of the NSW Minerals Council, partner with NSW Health where possible to address any health concerns that may arise regarding mining activities. Notwithstanding, ICO is of the opinion that any major study requires a comprehensive, transparent and inclusive approach to ensure that all health concerns are explored and addressed accurately. It should also be noted that the air quality standards that need to be met are set very high to protect the most susceptible people in our community such as children and the elderly and that the mining sector is the most highly regulated industry in NSW: there are more than 570 pieces of legislation filtering every step of a mining operation to ensure compliance.

The NSW Minerals Council, in association with NSW Health, has produced a Dust Fact Sheet for local mining communities. The Factsheet can be accessed at:

http://www.health.nsw.gov.au/pubs/2005/pdf/mine_dust.pdf

References

ACARP 2007

"Final Report: Characterising and Assessing Fine Particle Concentrations on the Hunter Valley – Implications of National Environment Protection Measures for the Coal Mining Industry" September 2007. ACARP Project C13036.

ACARP 2008

"Characterising and Assessing Fine Particle Concentrations on the Hunter Valley" April 2008. ACARP Project C15042.

NSW Health (2008)

“The health of the people of New South Wales - Report of the Chief Health Officer”, Population Health Division. NSW Department of Health, 2008. Available at: www.health.nsw.gov.au/publichealth/chorep/. Accessed 27th August 2009).

4.3.4 Health Effects – Dairy Farms

Submission Received

One submission identified increased eye irritation and running eyes amongst cattle and horses located in proximity to the Integra Open Cut. Feed covered in dust was raised as an issue.

Response

Two research trials have been conducted by Andrews and Srikantharajah (1992) to investigate the effects of coal mine dust on dairy farms in the Hunter Valley. These studies concluded that coal mine dust, at levels much higher than would be experienced in practice, had no effect on the production of dairy cows. Furthermore, the amount of soil ingested by dairy animals for typical grazing behaviour far outweighs the quantity of dust ingested by consumptions of deposited dust on the pasture.

Reference

Andrews A & Srikantharajah N (1992)

“Coal Mine Dust & Dairy Farming – The Answers”, New South Wales Coal Association, Newcastle.

4.3.5 Cumulative Air Quality Impacts

Submissions Received

Four submissions were received regarding the cumulative effect on air quality resulting from the number of open cut mines operating in the area including Ashton, Rix’s Creek, Mount Owen, Glendell and Ravensworth East. Issues raised included the cumulative effect of dust and impact on tankwater supply and human health.

Response

Impacts on tankwater quality and on human health are discussed in **Sections 4.3.2 and 4.3.3**. The air quality assessment for the Open Cut Project included an assessment of the cumulative impacts of particulate matter from the Open Cut Project and the Integra Underground Mine, together with those from nearby mining operations including Mount Owen, Rix’s Creek, Glendell, Ashton and Ravensworth East. The inventories used in the modelling included operations in the Open Cut Project Area, estimates of emissions from nearby mines, and allowance for emissions from other sources.

The predicted air quality concentrations were then compared against Department of Environment, Climate Change and Water criteria which are set to protect both health and amenity. Refer to Chapter 12 and Appendix G of the EA.

4.3.6 Greenhouse Effects

Submissions Received

One submission raised the issue of the contribution the mining industry makes to emissions of greenhouse gases.

Response

The enhanced greenhouse effect and climate change is recognised as a global environmental issue. Given the global nature of the issue and a requirement of the DGRs, a greenhouse assessment was carried out as part of the air quality assessment (refer Section 12.9 of the EA). This assessment included emissions from the extraction and processing of coal, the transport of product coal to Newcastle port, and the combustion of product coal for steel production and power generating facilities. The greenhouse gas assessment concluded that the emissions from the Open Cut Project would lead to an increase in global temperature of 0.00005°C.

4.4 Traffic

Submissions Received

Three submissions cited concerns regarding traffic flow increases.

Response

Activities associated with the proposed extension of the South Pit represent a continuation of existing activities. As such, the same workforce and contractor support levels will be utilised, and there would be no significant change in the existing number of vehicle movements to and from the site. The Environmental Assessment noted that even allowing for the maximum projected traffic generated by the Open Cut Project, Bridgman Road would continue to operate well below capacity.

4.5 Heritage

Submissions Received

One submission raised concern regarding damage done to St Clements Church and gravestones as a result of blasting activities in the area.

Response

The blasting assessment undertaken as part of the EA (refer to EA Section 11.10) concludes that all blast impacts are predicted to comply with the ANZEC guidelines, except for at the location of the nearest residential receptor (receptor No. 153).

Structural surveys have been undertaken in order to determine the impact of mining activities on St Clements Church and gravestones. Prior to 2007, Ashton Coal commissioned a structural engineer to review blasting data and undertake a structural survey. This survey concluded that no damage to the Church or gravestones could be attributed to mining activities. It is understood that individuals representing the Church community were not in agreement with the conclusions of the survey. A second survey was undertaken in 2007 (Bill Jordan & Associates 2007) by an engineer selected by individuals representing St Clements Church. The survey was paid for by Ashton Coal. The survey concluded that 'there is no evidence at St Clements Church, Camberwell, that it has been affected in any way by ground vibration. There are however, many indications that the building has been suffering damage from reactive

clay foundation movements for much of its life and that the recent second drought has worsened the movement in some locations'.

Further information on blasting is provided within the submission to DECCW (refer **Section 3.5.2**).

Measures implemented by ICO to manage impacts associated with blasting are further detailed in **Chapter 3 Response to Government Agency Submissions** and include:

- modelling of the predicted noise and overpressure using a site-specific blasting model developed by Terrock Consulting Engineers (Richards B. R and Moore A.J, 2006- 2008). The model is continually refined on the basis of monitoring results and new blast information;
- use of inert decking within the explosive column to manage MIC or charge mass;
- using smaller diameter blast holes;
- splitting overburden into two passes where the total thickness is greater than 10 metres;
- creation of a buffer of shot ground between the potentially affected property and production blasts;
- selection of a less dense explosive type;
- blast initiation sequences designed to direct vibration away from sensitive receivers;
- orientation of blast hole direction to blast across dominant rock joints and thereby ensure effective fragmentation at a reduced powder factor;
- control of cratering conditions around blast hole collars by using imported single sized aggregate as blast hole stemming and a minimum stemming depth of 15 times the hole diameter; and
- control of stemming ejection by setting minimum stemming heights nominally 4 to 5 metres in 229mm diameter blast holes (Terrock Consulting Engineers, Richards B. R and Moore A.J, June 2008).

4.6 Property Values

Submissions Received

Five submissions were received raising issues related to property values.

Response

Chapter 18 of the Environmental Assessment presents the objectives of the Open Cut Project. One of the key objectives is to design and operate the open cut operation in a manner that minimises surface disturbance and impact on the environment and surrounding residents. A detailed description of the design and operational management mitigation measures that have been or would be implemented to achieve this objective is presented in Chapter 17 and Chapter 18 of the Environmental Assessment. Briefly, Integra contends that it has minimised the likely impacts on surrounding residents to the greatest extent practicable.

Integra acknowledges that residents surrounding the Open Cut Project Area perceive that the project and other existing and proposed coal mining operations in the area have adversely affected property values in the vicinity of the project site. However, the Proponent would highlight the following.

- Existing coal mining operations in the vicinity of the Open Cut Project Area, namely Ashton, Mt Owen, Rixs Creek and Ravensworth East Open Cut Coal Mines and the Integra Underground Coal Mine produce approximately 16.4Mt per year of coal. The Open Cut Project would not increase annual coal production within the area.

- As stated in Chapter 16 of the Environmental Assessment, census data from 2001 indicates that 16.7% of employed persons within the Glennies Creek Community and the Singleton Local Government Area are employed within the mining industry. As mining-related positions are generally well remunerated, it is likely that property values within the wider Singleton Local Government Area are higher than they would otherwise be as a result of coal mining activities.
- Property values, and perceptions of property values, are influenced by many factors including soil fertility, water supplies, road access, aesthetic appeal, access to services and schools, distance from shopping centres and employment. It would be unreasonable to attribute any perceived decrease in property values to one factor or to one project alone.
- The project is located within an area where mining is a dominant land use. Property values in the area have continued to grow from a property 'value' perspective despite, or in spite of mining's existence in the region.

4.7 Hydrology and Surface Water

Submissions Received

Four submissions raised issues regarding the quality and the levels of water in Station Creek and Glennies Creek.

Response

Chapter 8 and Appendix D of the EA describe the surface water investigation undertaken for the project and demonstrates that the extension to the existing South Pit would have minimal impact on the surface water management strategy of the existing operation.

Integra currently has a surface water monitoring program which measures a range of water quality parameters at some 20 locations (including Station Creek and Glennies Creek) in the area surrounding its mining operations. The locations of surface water sampling points are shown in EA Figure 7-2 (Chapter 7 Groundwater). Water quality samples are collected on a monthly basis and sent for laboratory testing to determine a range of water quality parameters including pH, EC, TSS and TDS.

Integra would continue to collect samples from these locations and in addition would:

- collect grab samples along ephemeral watercourses such as Station Creek, during or immediately after surface runoff events;
- undertake monthly water quality sampling of water storages on the site; and
- undertake regular collection of data on water quality, storage water levels (including the Portal Sump) and pumping volumes between storages.

Collection of water quality and water level data assists in the validation of the existing water balance model and management of water within the Open Cut Project Area.

4.8 Socio-Economic

Submissions Received

One submission expressed support for the proposed project and identified the contribution ICO and other mines in the area make to employment and income generation at the local, regional, state and national level.

Response

Letter of support is noted. If the project does not proceed the economic benefits outlined within Chapter 16 of the EA will not be realised, including approximately 250 jobs associated with the Extended South Pit.

5 Response to R&D Hall Submission

The Part 3A application lodged by Integra seeks the Minister's approval for the extraction of up to 30 million tonnes of run of mine coal by open cut methods from an area to the north west of the existing South Pit. The northern half of the proposed mine area includes one privately owned property, "Dulwich" (Lot 8 DP 246434), which was purchased in 1983 by, and remains in the ownership of, R & D Hall. The "Dulwich" property is approximately 10ha in area and lies within land zoned 1(a) Rural under the Singleton Local Environmental Plan, 1996. Within the 1(a) Rural zone, the minimum area for rural/residential home sites is 40ha, thereby preventing further subdivision of this lot.

Integra or its predecessors has been willing to acquire the "Dulwich" property since 1990 and has actively sought to do so during the Integra Open Cut Project Application process. The Environmental Assessment lodged in respect of the Project includes an assessment of the likely environmental impact of the Project both in circumstances where:

- Integra acquires the "Dulwich" property from Mr and Mrs Hall; and
- Integra is unable to acquire the "Dulwich" property from Mr and Mrs Hall.

In this regard, Integra has assessed the likely environmental impact of both "Full Pit Extent" and "Part Pit Extent" alternatives in its Environmental Assessment.

The Minister's grant of Part 3A Approval for the Project on the basis of the Full Pit Extent design will not, by itself, confer a right on Integra to carry out the proposed mining activities on the "Dulwich" property: mining activities would only be able to be lawfully carried out on the "Dulwich" property following the grant of a mining lease over land including the "Dulwich" property. Having regard to the improvements on the "Dulwich" property, a mining lease under the Mining Act 1992 (NSW) which authorized mining in the Full Pit Extent area could not be obtained by Integra without first obtaining the written consent of the landowner of the "Dulwich" property.

The provision of the responses to the Hall submission, which was reportedly received by Department of Planning (DoP) on 7 August 2009 (following the 3 August 2009 closure of the public exhibition period), has been undertaken to assist the DoP and the Minister in the assessment of the above application and the formulation of appropriate conditions of approval. However, it should not be taken as a view on Integra's part that the Halls constitute "objectors" as defined in s.75L of the EP&A Act 1979.

The responses are provided under the headings identified in the submission, with sub-sections as appropriate depending on the content under each heading.

5.1 Context

5.1.1 "Prior to purchasing the Dulwich property in 1983, the geological data available at the time was assessed and the director of the company holding exploration rights was contacted. The director advised that the owner of Dulwich had been offering the property to the company for some time but the company did not want to purchase Dulwich. On the basis of this we purchased Dulwich as it appeared it would not be affected by mining which the director said would only be on the other side of the railway."

We are unable to comment on the veracity of these statements but, for the purpose of this submission, assume them to be true. However, we note that investigations undertaken on behalf of the Authorisation holder (Southlands Pty Limited) dated 1986, clearly identify the plan to mine in the South Pit, i.e. to undertake mining on the "Dulwich" side of the Main Northern Railway Line. We also note that the Authorisation had been granted in 1977 and that an examination of the available geological data prior to

the time of property purchase would have disclosed the presence of coal beneath and adjacent to the “Dulwich” property.

5.1.2. *“Prior to commencement of the current mining operations the company sent an agent, Trevor Hudson of Muswellbrook who told us that we would have to sell to the mining company. Knowing that we did not have to sell we objected to the mining proposal. Realizing there was virtually no chance of stopping it, we reluctantly entered into an agreement to withdraw our objections for the condition that the company would pay some compensation and buy the property using an agreed price mechanism for a certain period after mining commenced. At the expiration of that period, we were no longer restricted to object to the mining operations. That time has long passed and there is no agreement in force at present.”*

As with 5.1.1, we are unable to comment on the veracity of these historical comments, but note that although certain clauses of the Agreement between RHA Pastoral, Camberwell Coal and R & D Hall dated 12 February 1990 operated for a specified term, the Agreement itself and other clauses have no express time limitation on their operation, and the rights and obligations in them remain current.

5.2 Current Open Cut Mining Operations

5.2.1 “Dulwich” and Cultural Indifference

5.2.1.1 *“One of the Development Consent conditions is that the Dulwich property is not destroyed nor damaged.”*

The Halls’ comment above is incorrect. Rather, Condition 3 of DA105/90 dated 19 March 1990 states:

“The applicant shall take all necessary measures to ensure that the building known as “Dulwich” (Kangory) is not materially damaged by blasting arising from the development.”

Given that within the 1989 EIS, “Dulwich” was identified to be within the zone of affectation for the then proposed Camberwell Coal Project on the basis of air quality, noise and blasting, the use of the term “materially” in this condition could only realistically be interpreted to mean “substantially or significantly physically” damaged. It is also noted that under clause 19 of the 1990 Agreement formulated with the Halls, an amelioration fund was established and payments made to mitigate impacts of the Project. Further, clause 22 (which remains in force at this time) refers to the Proponent’s rectification of damage to improvements on the “Dulwich” property which in the view of the Owner were the result of blasting. The inclusion of this clause within the Agreement is a clear recognition on the part of both Camberwell Coal and the Halls of the potential for the Project’s blasting activities to impact on the various improvements on the property.

5.2.1.2 *“Dulwich” has historical significance for the Hunter area and arguably for a much larger areaAn architect’s report prepared by Suters and Busteed Pty Ltd.for the National Trust stated “Dulwich” is a fine example of a Victorian homestead, is well maintained and has a pleasant open nature.”*

Appendix I of the EA (summarized in Chapter 14) notes that:

- the standing structures comprising the “Dulwich” homestead are well known in the Singleton / Muswellbrook community but that the condition and integrity of the buildings appear reduced by deterioration although restoration is addressing this aspect;
- other contemporary, comparable homesteads exist in the local and wider area;
- the present “Dulwich” homestead is assessed to be locally significant at a representative level.

With respect to the Hall's quotation from Suters and Busteed Pty Ltd that "Dulwich is a fine example of a Victorian homestead, is well maintained and has a pleasant open nature", we note that the comment:

- appears on National Trust Real Estate Service letterhead and was used by LJ Hooker when advertising the property for auction in 1982. The National Trust Real Estate Service is a service provided by the National Trust as a way of advertising historic homes for sale and, with regard to the properties the Service lists for sale, notes: "No warranty given. You should seek your own independent advice as to the accuracy of the information provided;" and
- presents the property from an architectural perspective only, with no investigation as to its significance other than to identify its date of construction and that it is a fine example of Victorian architecture (which dates anywhere between the 1840s and 1901).

5.2.1.3 *"The company has no real consideration for local residents or cultural items. The company states that its preference is to completely destroy Dulwich forever as well as all related cultural and historical items and if it can't acquire Dulwich then it will 'extract the coal reserves to the limits permissible under the Mining Act 1992.' It is not even prepared to increase the distance to reduce damage . . . Its sole justification for this appears to be that is just locally and regionally significant but not unique. If this was accepted then it would follow that any other historically significant building could be totally destroyed forever as long as just one was left as an example. Australia already has very limited historical buildings and destroying or damaging more should not be agreed to."*

The Open Cut Project as presented in the EA is the result of an iterative process which considered the Company's obligations to maximize resource recovery under the terms of its mining tenements, and the potential impact on all aspects of the environment including local residents and cultural items (see Chapters 3 to 16 inclusive).

With respect to the Halls' comments that the justification for acquisition and demolition of the house is that it is "locally and regionally significant but not unique" and "that if this was accepted then it would follow that any other historically significant building could be totally destroyed forever as long as just one was left as an example", it is worth reiterating the way in which heritage laws are applied.

The overall aim with heritage management is to find a balance between the ways in which we can preserve our history and heritage but continue to support ourselves into the future. This includes development of many kinds, whether it is residential subdivisions, duplication of rail corridors and/or mining. The guidelines that are used to assess significance attempt to sort those items which have already become rare into State relics, with others falling into the local category.

The recent changes to the Heritage Act reflect a need to more accurately define a relic and this has been driven by the development sector. Previously any item 50 years or more was considered a relic. This has now been changed to:

... any deposit, artifact, object or material evidence that:

- (a) relates to the settlement of the area that comprised New South Wales, not being Aboriginal settlement, and
- (b) is of State or local heritage significance.

This is a reflection of the need to balance the retention of some examples of our heritage and the need for development to sustain us into the future, without catching too many items under the Heritage Act.

In short, the application of current heritage laws and the assessed heritage significance of the property is not a case in itself to justify its retention.

As a consequence of that process, the Company identified and committed to a range of practicable and economically feasible safeguards or management procedures to minimize the likely impacts including:

- development of a Conservation Management Plan to minimize and monitor any negative impacts of the open cut should the property not be acquired, i.e. only the Part Pit Extent is developed; and
- excavation, exposure, recovery and analysis of material evidence and the facilitation of its interpretation and reporting to the wider community (and posterity) as a contribution to the currently limited archaeological record which is currently locked and not available to the historical or archaeological record.

Notwithstanding Integra's endeavors and commitments, there will be some negative impacts.

However, as identified in Chapter 18: *"On considering the balance of environmental and community impacts, it would be reasonable for the Minister to conclude that the State, regional and local benefits of the Open Cut Extension and the Open Cut Project as a whole outweigh the limited adverse impacts."*

The EA clearly states that Integra's preference would be to mine through "Dulwich" as a means of maximizing resource recovery and the associated benefits to the State, regional and local communities and economies, and the Company. However, with respect to "Dulwich", that approach was only adopted following a detailed assessment of the heritage of the existing above ground structures and their significance locally, regionally and to the State in terms of their historical, social and scientific values.

5.2.2 Blasting Damage

"The physical condition of Dulwich has been monitored by engineers paid by the company. Observation of these records shows increased damage, particularly cracked brickwork since mining commenced. Prior to mining commencing, the buildings had survived the climatic extremes of over 100 years and the Newcastle Earthquake and was structurally sound" and "Based on the Company's mining activities to date we . . . do not believe that the mining Company is capable of blasting with its proposed close proximity to our property without producing significant damage . . . we have already had to endure a reduced quality of life living in a damaged building constantly in need of work to fix mine induced damage."

In accordance with the Agreement with the Halls, inspections of the improvements to the "Dulwich" property have been undertaken on nine occasions since the execution of the Agreement, initially in May 1990 (prior to the commencement of mining operations) and subsequently in May 1994, September 1995, August 1997, February 1999, February 2001, April 2003, May 2004 and March 2005.

The 1990 (pre mining) report prepared by Wood and Grieve Pty Ltd, Engineers, notes:

"The Hall residence exhibits a number of building defects, primarily as cracking in brickwork. The building is over 100 years old and as such would have experienced some severe loading

conditions through wind, rain and earthquake. The mortars of the era did not include cement and repainting has occurred where the atmospheric elements have removed some of the mortar or where general movement and hence cracking has occurred.

The relatively weak mortar, the age of the building and the articulated sandstone block footings would appear to be the main reason why the building has so much cracking."

Subsequent inspections have identified an increase in the number of defects such as cracking in internal plaster work, but in none was the damage attributed to activities at the mine.

A selection of statements from the various inspectors' reports which are relevant to the Hall's statements regarding blasting – induced damage are presented below.

The 1994 Report – with respect to additional defects noted between 26 May 1990 and 21 May 1994, which primarily comprised wall and cornice cracking, recorded that:

"... none of the above was considered serious or of structural concern and could be considered to be due to normal wear and tear.

Ceiling and cornice cracking can be due to expansion and contraction of roof timbers. The wall cracking can occur due to general building movement . . .

*We understand that mining activities will proceed closer to the Hall's residence in 1995. The likely increase in perceptible overpressure and ground vibration effects may cause the Hall's some discomfort and may also cause them to notice **what they consider** to be, new cracks. [Our emphasis]*

This situation is complicated by the fact that renovation of the house is gradually continuing and cracking of new work is probably going to cause more concern than the existing cracks. It should be noted that all new work in [an] old house can still exhibit cracking due to general material shrinkage and movement and is likely to occur to some extent in any environment".

The 1994 Report also recommended that a geotechnical investigation to determine the soil classification be undertaken. This investigation, undertaken by Douglas Partners, predicted surface movements of between approximately 30mm and 50mm, corresponding to a Class H, highly reactive site classification. The Douglas Partners report also notes that *"When reasonably rigid structure such as the subject house have been constructed in reactive soils, then some minor cracking of masonry walls is almost inevitable despite proper design, construction and maintenance."*

The 1999 Report, which assessed the condition of the building at the time and the outcomes of the previous investigations, noted that:

"Generally the damage which is evident in the building can be summarised as:

- 1. The existence of large areas of 'drummy' render together with varying degrees of cracking ranging from hairline width to patches missing from the walls;*
- 2. Separation between plaster cornices and walls and at mitres in cornices;*
- 3. Separation at joints in plaster ceiling panels;*
- 4. Minor cracking to joints in brickwork;*
- 5. Evidence of the existence of previous dampness in walls and ceilings;*
- 6. Various cosmetic items including flaking paintwork to walls and ceilings, lifting of wallpaper at joints, cracking of marble fireplace surrounds, cracked wall tiles, loose skirting boards and loose picture rails; and*
- 7. Settlement and cracking of external concrete paving slabs.*

In addition Mr. Hall advised me that he believed that pipework was broken below concrete slabs in wet areas."

We also note that in Annex A to BS7385: Part 2 "Evaluation and Measurement for Vibration in Building Part 2" which is referred to in AS 2187: Part 2 – 2006 as being applicable to Australian conditions, it states that "... a small increase in cracks or crack length should not be taken as damage due to any imposed vibration. Buildings also expand and contract preferentially along existing weaknesses (cracks) between daytime and night-time and also seasonally. This continually varying expansion and contraction will return normal painting and repair to the previous cracked state within several years or even months."

The 1999 Report also included some comments on the general effects of blasting and made the following comments which are relevant to the Hall submission.

"As to the effect of blasting operations, I note that Richard Heggie Associates Pty Ltd in their paper, 'Blast Vibration and Airblast Overpressure' presented to the 1991 Environmental Workshop at Singleton NSW defined the following three levels of observed response for old plaster and lath homes subjected to experimental blast vibration:

a	Threshold	Opening of old cracks and formation of new plaster cracks, dislodging of loose objects (eg loose bricks in chimneys)
B	Minor	Superficial, not affecting the strength of the structures (e.g. broken windows, loosened or falling plaster) hairline cracks in masonry.
C	Major	Resulting in serious weakening of the structure (e.g. large cracks or shifting of foundations or bearing wall, major settlement resulting in distortion or weakening of the superstructure – walls out of plumb.

In their studies they found that threshold cracking first appeared at 76 mm/sec, minor cracking appeared at 114 mm/sec and major at 203 mm/sec. They also noted that these levels were at or below those necessary to cause cracks that normally appear in a home as the result of the natural ageing process.

The existence of 'drummy' render, where the render and set plaster has separated from the brick walls, is part of the natural ageing process of a building resulting from differential movement of dissimilar materials causing a break down of the bond between them and creating a void.

Render which is in this condition is unstable and since it has negligible tensile strength, cracks result from levels of vibration as low as that produced by a passing truck or a punch from a fist. Small cracks would be caused initially, and overtime, and with further vibration and normal building movement, these would increase in size and number until lumps of render become dislodged from the wall.

The blast monitoring records which are set out earlier in this report record a maximum ground vibration level of 18 mm/sec which is considerably less than that which Richard Heggie Associates Pty Ltd would expect to cause damage to property other than dislodgement of drummy render.

A comparison of the current condition of the house and its condition during earlier inspections do not indicate any appreciable deterioration of the building over time.

My conclusion is that the "Dulwich" property is not suffering from any structural defects and that it is in very good condition for its age and materials of construction." [Our emphasis]

The 2001 Inspection Report noted the same comments as the 1999 report but also noted the stables as being in an unsafe condition.

The 2003 Report noted the same nature of defects as in the 1999 and 2001 reports, but recorded an increase in deterioration over time, including the re-appearance of previously repaired damage. Again the inspection concluded that the “Dulwich” property [house] is not suffering from any structural defects but noted that *“many areas of render and set plaster to the walls are, however, drummy such that its bond to the base brickwork has broken down. The render is unstable and over time hairline cracks will increase in size and major cracking will develop and if not repaired will result in areas of render falling from the walls.”*

With respect to the stables, the report also noted *“the old stables have deteriorated further since my last inspection and there is evidence of the western wall having rotated outwards to a greater extent. It is my opinion that this building is in a dangerous state and, unless it is either repaired or propped then it will collapse in time.”*

In a 2006 letter report to Camberwell Coal, Terrock Consulting Engineers, when discussing a conservative ground vibration level at “Dulwich” to prevent cosmetic damage, noted that the brick walls of the stables were susceptible to collapse from further rain and should be stabilized to *“ensure that future collapse cannot be blamed on ground vibration”*. That same report, when discussing the prevention of cosmetic damage to buildings, noted that: *“if we ignore human response and concentrate on structural integrity alone, a ‘safe’ ground vibration level at the Dulwich monitor is 12.7mm/s peak component velocity. The ppv equivalent ranges from 12.7 to 22.0mm/s”*.

Similar comments were made in the 2005 Report.

Further to the above, it is worth reproducing the text from EA Appendix F, Section 13 regarding ground vibration, airblast and structural damage.

“GROUND VIBRATION - STRUCTURAL DAMAGE CRITERIA

In terms of the most recent relevant blast vibration damage criteria, British Standard 7385:Part 2-1993 *“Evaluation and Measurement for Vibration in Buildings Part 2”* is a definitive standard against which the likelihood of building damage from ground vibration can be assessed. This is the Standard recommended in Australian Standard AS 2187: Part 2-2006 *“Explosives - Storage and Use - Part 2: Use of Explosives”* as the guideline values and assessment methods *“are applicable to Australian conditions”*.

Although there is a lack of reliable data on the threshold of vibration-induced damage in buildings both in countries where national standards already exist and in the UK, BS 7385:Part 2 has been developed from an extensive review of UK data, relevant national and international documents and other published data. The standard sets guide values for building vibration based on the lowest vibration levels above which damage has been credibly demonstrated. These levels are judged to give a minimum risk of vibration-induced damage, where minimal risk for a named effect is usually taken as a 95% probability of no effect.

Sources of vibration which are considered in the standard include blasting (carried out during mineral extraction or construction excavation), demolition, piling, ground treatments (eg compaction), construction equipment, tunnelling, road and rail traffic and industrial machinery.

As the strain imposed on a building at the foundation level is proportional to the peak particle velocity, but is inversely proportional to the propagation velocity of the shear or compressional waves in the ground, this quantity (ie peak particle velocity) has been found to be the best single descriptor for correlating with case history data on the recurrence of vibration-induced damage.

The guide values from this standard for transient vibration judged to result in a minimal risk of cosmetic damage to residential buildings and industrial buildings are presented numerically in **Table 5-1** and graphically in **Figure 5-1**.

Table 5-1 Transient Vibration Guide Values for Cosmetic Damage

Line	Type of Building	Peak Component Particle Velocity in Frequency Range of Predominant Pulse	
		4 Hz to 15 Hz	15 Hz and above
1	Reinforced or framed structures Industrial and heavy commercial buildings	50 mm/s at 4 Hz and above	
2	Unreinforced or light framed structures Residential or light commercial type buildings	15 mm/s at 4 Hz increasing to 20 mm/s at 15 Hz	20 mm/s at 15 Hz increasing to 50 mm/s at 40 Hz and above

In the lower frequency region where strains associated with a given vibration velocity magnitude are higher, the guide values for the building types corresponding to Line 2 are reduced. Below a frequency of 4 Hz where a high displacement is associated with the relatively low peak component particle velocity value, a maximum displacement of 0.6 mm (zero to peak) is recommended. This displacement is equivalent to a vibration velocity of 3.7 mm/s at 1 Hz.

The standard goes on to state that minor damage is possible at vibration magnitudes which are greater than twice those given in **Table 5-1** and major damage to a building structure may occur at values greater than four times the tabulated values.

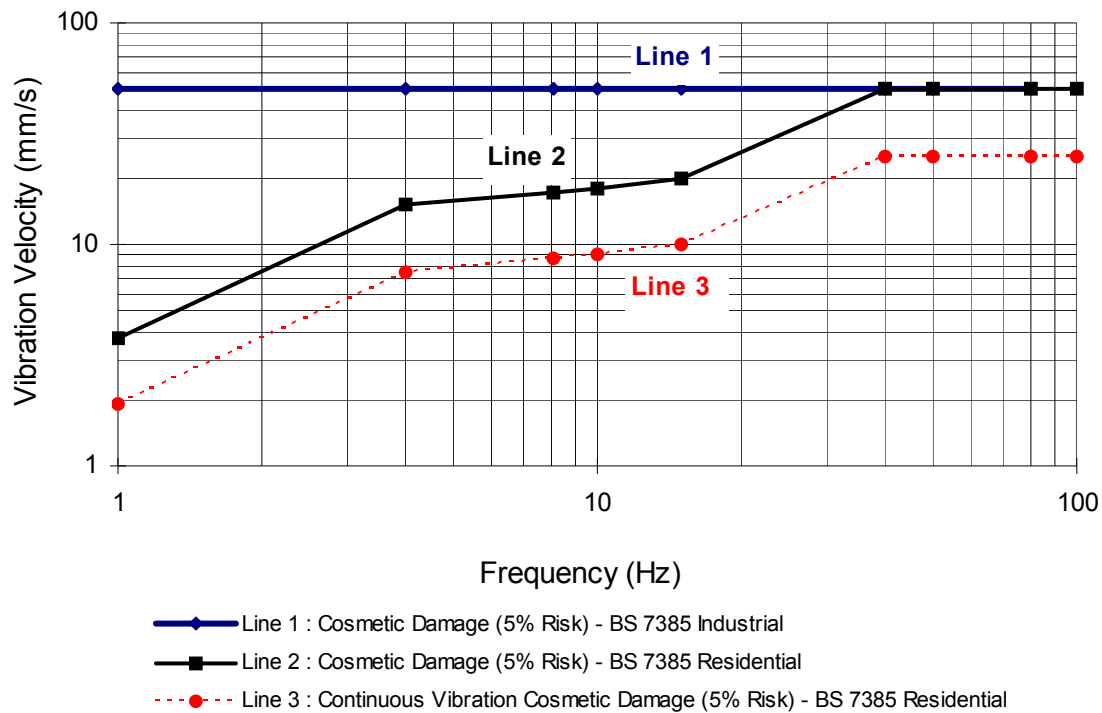
Fatigue considerations are also addressed in the standard and it is concluded that unless calculation indicates that the magnitude and number of load reversals is significant (in respect of the fatigue life of building materials) then the guide values in **Table 5-1** should not be reduced for fatigue considerations.

It is noteworthy that extra to the guide values nominated in **Table 5-1**, the standard states that:

“Some data suggests that the probability of damage tends towards zero at 12.5 mm/s peak component particle velocity. This is not inconsistent with an extensive review of the case history information available in the UK.”

Also that:

“A building of historical value should not (unless it is structurally unsound) be assumed to be more sensitive.”

Figure 5-1 Graph of Transient Vibration Guide Values for Cosmetic Damage**AIRBLAST - STRUCTURAL DAMAGE CRITERIA**

Based largely on work carried out by the US Bureau of Mines, the US Office of Surface Mining has presented the following regulatory limits for airblast from blasting (depending on the low frequency limit of the measuring system):

Low Frequency Limit	Peak Airblast Level Limit
2 Hz or lower	132 dB Linear
6 Hz or lower	130 dB Linear

These levels are generally consistent with the level of 133 dB Linear nominated in AS 2187.2-2006.

The US criteria are structural damage limits based on relationship between the level of airblast and the probability of window breakage, and include a significant safety margin. It has been well documented that windows are the elements of residential buildings most at risk to damage from airblast from blasting.

While cracked plaster is the type of damage most frequently monitored in airblast complaints, research has shown that window panes fail before any other structural damage occurs (USBM, RI 8485-1980). The probabilities of damage to windows exposed to a single airblast event are as shown in **Table 5-2**.

Table 5-2 Probability of Window Damage from Airblast

Airblast dB Linear	Level kPa	Probability of Damage	Effects and Comments
140	0.2	0.01%	"No damage" - windows rattle
150	0.6	0.5%	Very occasional failure
160	2.0	20%	Substantial failures
180	20.0	95%	Almost all fail

HUMAN COMFORT AND DISTURBANCE CONSIDERATIONS

The ground vibration and airblast levels which cause concern or discomfort to residents are significantly lower than the damage limits. Humans are far more sensitive to some types of vibration than is commonly realised. They can detect and possibly even be annoyed at vibration levels which are well below those causing any risk of damage to a building or its contents.

The criteria normally recommended for blasting in NSW, based on human discomfort, are contained in the DECC's Environmental Noise Control Manual (Chapter 154). However, for recent projects the DECC has advocated the use of the Australian and New Zealand Environment Council (ANZEC) guidelines *"Technical Basis for Guidelines to Minimise Annoyance Due to Blasting Overpressure and Ground Vibration"* (ANZEC guidelines) for assessing potential residential disturbance arising from blast emissions."

Based on the above comments, it is apparent that the "damage" wrongly attributed by the Halls solely to the Company's blasting activities, is a function of the site and age and construction of the building. It is also noteworthy that a review of our files indicates that, apart from the owner, only one person, a restoration tradesman commissioned by the Halls, has identified blasting to be the cause of the damage/change in the condition of the "Dulwich" residence over time.

Other investigations relevant to the purported damage to "Dulwich" from activities at the mine include the 2004 investigation by Terrock Consulting Engineers as to the "Potential for Ground Vibration to Damage Buried Sewer Pipes".

These investigations noted that:

"Ground movement can be due to variable moisture conditions of reactive clay soils; surface movements of 20-40mm are common in the Hunter Valley . . .

Because of the potential small surface deflections from blasting operations at Camberwell Coal compared to the potential soil movement from reactive soil, it is concluded that blast vibration is not responsible for damaged ceramic pipes that received a peak vibration level of about 25mm/s. Damage from ground vibration may be expected if ground vibration levels approach several hundred millimetres per second."

Despite the lack of evidence that the changes to "Dulwich" over time are a result of blasting or any admission from the Company in this regard, in accordance with the Agreement, Camberwell Coal and Integra have paid for repair works at the house when requested. There are no requests outstanding.

5.3 Proposed Mining Extension

5.3.1 Assessment and Approval Process

5.3.1.1 *“Any extension should be a completely new Environmental Assessment, Lease and development application as the current lease is due to expire in 2011 and this is a new application.”*

This statement appears to indicate that the Halls have misunderstood the nature of the Project Application. Section 1.1 of the Environmental Assessment clearly states that the Integra Open Cut Project Application is not only seeking to extend the existing South Pit but also:

- the long-term use of the CHPP, train loader, infrastructure and facilities required for or to support mining, processing and dispatch of coal from the open Cut Project; and
- replace the current approvals (DA 86/2889) and PA 06_0073 with a single consolidated approval with the matters addressed within the Environmental Assessment reflecting the Application and being consistent with those identified in the Director-General's requirements.

Renewal of CL357 will occur in 2011 regardless of the outcome of the Part 3A approval process as CL357 includes areas of the approved North Open Cut (MP06_0073) operation as well as the CHPP, train loader, infrastructure and facilities which also support the Integra Underground operations. However, additional tenement(s) are also required to enable the extension of the South Pit and can only follow the receipt of the Project Approval.

5.3.1.2 *“There were some anomalies with the north pit approval process which should not be repeated.”*

We have no knowledge of the anomalies referred to in the above and therefore are unable to make any comment in this regard.

5.4 Air Quality

5.4.1 Health concerns

As discussed in the response to comments by JH and MR Moore and Wendy Bowman (see Section 4.3.3 in Submissions Report), the incidences of hospitalisation and death due to asthma or chronic obstructive pulmonary disease (COPD) are lower in the Hunter & New England Health Area (which includes Singleton LGA) than in NSW as a whole, although there is a slightly higher incidence of hospitalisation due to COPD and deaths due to lung cancer.

5.4.2 Contribution At Other Residential Areas

“Integra open cut is a significant contributor to dust for surrounding properties and residential areas such as The Retreat, Singleton Heights, Hunter View Estate and Singleton. Any extension would (sic) extend the duration of high dust levels in all these areas.”

In the EA, dust levels were assessed at all residences with any potential for impact from Integra's operations, including Residence 142 which is located between the mine and Singleton. This residence is closer to the mine and, consequently, more affected by the mine than the residential areas such as The Retreat, Singleton Heights, Hunter View Estate and Singleton.

As shown in **Table 5-3**, the contribution that Integra makes to dust levels at Residence 142 is more than would occur in the residential areas of Singleton. However, it is significantly below the applicable impact assessment criteria.

Table 5-3 Summary of predicted PM10, TSP and dust deposition levels at Residence 142

PM10 ($\mu\text{g}/\text{m}^3$)		TSP ($\mu\text{g}/\text{m}^3$)	Dust deposition ($\text{g}/\text{m}^2/\text{month}$)	PM10 ($\mu\text{g}/\text{m}^3$)	TSP ($\mu\text{g}/\text{m}^3$)	Dust deposition ($\text{g}/\text{m}^2/\text{month}$)
24-hour	Annual	Annual	Annual	Annual	Annual	Annual
<i>Assessment Criteria</i>						
50	30	90	2	30	90	4
FULL PIT EXTENT						
Year 1 Project only				Year 1 Project & other sources		
9	1	2	0.1	15	48	1.1
Year 4 Project only				Year 4 Project & other sources		
10	2	2	0.2	15	48	1.1
Year 6 Project only				Year 6 Project & other sources		
9	1	1	0.1	15	48	1.1
Year 8 Project only				Year 8 Project & other sources		
11	2	2	0.2	15	48	1.1
PART PIT EXTENT						
Year 3 Project only				Year 3 Project & other sources		
10	2	2	0.1	15	48	1.1
Year 6 Project only				Year 6 Project & other sources		
9	2	2	0.2	15	48	1.2

5.4.3 Disturbed Areas and Haulage

“With a proposed pit mining area of 162 [sic] hectares and “disturbance to and/or clearing of vegetation within a total area of 283ha [sic] that is a significant amount of disturbed ground for generation of airborne dust. In addition to this extra disturbed area there are increased haul distances for both coal and overburden from the western extension to the coal preparation plant for coal and the current south pit for overburden dumping.”

The dispersion modelling completed for the air quality assessment took full account of the impacts due to the emissions of particulate matter arising from haulage and wind erosion from exposed areas.

Table 5-4 presents a summary of the exposed areas included in each year of the assessment for both the Full Pit Extent and Part Pit Extent.

It is noted that not all the exposed areas will be in active use at all times, however, the air quality assessment has conservatively assumed that they will be.

The air quality dispersion modelling presented in the EA also took full account of the length of the haul routes for the transfer of topsoil (where applicable), waste rock and coal.

Table 5-4 Summary of exposed areas in air quality dispersion modelling for Western Extension (ha)

Year	Open pit area (ha)	Waste rock spoil area (ha)	Topsoil extraction areas (ha)	Stockpile areas (ha)	Total (ha)
Full Pit Extent					
1	50	107	22	17	196
4	90	138	40	26	294
6	70	118	-	11	199
8	52	170	-	11	233
Part Pit					
1	50	107	22	17	196
3	52	120	7	14	193
6	47	181	-	11	239

5.4.4 Dust Monitoring at Residence 153

“At our residence, dust levels have exceeded the mine’s worst case predictions with TSP > 150 µg/m³ compared to the danger level of 90 µg/m³. Integra wrote to us stating “Total Suspended Particulates (TSP) levels from the monitor located on your property exceeded the NSW DECC Impact Assessment Criteria and our predicted worst case scenario” and “fine particles in this total suspended concentration may exceed accepted health impact criteria”. An accompanying graph showed a 12 monthly rolling average peaking above 150 µg/m³ around November 2007 gradually declining to a bit under 120µg/m³ in August 2008 (the most recent data shown). The 2008 average was also just under 120µg/m³. Other graphs showed the PM10 , PM2.5 and depositional dust for two monitoring points but omitted our monitoring points. PM10 is often about 40% of TSP. For the 150 reading the PM10 would be 60 which is twice the 30 level of the NSW DECC standard. The PM2.5 would also be well above the standard”.

It is noted that measured annual average TSP levels at Residence 153 exceeded the impact assessment criteria of 90 µg/m³ in 2007 and 2008. Chapter 6 of Appendix G of the EA (Air Quality Assessment) presents a detailed assessment of the monitoring data collected in the vicinity of the Integra operations. PM10 data are not collected at Residence 153, while PM2.5 data are not collected by Integra at any location.

The June 2004 Statement of Environmental Effects (SEE) predicted TSP concentrations at Residence 153, i.e. within the existing Camberwell Coal (now Integra Coal) zone of affection would exceed criteria. As such, Residence 153 is not subject to the 90 µg/m³ criterion (please refer to **Figures 5-2** and **Figure 5-3** which provide copies of communication between Integra Coal and Department of Planning dated February 2009).



NSW GOVERNMENT
Department of Planning

Major Project Assessment
Industry & Mining
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Room 305
23-33 Bridge Street
GPO Box 39
SYDNEY NSW 2001

Ms Aislinn Farnon
Environment and Community Advisor
Integra Coal Operations Pty Ltd
PMB 7
SINGLETON NSW 2330

Our Ref: S03/00187

Dear Ms Farnon,

Integra Coal 2007-2008 Annual Environmental Management Report

- Thank you for forwarding the 2007-2008 Integra Coal Annual Environmental Management Report (AEMR) for the Department's consideration. The Department has reviewed the AEMR and is generally satisfied with its content, format and presentation. However, the Department requires further clarification and/or information on the following:
- data recovery for BM2, which only recorded approximately 47% of all blasts over the AEMR reporting period. The Department requests that Integra provide a full description of measures being taken to ensure comprehensive data recovery in the future;
 - a copy of the noise surveys conducted; and
 - data in section 3.2.2 and Appendix 4 show that the annual average TSP result for High Volume Air Sampler 2 was 119.3 $\mu\text{g}/\text{m}^3$, significantly exceeding the EIS's modelled annual average "worst case" scenario of 105.6 $\mu\text{g}/\text{m}^3$. While it is noted that this site is within the zone of affectation and therefore not subject to the 90 $\mu\text{g}/\text{m}^3$ emissions criterion, there is no discussion of the causes of the exceedance of the maximum modelled criteria or its significance. The Department requests that Integra provide further detailed information on the exceedance of the modelled scenario, and indicate whether affected residents have been notified of the exceedance.
-

The Department requires Integra Coal to provide a response to these matters by 27 February 2009.

Should you wish to discuss this matter further, please contact Belinda Parker on 9228 6306.

Yours sincerely,

Howard Reed
Howard Reed
A/Manager
Industry & Mining
10.2.09.

Figure 5-2 Letter from Department of Planning to Integra

INTEGRA COAL

INTEGRA COAL OPERATIONS PTY LTD
653 Bridgman Road, Singleton N.S.W.
PMB 7, Singleton 2330
Phone: 61 + 02 65702111
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ABN 96 118 030 998

23rd February 2009

Mr and Mrs R G Hall
Dulwich
Middle Falbrook Rd
SINGLETON 2330

Dear Mr and Mrs Hall,

High Total Suspended Particulate Levels 2007-2008

As discussed between yourself and Colin Davies on the 20th February 2009, Integra Coal advises that the Total Suspended Particulates (TSP) levels from the monitor located on your property exceeded the NSW DECC Impact Assessment Criteria and our predicted worst case scenario in the last Annual Environmental Management Report period. While the NSW DECC impact criterion of 90µg/m³ TSP does not apply due to the location of the property, inside the Camberwell Coal "zone of affectation", Total Suspended Particulate levels are higher than predicted and fine particulates in this total suspended concentration may exceed accepted health impact criteria. Our predicted worst case scenario is modelled on Integra Coal Operations and did not take into account any new cumulative impacts from other operations and dust sources. The dust concentrations monitored do not define the source of the material.

For your information, I have enclosed the latest results from the Annual Environmental Management Report and a copy of the NSW Department of Health Factsheet "Mine Dust and You"

Please do not hesitate to call me on 0265 702168 if you have any questions or require additional information.

Yours sincerely,

Aislinn M. Farnon
Environment and Community Advisor
Integra Coal Open Cut

Figure 5-3 Response from Integra to Letter from Department of Planning

With the proposed additional controls (as detailed in **Section 5.4.5**), the predicted annual average TSP concentrations at Residence 153 are significantly reduced.

5.4.5 Predicted Exceedances and Implementation of Additional Controls

“The EA at 18.2.1, on air quality states that “exceedances were predicted for a total of 11 private residences”. Three residences ‘would be impacted by dust levels exceeding the 24-hour average PM10 assessment criteria (98.6th percentile) of 50µg/m³’ and all eleven “would be impacted by dust levels exceeding the annual average PM10 assessment criterion of 30µg/m³”. Our residence “would be impacted by dust levels exceeding the TSP assessment criterion of 90µg/m³ for the project and other mines and other sources and by the annual average 2gm/m²/month (insoluble solids) deposition level criterion from the Open Cut Project alone. Our residence and one other “would be impacted by dust levels exceeding the annual average 4gm/m²/month (insoluble solids) deposition level assessment criterion from the Project and other mines and other sources.”

The dispersion modelling completed for the air quality assessment presented in the EA was conservative in its assessment, with the dust emission controls a compromise between those which were considered feasible and the operational efficiency (which directly impacts the economic viability) of the Western Extension.

As the concentrations at Residence 153 presented in the EA in Year 1 and Year 3 (of the Part Pit extent) were predicted to exceed the current NSW DECCW impact assessment criteria, Integra have investigated implementation of a range of controls, additional to those presented in the EA, to reduce these impacts. As a consequence of these investigations, the following additional controls have been identified as providing the most effective reduction in impacts compared with those predicted in the EA.

Integra commits to the implementation of each of these additional controls during the mining activities in Years 1 to 3 of the Part Pit Extent inclusive, i.e. unless it is able to acquire Residence 153 or negotiate an agreement with the owner. By Year 6, the predicted impacts of the proposed operations meet all air quality criteria at “Dulwich” and, as such, these additional controls are not deemed necessary.

- The main waste and coal haul routes in both Year 1 and Year 3 were positioned in the EA to minimise haul distances, and consequently the wheel generated dust associated with materials movement. However, on review it was identified that the roads were also positioned in direct alignment with the prevailing wind directions towards Residence 153. These roads have been relocated in order to make significant reductions in dust impact at Residence 153 (see **Figures 5-4 to 5-7**).
- Main haul roads will be treated beyond the level of routinely applied control of 75% (as assumed in the EA). This would involve the use of water carts to maintain suitable surface moisture content and/or chemical suppressants.
- In Year 1, the EA showed a large area of soil removal from an area directly south of Residence 153. This was identified as being a major contributor to the predicted impacts at the residence. Soil removal will no longer occur throughout Year 1. Rather, this work will be undertaken as a pre-operational campaign involving :
 - contour ripping of the upper layer with a dozer or other suitable earthmoving or agricultural equipment followed by prolonged water application in order to increase the normal soil moisture content significantly and thereby limit the dust produced when the soil is handled;
 - a nominal three-month campaign to construct an environmental bund, preferably when the prevailing winds blow away from Residence 153, i.e. the operations would be
 - managed such that if the prevailing direction of significant dust-generating wind is identified to be unfavourable to Residence 153, operations would be modified; and
 - expedited vegetation of the bund.

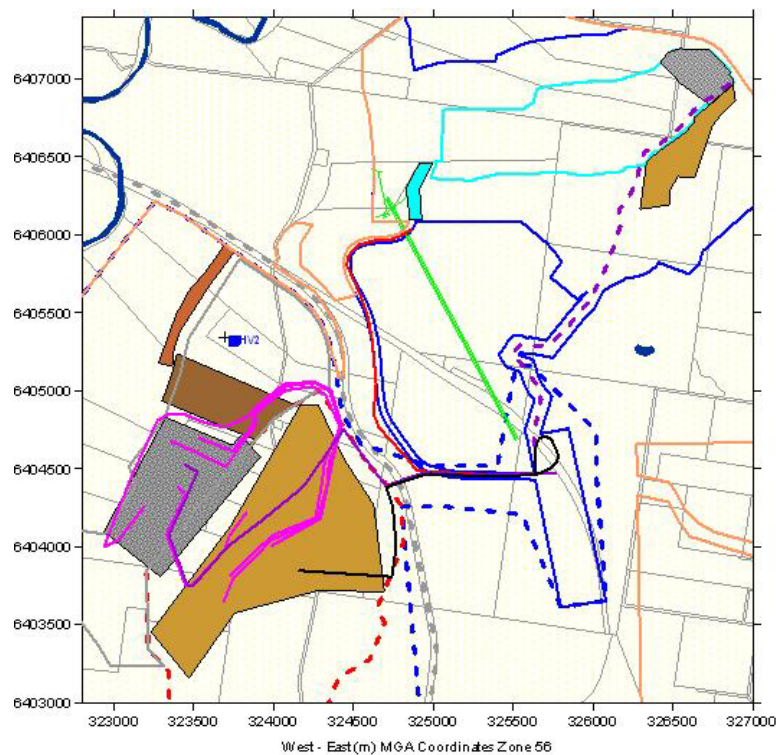


Figure 5-4 EA Year 1 Layout

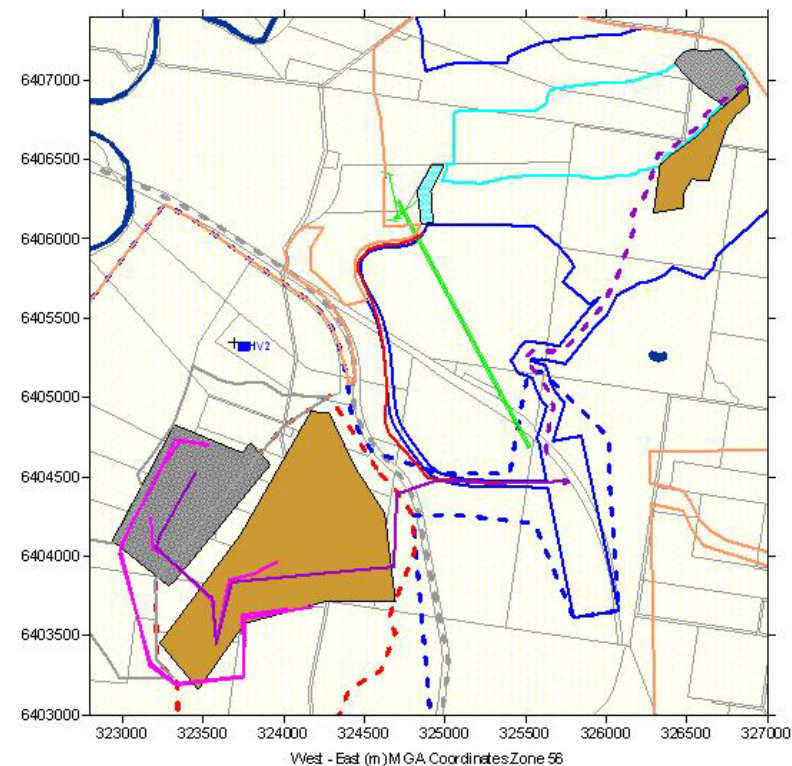
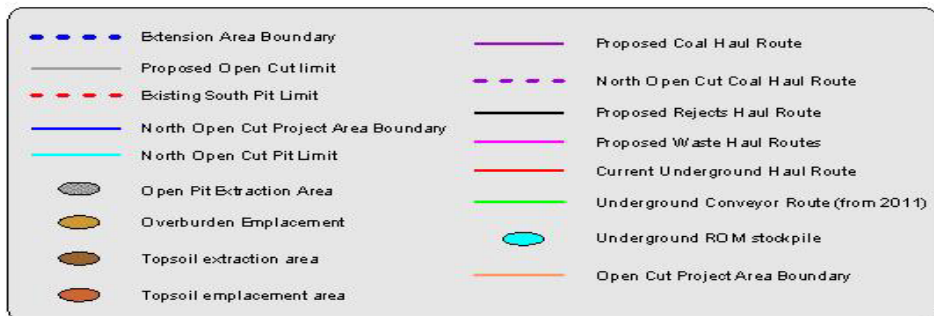


Figure 5-4 Year 1 Revised Layout

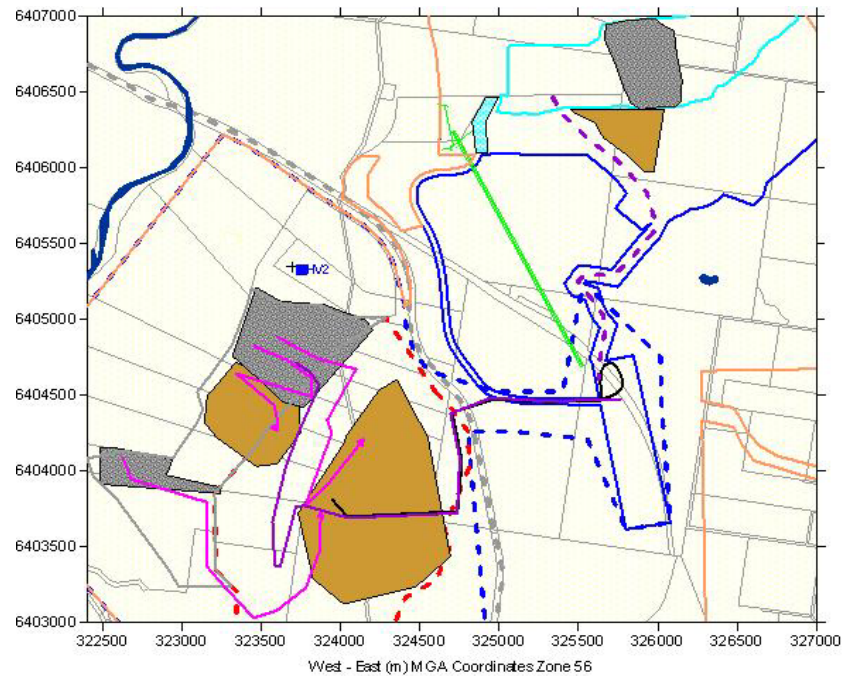


Figure 5-6 Year 3 Layout

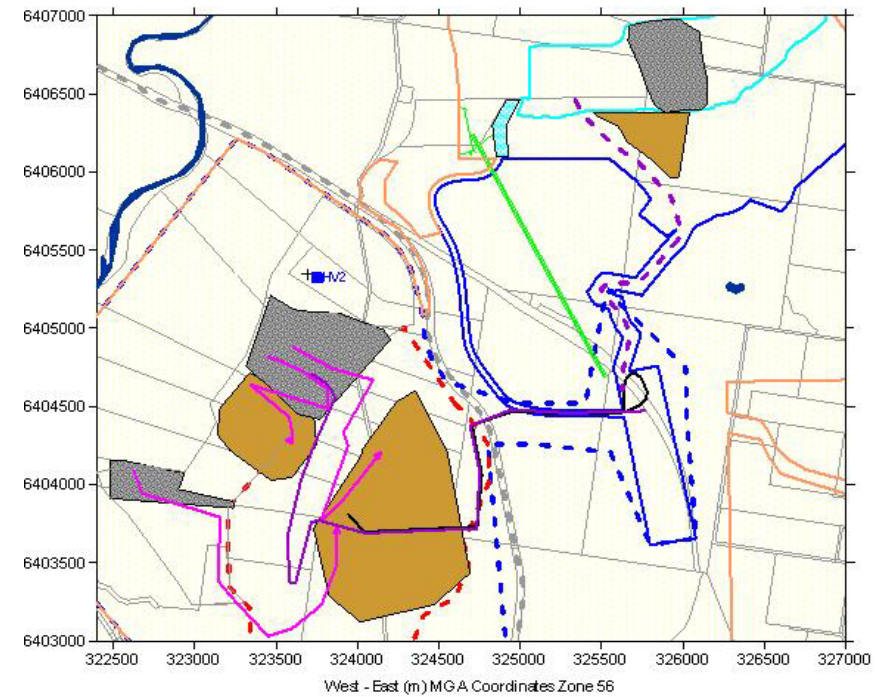
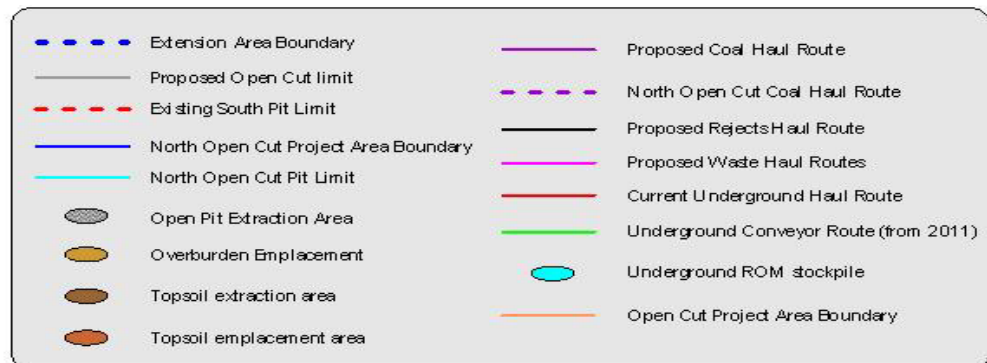


Figure 5-5 Year 3 Revised Layout



An environmental management plan that specifically addresses this pre-operational activity, and the implementation of air quality management controls, will be developed and implemented.

To some degree the bund will also reduce the potential impact from other dust sources and noise.

- Emissions from drilling operations will be controlled with the application of water.
- Blasting operations will only occur between the hours of 9 am and 5 pm (compared with 24/7 operation modelled in the EA). These restrictions are consistent with ANZECC blasting guidelines.
- The moisture content of the ROM coal in-pit will be increased above the levels assumed in the EA modelling).

An assessment of the impact of the Integra Open Cut Project on “Dulwich” with the adoption of these controls is presented in **Section 5.4.6**.

As presented in **Section 5.4.7**, a number of other controls were also investigated but found to be either not feasible or to have a limited or negative impact on predicted concentrations at Residence 153.

5.4.6 Assessment of predicted impacts at Residence 153 in Year 1 and Year 3 with adoption of identified additional practical and feasible operational controls

Table 5-5 and **Table 5-6** summarise the additional controls that Integra would apply to operations in Years 1 to 3 of the operation of the Part Pit Extent.

The slight variation in volumes between the revised schedule and those shown in the EA reflect increased utilisation of the existing equipment fleet and a revised mine scheduling database over the same area. This has the effect of making small changes in the overburden and coal volumes from the same operational footprint over the same period of time. The increased truck operating hours also reflect the changes made to haul road locations away from the “Dulwich” property with resulting increased haul distances.

Table 5-5 Summary of modifications made to Year 1 dispersion modelling

Activity	Year 1			
	EA operations		Modified operations	
Haul routes	Aligned directly with Residence 153 and prevailing winds		Moved out of alignment with Residence 153 and prevailing winds	
	75% control through application of water		85% control through maintaining suitable surface moisture content and/or chemical suppressants	
Topsoil removal	197,364	t/y	0	t/y
Overburden removal	17,176,029	bcm	17,923,100	bcm
ROM removal	2,300,000	t/y	2,337,718	t/y
ROM moisture in-pit	6	%	8	%
Drilling activities	No control		95% control through application of water	
Blasting	Assumed blasting would occur 24/7		Blasting will only occur between the hours of 9am and 5pm	

Table 5-6 Summary of modifications made to Year 3 dispersion modelling

Activity	Year 3			
	EA operations		Modified operations	
Haul routes	Aligned directly with Residence 153 and prevailing winds		Moved out of alignment with Residence 153 and prevailing winds	
	75% control through application of water		85% control through maintaining suitable surface moisture content and/or chemical suppressants	
Topsoil removal	356,969	t/y	0	t/y
Overburden removal	22,125,094	bcm	16,773,250	bcm
ROM removal	3,500,000	t/y	2,500,000	t/y
	Assumed removal rate equal across entire open pit area.		Removal rate modified to more accurately represent ROM reserves.	
ROM moisture in-pit	6	%	8	%
Drilling activities	No control		95% control through application of water	
Blasting	Assumed blasting would occur 24/7		Blasting will only occur between the hours of 9am and 5pm	

Table 5-7 presents a summary of the predicted impacts at Residence 153 as identified in the EA together with those predicted with the adoption of the additional Year 1 to 3 controls identified in **Table 5** and **Table 6**.

Table 5-7 Comparison of predicted PM10, TSP and dust deposition levels at Residence 153

PM10 ($\mu\text{g}/\text{m}^3$)		TSP ($\mu\text{g}/\text{m}^3$)	Dust deposition ($\text{g}/\text{m}^2/\text{month}$)	PM10 ($\mu\text{g}/\text{m}^3$)	TSP ($\mu\text{g}/\text{m}^3$)	Dust deposition ($\text{g}/\text{m}^2/\text{month}$)
24-hour	Annual	Annual	Annual	Annual	Annual	Annual
<i>Assessment Criteria</i>						
50	-	-	2	30	90	4
Year 1						
Year 1 Project only (per EA)				Year 1 Project & other sources (per EA)		
123	35	49	6.4	55	103	7.9
Year 1 Project only (modified)				Year 1 Project & other sources (modified)		
79	15	17	1.3	34	70	2.7
Year 3						
Year 3 Project only (per EA)				Year 3 Project & other sources (per EA)		
195	50	73	6.6	68	124	7.9
Year 3 Project only (modified)				Year 3 Project & other sources (modified)		
85	22	26	2.1	40	77	3.4

The predicted cumulative impacts with the adoption of the additional satisfy the air quality criteria in Year 1 and Year 3 for all but PM₁₀ annual average.

As discussed in detail in Section 7.5 of Appendix G of the EA (Air Quality Assessment), it is important to note that the dispersion modelling includes only emissions from the Project and nearby mines. As more distant mines and other sources will also contribute to PM₁₀ emissions, an estimate of the “background” also has to be made. For the Integra Open Cut Project, a conservative blanket annual average PM₁₀ contribution of 8 µg/m³ was allocated to represent the contribution from these more distant sources, with this value then added to all the predicted impacts from the Project and other mines to provide an estimate of the cumulative impacts including all sources in the area.

Estimating the “background” allowance is complicated and depends on local land use and the associated emissions sources, as well as climate, soil type, farming practice etc. Furthermore, in reality, there is spatial variation in the contribution that distant mines and other sources make to the ambient concentrations of annual average PM₁₀.

The dispersion modelling completed includes emissions from all the mines in the vicinity of the Integra Open Cut Project, and as such:

- in locations where the dominant surrounding land use is coal-mine activity, the surrounding “background” level that is not already modelled is relatively low as there is less land available in the area to produce dust that has not been accounted for in the modelling. For example, a spatially varying background grid was applied in the air quality assessment currently on exhibition for Mt Arthur Coal. This shows that the background annual average PM₁₀ concentrations at the closest residences are as low as 3 µg/m³. A further example is the EA for the proposed Ashton South-East Open Cut which applied a uniform value of 2 µg/m³; and
- in locations distant from modelled mine activity, “background” levels of dust would be relatively higher as there is more available land in the area to generate dust that has not already been modelled.

Due to the proximity of Residence 153 to existing Integra operations, it is likely that the “background” levels at Residence 153 are substantially lower than the 8 µg/m³ assumed in the EA as there is less “other” activity nearby that is not related to open cut mining.

5.4.7 Controls assessed but deemed operationally non-viable, or had an adverse or negligible effect on predicted impacts at Residence 153

Other controls that were assessed, but either had an adverse or negligible effect on the predicted impacts at Residence 153, or were discounted as they were assessed to be operationally non-viable, included the following.

5.4.7.1 Offsetting Operations to 300 m or 500 m of Residence 153

Year 1

With the topsoil removal and environmental bund construction activities being undertaken in a dedicated pre-operational campaign, there are no mining activities proposed within 500 m of Residence 153 in Year 1.

Year 3

Table 5-8 presents a comparison of the predicted impacts at Residence 153 in Year 3:

- with the revised haul road locations alone and with the revised haul road locations; and
- the implementation of the additional controls identified in Point 4.5 should a 300m or 500m buffer be retained between the planned operations and the “Dulwich” residence,

i.e. as opposed to the nominal 200 m identified in the EA.

It is noteworthy, however, that the limit of mining in the Part Pit Extent as identified in the EA, and in the additional assessments undertaken in developing this response, conservatively assumed that mining (i.e. overburden and coal removal) could take place up to the limits identified as the northern boundary of the Part Pit Extent boundary. However, in reality, allowing for a lease boundary offset, sufficient room for a light vehicle access and a safety berm along the pit end wall, the actual offset would be approximately 250 m-260 m.

Table 5-8 Comparison of predicted PM₁₀, TSP and dust deposition levels at Residence 153 with additional controls and 300m and 500m buffers – Year 3

	PM10\ (µg/m³)	TSP (µg/m³)	Dust deposition (g/m²/month)	PM10 (µg/m³)	TSP (µg/m³)	Dust deposition (g/m²/month)
ID	Annual averages					
	Assessment Criteria					
			2	30	90	4
	Year 3 Project only			Year 3 Project & other sources		
Environmental Assessment						
153	50	73	6.6	68	124	7.9
No buffer, revised haul roads, and all proposed controls						
153	22	26	2.1	40	77	3.4
300 m buffer and revised haul roads						
153	30	36	26	48	87	3.9
300 m buffer, revised haul roads, and all proposed controls						
153	22	25	2	39	76	3
500 m buffer and revised haul roads						
153	27	31	2.3	45	82	3.6
500 m buffer, revised haul roads, and all proposed controls						
153	20	24	2	38	75	3

A review of **Table 5-8** shows that if both the additional controls and the buffer are applied, the predicted annual average PM₁₀ concentrations at Residence 153 are only reduced by 1 $\mu\text{g}/\text{m}^3$ with the 300 m buffer and by 2 $\mu\text{g}/\text{m}^3$ with 500 m buffer when compared with the predicted impacts with the additional controls and operations to the lease boundary as identified in the EA.

5.4.7.2 Restricting Blasting Operations

The option to cease blasting operations if the wind speed is greater than 7 m/s and the wind direction is from the south-east, east, or south-west was assessed and showed no reduction in the predicted impacts at Residence 153 and, as such, was not considered warranted or justifiable as an additional control. Only 2% of winds greater than 7 m/s were from this quadrant in the meteorological dataset used in the assessment.

5.4.7.3 Wind Erosion

The dispersion modelling completed for the EA applied a constant emission factor of 0.4 kg/ha/h to calculate emissions due to wind erosion from exposed areas. It also assumed that open areas are emitting continuously each hour of the year from the entire exposed area.

In reality, not all the areas will be active constantly, meaning that dust from exposed areas will only be generated if the wind velocity is high enough to lift dust from the surface. This occurs when the surface wind velocity is greater than the threshold friction velocity (TFV) of the material (i.e. the wind speed above which material would be lifted). Surfaces with a low TFV have greater propensity for fine particles to be lifted at relatively low wind speeds. Since rocks and other non-erodible elements add protection against soil erosion, they raise the TFV if they are present on the disturbed surface.

The US EPA AP-42 emission factors provides a method to estimate particulate emissions from wind erosion which can be more representative of wind erosion emissions than the simplified assumptions applied in the dispersion modelling presented in the EA. The method takes into account site specific wind data, erodible material properties (friction threshold velocity, particulate size distribution of the material eroded) and the frequency of material disturbance.

To determine the relevant threshold friction velocities, samples of material from the following locations were collected and analysed in accordance with the method outlined in AP-42.

- Topsoil (North Open Cut)
- Subsoil (North Open Cut)
- Open pit (South Pit)
- Active waste dumps (South Pit)
- ROM stockpile (CHPP).

Threshold friction velocity is determined by passing the samples through a series of nested sieves with openings of 4 mm, 2 mm, 1 mm, 0.5 mm and 0.25 mm. **Table 5-9** presents a summary of the size distribution analysis.

Table 5-9 Integra material size distribution

Sieve size (mm)		Topsoil	Subsoil	Open pit	Active waste dumps	ROM stockpile
Min	Max	Mass %				
greater than 4.0		38.6	41.8	53.5	48.2	25.5
2.0	4.0	20.3	20.7	18.4	16.3	14.0
1.0	2.0	13.4	12.2	12.8	12.7	13.4
0.5	1.0	9.9	8.9	7.2	8.8	24.0
0.25	0.5	7.6	7.4	3.9	6.9	15.1
less than 0.25		10.2	9.0	4.2	7.1	8.0

The sieve which contains the majority of the material is used to determine the threshold friction velocity by reference to **Table 5-10**. As all the collected samples have the majority of material in the 4 mm sieve, the threshold friction velocity is greater than 100 cm/s.

Table 5-10 Threshold friction velocity (cm/s)

Sieve size (mm)	Threshold friction velocity (cm/s)
4	Greater than 100
2	100
1	76
0.5	58
0.25	43

Adopting this approach would result in essentially no wind initiated dust lift-off emissions from these sources. The US EPA method is limited when applied in this situation, and for this reason, it has not been applied to the predicted impacts. However, it is clear from the examination of the threshold friction velocity of material at Integra Coal, that the constant emission factor adopted in the dispersion modelling completed is conservative.

5.4.7.4 Restricting Coal Haulage to Between the Hours of 6pm and 7am in Year 3

Restricting coal haulage to 6pm to 7am in Year 3 to avoid high wind periods during the day had an adverse impact on the predicted concentrations at Residence 153.

5.4.7.5 Rescheduling Coal Haulage

Rescheduling coal haulage activities to avoid times when prevailing wind directions were towards Residence 153 gave negligible benefit.

5.4.7.6 Examination of Wind Speed and Direction on an Annual Basis to see if there are Seasonal Opportunities to Restrict Operations

The profile of wind speed and direction on an annual basis was examined to determine if there were any seasonal opportunities to restrict operations. None were identified.

5.4.7.7 Rescheduling Overburden dumping activities

Rescheduling overburden dumping activities to avoid times when prevailing wind directions were towards Residence 153 gave negligible benefit.

5.4.7.8 Effects of Tree Screening

Due to their large leaf areas (relative to particulate matter) and aerodynamic roughness, trees are effective scavengers of both gaseous and particulate pollutants from the atmosphere. The use of vegetation for air pollution amelioration in urban areas was first actively promoted more than 300 years ago (**Warren, 1973**). **Warren (1973)** reported that for most heights and distances from a forest edge, particle concentrations were reduced 40-50% by particles released 2 m above the ground.

More recently, an Environmental Information System for Planners (EIPs) has been developed in the UK to allow the effect of tree planting strategies on air quality to be quantified and considered within the planning process (**Bealey et.al, 2007**).

In rural areas, the use of vegetation as a windbreak/visual screen is common. In the US, the planting of vegetative environmental buffers (VEBs) around poultry farms to provide a visual screen, a vegetative filter (for odour and particulate matter) and a windbreak/shade is becoming increasingly common. For example, the states of Texas and Delaware provide explicit advice to the industry relating to the selection of trees, windbreak design, and care and maintenance.

The air quality modelling has not taken into account the screening impact of the vegetation that exists between the proposed operations and Residences, and this is one of the factors that lead us to conclude the predicted concentrations of TSP and PM₁₀ are conservative.

5.4.8 Particle size and potential for health impacts

“The various levels set by government organizations are there for a reason and no one should be subjected to these levels. The fact that people choose to stay in their homes and not to move should not be a reason to allow a development to proceed on the basis that it will cause unhealthy dust levels and the only remedy is for the people to sell out to the developer. Some environmentalists are currently taking legal action against Macquarie generation for polluting with CO₂. While this may not succeed, similar actions against mining companies (and / or government organizations who approve the developments) for unhealthy dust levels and property damage from blasting may be the next phase with a much higher probability of success. To avoid this, developments that knowingly deliver above standard levels of dust and other detrimental affects should be modified to bring the levels down to acceptable limits or not approved at all.”

The impact assessment criteria for PM₁₀ in current DECCW Approved Methods have not been reviewed since 2005 and reflect the same values contained in the Air NEPM which was published in 1997 and, as such, may not reflect contemporary scientific understanding. For example, the US EPA revised their ambient air quality criteria for particulate matter in 2006, following an extensive review of thousands of scientific studies on the impact of fine and coarse particles on public health and welfare. The final standards address two categories of particle pollution: fine particles (PM_{2.5}), which are 2.5 micrometers in diameter and smaller, and inhalable coarse particles (PM₁₀) which are smaller than 10 micrometers.

The US EPA is currently in the process of a subsequent review of the ambient air quality criteria for particulate matter, with a proposed ruling expected in November 2010 and completion due in July 2011.

As a result of the 2006 review, the US EPA revoked their annual PM₁₀ standard because available evidence did not suggest a link between long-term (i.e. annual average) exposure to current levels of coarse particles and health problems. The US EPA considered adequate protection was afforded to the population from exposure to inhalable coarse particles by:

- retaining their existing daily PM₁₀ standard of 150 µg /m³;
- strengthening the 24-hour PM_{2.5} particle standard from the 1997 level of 65 µg/m³ to 35 µg/m³; and
- retaining the annual PM_{2.5} standard of 15 µg/m³.

NSW DECCW does not currently set impact assessment criteria for PM_{2.5} concentrations, although the NEPM has an advisory reporting standard.

In light of the current scientific research suggesting health impacts are more closely related to exposure to PM_{2.5}, this issue is examined more closely below, noting that particulate emissions from mining comprise approximately 5% PM_{2.5}.

Table 5-11 presents a comparison of the predicted PM_{2.5} concentrations with the US EPA criteria and NEPM advisory reporting standards for PM_{2.5}. The predicted impacts at Residence 153 are below the relevant NEPM advisory reporting standards and the relevant US EPA standard for PM_{2.5}.

Table 5-11 Summary of predicted PM_{2.5} concentrations at Residence 153

PM _{2.5} (µg/m ³)			
24-hour	Annual	24-hour	Annual
NEPM Advisory Reporting Standard		Advisory Reporting Standard	
25	8	25	8
US EPA standard		US EPA standard	
35	15	35	15
Year 1			
Year 1 Project only (modified)		Year 1 Project & other sources (modified)	
11	2	13	5
Year 3			
Year 3 Project only (modified)		Year 3 Project & other sources (modified)	
13	4	16	5
Year 6			
Year 6 Project only (modified)		Year 6 Project & other sources (modified)	
8	2	10	3

The Australian Coal Association Research Program (ACARP) funded a three-year monitoring program to characterise the concentration and composition of fine particles (PM_{2.5} and PM₁) in the Hunter Valley (**ACARP 2007 and 2008**).

Continuous monitoring took place in 2005 (PM₁₀ and PM_{2.5}) and 2006 (PM₁) at two representative population sites in the Hunter Valley (Muswellbrook and Singleton), and at two sites immediately adjacent to mining operations ('Glenville' and Rix's Creek). The 'Glenville' property is identified as Residence 106 in the Integra EA, and is located between the Ashton mine and the current Integra Open Cut.

Data collected at "Glenville" property showed only one event where the 24-hour average PM_{2.5} concentration was measured above the NEPM advisory reporting standard of 25 µg /m³. The Rix's Creek data showed two events, and Muswellbrook and Singleton did not record any events above the 24-hour average NEPM advisory reporting standard. The annual average concentrations at "Glenville" and Muswellbrook were below the NEPM advisory reporting standard of 8 µg /m³, whilst Rix's Creek and Singleton were slightly above.

PM_{2.5} monitoring has continued at Muswellbrook and the most recent State of Environment Report published by Muswellbrook Shire Council shows that annual average PM_{2.5} concentrations have remained below the NEPM advisory reporting standard.

Elemental compositional analysis of the samples collected (see **Table 5-12**) has shown the fine particles (PM_{2.5}) are primarily sourced from combustion products (almost 67% of the emissions are from motor vehicles and power generation), and sea salt and its reacted products (15%) with a smaller contribution from local soils (11% emissions result from mining and agriculture).

Table 5-12 Contribution of different sources to coarse and fine particulate matter

Source	Element	Coarse (PM _{2.5-10})	Fine (PM _{2.5})
Combustion	BC, Cr, F, Ni and S	18.83	66.87
Industry	Co, Cu, Mn and Zn	0.32	0.23
Motor Vehicles	Br and Pb	0.16	0.26
Seasalts	Cl and Na	39.90	15.19
Soils	Al, Ca, Fe, Si and Ti	38.48	10.62
Woodsmoke/Biomass burning	K	1.97	0.94
Others	H, P and V	0.33	5.88

Source: ACARP (2007)

5.4.9 Dust Nuisance

“Apart from the health aspects of dust there is extreme nuisance from it at levels below the health limits. Washing cannot be left for lengthy periods, the gutters fill with dust some of which stays and corrodes the gutter while some ends up in the drinking water tanks. Cars can be washed in the afternoon and next morning, are covered in dust. Verandahs and any flat areas such as tables and chairs have to be washed weekly to remove the thick layer of dust.”

It is accepted that current levels of deposited dust experienced at Residence 153 are likely to cause annoyance. However, recent research conducted in Queensland (in close proximity to the Dalrymple Bay Coal Terminal) investigated the potential health risks as a result of elements contained in coal dust deposited on rooftops entering rainwater tanks systems used for potable supply (**Lucas et. al., 2009**).

Leaching tests were conducted on numerous coal types to identify the potential for trace element release into rainwater in the tank. In addition, rainwater samples were collected from both the rainwater tanks and taps of three homes within the dust deposition zone of Dalrymple Bay area.

The leaching tests indicated that negligible amounts of trace elements in coal dust were released in the rainwater, and all trace elements were below the Australian Drinking Water Guidelines (ADWG). The ADWG provide the threshold levels considered safe for human consumption.

The analysis of the rainwater from homes also showed that no trace element exceeded the ADWG.

The research concluded:

“.....tank and tap samples were all below ADWG and indicated a minimal likelihood of coal dust being an issue with respect to human health”

Regardless of this, as per advice from **NSW Health (2007)** it is good practice for any rain water system in any location to install a simple first flush system to prevent particulate matter (or any other undesirable materials) that have collected on the roof being washed into the rain water tank. Integra would be pleased to install a first flush system to the rain water tanks of any resident that is concerned about the impact of dust fallout on the water quality within the mine's zone of influence.

As presented in **Table 5-7**, the predicted dust deposition levels at Residence 153, with the adoption of the additional controls, are below the assessment criteria of 4 g/m²/month.

References:

ACARP 2007

“Final Report: Characterising and Assessing Fine Particle Concentrations on the Hunter Valley – Implications of National Environment Protection Measures for the Coal Mining Industry” September 2007. ACARP Project C13036.

ACARP 2008

“Characterising and Assessing Fine Particle Concentrations on the Hunter Valley” April 2008. ACARP Project C15042.

Lucas S A, Coombes P J, Planner J and Welchman S (2009)

“Rainfall harvesting and coal dust: the potential health impacts of trace elements in coal dust in rainwater”, Air Quality and Climate Change Vol. 43 No. 2 May 2009 pp23-30.

NSW Health (2007)

Rainwater Tanks Brochure

http://www.health.nsw.gov.au/pubs/2007/pdf/rainwater_tanks.pdf

Warren, J. L. (1973)

“Green Space for Air Pollution Control”. Technical Report N.50. School of Forest Resources, North Carolina State University, Raleigh. July 1973.

Bealey, W.J., McDonald, A.G., Nemtitz, E., Donovan, R., Dragosits, U., Duffy, T.R., and Fowler, D. (2007).

“Estimating the reduction of urban PM₁₀ concentrations by trees within an environmental information system for planners”. Journal of Environmental Management, Vol 85 (2007), pp 44-58.

5.4.10 Change of Plans and Short-term Focus

“The Company also appears to change its ‘plans’ and has a short term focus on its interests only. It is only a few years ago that the Company applied to put an out-of-pit overburden dump on the land immediately west of us because the coal below it was of no interest.”

Decisions regarding the development or extensions of mines are determined by economics, particularly the cost of extraction, demand for product and hence the price the products attract, and the exchange rate. In 1999, Camberwell Coal Pty Ltd did apply to Singleton Shire Council to place overburden in the area of the now planned westerly extension to the South Pit, although the application was subsequently refused.

At that time, the underlying coal in the area of the then proposed emplacement was not economic to mine nor was it considered likely to be mineable in the foreseeable future. However, in the period from 1999 to 2008, the price of coal had increased by approximately 600% (and even now remains at approximately 200% of the 1999-2004 price) and what was considered economically unviable to mine at that time now is viable. Additional factors contributing to the decision to progress mining to the west of the existing South Pit have included:

- the results of 2 exploration drilling programs in 2007 and 2008 in the area;

- the Company's ability to successfully demonstrate that mining a deposit comprising multiple thin plies can be undertaken economically;
- existing export customers and markets for the reliable and consistent Integra Open Cut coal products; and
- the changed ownership structure and management responsibilities at the mine with the integration of the Camberwell and Glennies Creek mines in 2005. With the subsequent sale of the AMCI group (including Integra) to CVRD (Vale) in 2007, the vision for the operation also changed.

5.4.11 Predicted versus Actual Performance

"If you go through the details of the EIS for the current mine and compare predicted levels of dust, blasting and noise, you will find significant variations for the worse. The stated rehabilitation at various times through the mine life has also varied significantly again mainly for the worse."

The original EIS and DA for the Camberwell Coal Project were prepared in 1989. Subsequent to that time, a number of amendments have been approved including processing of Glennies Creek coal, increases in CHPP throughput and open cut production along with associated materials movements, with predictions as to the likely impacts as a consequence of those amendments included in the application documentation. Any comparison of the predicted outcomes identified in the 1989 EIS to those currently experienced is therefore invalid. With respect to noise and air quality in particular, it should also be recognized that since 1989 there have been significant improvements/refinements in computer modelling, the introduction of increased levels of complexity in the models and vastly improved computational ability, all of which now enable the generation of substantially improved and more accurate predictions as to the likely impact of a particular operation or operations on individual receptors.

Similarly, the progress in rehabilitation of disturbed areas has also changed from that originally identified and projected in subsequent documentation. The Company's rehabilitation activities and achievements have been the subject of regular inspections by officers of the former Department of Primary Industries and its predecessors and, with the exception of the delayed rehabilitation of the tailings dams, those officers have routinely indicated their satisfaction with rehabilitation programs. We also note that when undertaking her most recent annual monitoring of the rehabilitation, Dr Donna Johnson of D & A Environmental stated that "the quality of our rehabilitation was some of the best she had seen."

5.4.12 Biodiversity

"In the Executive Summary under Biodiversity for fauna species 'five species are threatened'. There could well be others that have not been recorded as threatened Species tend to be limited in numbers. There are some "habitat trees" marked in the area of proposed mining. We do not know the definition of a habit [sic] tree but there are multiple trees on our property some of which are old large iron barks. If you look at an aerial photograph (Figure 14.2) you will notice our property stands out with good tree cover all around the house. We have not been approached by the company to observe any flora or fauna on our property. The vegetation attracts many birds and reptiles plus occasional marsupials."

Ecology surveys of the proposed Integra Open Cut Extension were undertaken in accordance with DECC (2004) Draft Threatened Biodiversity Survey and Assessment: guidelines for developments and activities, and have been reviewed and deemed adequate by DECCW.

Whilst targeted flora surveys were carried out in spring to maximize the number of species flowering and fauna activity periods, as identified in the Hall comments, some threatened species are naturally cryptic, or have limited activity periods and might not have been detected. As such, detailed habitat assessments were presented in the Environmental Assessment and the precautionary principle was adopted. That is, if

the species was not detected during field surveys but the study area supports suitable habitat and is within the species' distribution, it was assumed that the species has the potential to occur within the area and therefore be affected by the proposal.

Detailed habitat assessments and seven-part tests as defined under the NSW Threatened Species Conservation Act 1995 were presented in the Environmental Assessment for any species predicted or known to occur within the development footprint.

In addition to this an appropriate offset has been proposed to offset any unavoidable loss of threatened species habitat as a result of the proposal.

5.4.13 Blasting

5.4.13.1 Ground Vibration Prediction

"We saw no figures for ground vibration and only a 'motherhood' statement that impacts would be within ANZEC guidelines. Based on the mining company's activities to date we believe that is totally inadequate and do not believe that the mining company is capable of blasting with its proposed close proximity to our property without producing significant damage."

Contrary to the above comment, Section 11.10.3 of the EA provided an assessment of the potential ground-borne vibration and airblast emissions arising from overburden blasting within the Mine Area based on parameters for two indicative blast designs and existing South Pit operations and using site laws developed from the blast emission data obtained from the existing Integra Open Cut Operations between January 2004 and April 2006, i.e. from some 650 blasts. The predicted outcomes (Table 11-8) were then compared with ANZEC general human comfort criteria as well as the British Standard 7385 structural damage criterion for ground vibration and the US Bureau of Mines damage limit for peak airblast to demonstrate whether the initiation of the "indicative" blast would satisfy the ANZEC criteria or be likely to cause damage at residences within each Noise Assessment Group. However, as a footnote to Table 11-8, it clearly states that "Actual blast parameters would be designed to ensure the ANZEC criteria are satisfied at all residences."

Integra Coal Operations, and its predecessors, has worked closely with Terrock Consulting Engineers since 1997 and have developed a blasting impact prediction model with resultant site laws.

The site laws for ground vibration and airblast, both of which are presented in Appendix F of the EA, are expressed as mathematical formulae which relate ground vibration and airblast to the distance between the charge mass and the receiver, and the charge mass per delay (or Maximum Instantaneous Charge). Thus, for a known distance between a blast and a residence such as "Dulwich" and target ground vibration or airblast levels, a design MIC can be calculated. Adoption of such a process to satisfy the blasting comfort criterion as committed to within the EA is an accepted and routine practice at mining operations and is in no way a "motherhood" statement.

As also noted in Appendix F, all blasts within the Open Cut Project Area would be monitored and the results used to further develop and refine the existing site laws for ground vibration and airblast emissions.

5.4.13.2 Blasting Offset

"The proposal (on the reduced pit scenario) shows the mining limit only a couple of hundred metres away from the house. Current practice for mines in this area is to block roads during blasting if the blast is within 500m of the road to reduce the chance of fly rock injuring people or damaging property. The mining company appears to be unconcerned by having us within this hazardous zone. If the technology was present to guarantee there was no fly rock, then highways and other roads would not be blocked for

blasts, so all blasts will have the possibility of fly rock. At the eastern end of our property, our access from the public road, the proposed mining boundary is almost on our boundary. At the map scale we can't determine the actual distance but it is maybe 10 to 20m . . .

We are entitled to the full enjoyment of our land and cannot be expected to be restricted in freely being at any point on our property whenever we choose. We also have stock. As a minimum we see this distance as being greater than the distance for which blasts have damaged our residence after it was repaired. In this instance there is clear evidence that the blasting caused the damage."

The Part Pit Extent identified in the EA has conservatively assumed mining, i.e. overburden and coal extraction would/could take place to the boundary of any mining lease which may be granted by the Minister under s.62 of the Mining Act. For the purposes of the EA, these distances were set at 200m from the "Dulwich" residence and 50m from any garden and, for the sake of conservatism, 50m from the boundary fence. However, lease boundary barrier requirements, the desirability to provide light vehicle access around the pit perimeter and the requisite safety bund between the Open Cut endwall and the service road would, in reality, mean that under the Part Pit Extent, overburden removal activities would be unlikely to proceed closer than 250-260m from the "Dulwich" residence nor 100-110m from the southern boundary fence.

Although it might be current common practice for mines to block roads when blasting is to be undertaken within 500m, this distance is arbitrary, with no scientific basis, either theoretical or empirical.

Rather, provision of requirements, information and guidance for the use of explosives, the management of a site where explosives are used and the destruction of excess or deteriorated explosives to ensure risks are acceptably managed are presented in Australian Standard AS2187.2-2006 Explosives – Storage and Use Part 2: Use of Explosives.

AS2187.2 notes that:

- "whenever explosives are to be used, a competent person(s) should carry out a detailed risk assessment to identify all foreseeable potential hazards, and take appropriate steps to eliminate or reduce the likelihood and mitigate the severity of any effects of such hazard, so that risks are at an acceptable level;"
- "a blast, whether surface, underground or submarine, shall be planned and designed to achieve the required outcome with the first consideration being the protection of persons, property and the environment"; and
- "before the commencement of any blasting operation an investigation of the site and its environs ... should be carried out identifying any potential hazards and risks. On the basis of the investigation, a blast management plan incorporating a risk assessment and control measures shall be prepared".

The contents of the blast management plan are also identified in the Standard.

Integra has an Explosives Hazard Management Plan which has been audited by external sources. The Plan includes a number of existing procedures pertaining to specific blasting-related tasks and risks such as Sentry Details, Firing Shots and Road Closures, with additional procedures developed to reflect the risks associated with specific blasting activities or conditions. That is, blast design and implementation and the adoption of specific safeguards are risk-based processes.

It is noteworthy that unlike AS2187-1993, AS2187-2006 does not include specific distances. Rather, it uses the term "close proximity" which is then defined as "an acceptable distance determined through risk assessment procedures for a specific application unless the distance is legislated."

With respect to Blast Exclusion Zones, AS2187-2006 notes:

- “all blasts require the establishment of an exclusion or evacuation zone prior to firing the shot. Depending on the industry, the zone can be the area, below, at or above ground level, from which all unauthorized persons are excluded to protect them from injury or harm; and
- the size of the exclusion zone is directly related to the blasting activity and the surrounding environment”.

AS2187 also notes that the size of the blast exclusion zone shall be determined by a competent person, i.e. “a person who has acquired through training, qualification or experience, or a combination of these, the knowledge and skills to carry out the required tasks. ”Integra’s Drill and Blast Coordinator (the ‘competent person’) has in excess of 15 years blasting design and implementation experience; has undertaken numerous training courses conducted by external organizations, and holds an Open Cut Examiners ticket and all other tickets and licences required by II NSW to permit him satisfy the role of a competent person. The Drill and Blast Coordinator is supported by blasting consultancies and explosives manufacturers’ technical groups as required.

Integra acknowledges that flyrock, ie “the undesirable projection of rock as a result of a blast” [AS 2187.2-2006] has the potential to damage people, animals, property and infrastructure and that the Hall’s concerns in this regard are legitimate. However, as noted previously, the distance within which the potential for flyrock exists should be based on science and an assessment of risk.

Flyrock can be generated by three possible mechanisms, namely:

- Burden Controlled Conditions – flyrock projected in front of a free face due to an inadequate burden distance;
- Cratering Conditions – when there is insufficient stemming height. Under such conditions, a crater can be formed around the collar of a blasthole and flyrock projected in any direction. As stemming height increases, there is an increasingly less chance of cratering occurring; and
- Stemming Controlled Conditions – Flyrock may occur by this mechanism when the stemming height is too great to prevent cratering but, due to inadequate stemming practices, the stemming material is ejected at a high trajectory from the blasthole (rifling). Flyrock from rifling is usually the stemming size material but may include large size rocks from the blasthole walls and collar.

To achieve maximum throw, the launch angle for the rock is 45° , a launch angle which is only possible in front of a face from underburdening or from cratering near the blasthole collar surface from understemming. As blasts near “Dulwich” will face away from the property, flyrock from underburdening has no potential to impact the property with the only mechanism for flyrock projection towards the property being understemming resulting in the removal of a 45° crater of material.

Following investigations of flyrock events where accurate data was available for analysis, Terrock Consulting Engineers (Integra’s blasting consultants) have developed a series of models for predicting the maximum flyrock projection for given confinement (burden or stemming height) and charge mass conditions from which minimum exclusion zones can be and are then determined. The models, which were calibrated at the Integra Open Cut, have been successfully used to prevent flyrock from projecting onto privately-owned land to the west of the mine, with a comparison of model predictions to actual performance to 31.08.09 showing no incident of flyrock projection beyond 50m from 43,200 blastholes or a probability of 1×10^{-6} . It is also noteworthy that these models have been successfully used at other mines and quarry sites throughout Australia and as a mechanism for gaining approval to reduce blast clearance distances.

The Main Northern Railway line passes through the Integra Open Cut lease and separates the former North Pit from the current South Pit operations. In order for blasting to be undertaken in close proximity to the rail line, ARTC requires that Integra takes possession of the track when blasting is to be undertaken within 200m, i.e. to ensure that the track is clear of traffic and that there are no personnel on railway land within the vicinity of the blast. Applying the above models, Terrock have determined that the probability of flyrock projecting into the rail corridor would be once in 11 years or 1.82×10^{-6} per hole. The degree of confidence in the application of the models and the recommended design controls has also been demonstrated by Integra's ability to undertake blasting within 50m of the rail line with no incidents of flyrock projection into the rail corridor.

It is also noteworthy that blasting within the South Pit has been undertaken within 200m of the "Dulwich" property with no incidents of flyrock projection onto the property.

Notwithstanding that through the development, implementation and ongoing refinement of the Terrock/Integra flyrock models on the basis of monitoring, and the application of detailed design controls with respect to burden and stemming height, Integra has been able to demonstrate that flyrock projection is predictable, controllable and can readily be contained within 50m of a blast hole, Integra commits to not undertaking blasting within a 500m Exclusion Zone surrounding the "Dulwich" residence and 200m from the property boundary until such time that it can demonstrate to the Director-General that blasting can be undertaken within that zone without an unacceptable risk to the residents, their stock or residence. To assist in this regard, a suggested condition for inclusion in the Project Approval following the expected requirement for a Blast Management Plan is presented below.

"Blasting in the Blast Exclusion Zone"

- (a) Subject to paragraph (b), the Proponent shall not undertake blasting in the Blast Exclusion Zone.**
- (b) Proponent may undertake blasting in the Blast Exclusion Zone only in the following circumstances:**
 - (i) the Proponent has prepared a Blast Exclusion Zone Management Protocol which has been approved by the Director-General and blasting is carried out in accordance with that Protocol. The Blast Exclusion Zone Management Protocol must:**
 - (A) be repaired by an appropriately qualified expert whose appointment has been endorsed by the Director-General; and**
 - (B) be designed to minimise the risk of flyrock entering the "Dulwich" property from the Project; and**
 - (C) be prepared following consultation with the owner of the "Dulwich" property; or**
 - (ii) if the Proponent has obtained the approval of the registered proprietor of the "Dulwich" property to undertake such blasting and it is carried out in accordance with the Blast Management Plan required by condition [X] of this approval.**

For the purposes of this condition, the Definitions section of the project approval should provide:

- ***Blast Exclusion Zone* means the area identified as such in the plan which is Appendix [X] to this approval.**
- **"Dulwich" property means Lot 8 DP 246434. "**

5.5 Consequences of Not Proceeding with the Project

"If the project doesn't proceed, many employees will be happy to obtain the redundancy payment either because they are ready to retire or because they can get employment at another mine in the area. Existing mines are expanding and new operations are coming on stream in the Singleton, Denman, Muswellbrook areas as well as the Quirundi to Gunnedah areas."

Integra Coal and formerly Camberwell Coal Pty Ltd have been successfully mining the thin coal plies of the Hebden to Pikes Gully sequence in CL357 since 1991 and, over that time, the Joint Venture participants have invested substantial amounts of capital into coal mining related infrastructure at this site such as the CHPP and train loading facilities. Integra has the skills and infrastructure to continue mining and has developed a competitive advantage over greenfield sites further from the Port of Newcastle whilst mining a deposit characterized by thin seams and high strength waste material. Retention of the 250 Integra Open Cut employees is a goal of the proposed extension, with most of the Open Cut's employees wishing to stay and continue working at an operation of its size and with the current shift work arrangements. Employees who wish to pursue employment further up the Hunter Valley are free to do so now but have to weigh up the cost of re-location or increased travelling time with the associated fatigue issues of travelling longer distances to and from work.

Closing the mine earlier than current mineral economics permit because Mr & Mrs Hall wish to remain in their dwelling may well occur, but this will come at a cost to the proponent, its employees, the community and all levels of government.

5.6 Private Landowner Interests versus Community Economic Benefits of a Major Project

Section 5 of the *Environmental Planning and Assessment Act 1979* (NSW) sets out the objects of that Act, which relevantly include the proper management and development of natural resources, including minerals, for the purpose of promoting the social and economic welfare of the community.

The conflict between individual landowner's rights and the wider social and economic benefits is an issue which often needs to be addressed in the context of large mining projects which have regional or State significance. This issue was dealt with recently in the context of the Minister's Part 3A Approval for the Moolarben Coal Project.

The Director-General's Environmental Assessment Report in respect of the Moolarben Coal Project relevantly provided on page 43:

"...the proposed open cut mining operations would be located on some of the last traditional farming properties in the area, which are still used for grazing. These farming properties are owned by three families that have a long historical association with the area. For these owners (the Swords, Mayberry and Rayner families), the issue is simple: if the mine goes ahead, then the farms would need to be sacrificed, as it is unlikely that farming on the remainder of these properties would be viable..."

Nevertheless, the Department has examined the broader land use planning conflict (ie mining versus farming) carefully, and has concluded that, from a State and regional planning perspective at least, there is no doubt that mining is the highest and best use for this land." [Our emphasis]

This report concluded on page 45:

“Conclusion

This socio-economic assessment, together with the other environmental assessments that comprise the EA, indicate that the project would have a significant impact on at least 8 private properties whose owners may not wish to sell or enter into an agreement with Moolarben...

On a broader level, Moolarben’s economic assessment, indicates that the project would have a considerable net benefit to the region and to the State. The Department acknowledges the validity of this conclusion, and in broad planning terms, agrees that coal mining is by far the highest and best use for the land that Moolarben propose to develop...[on page 47] On balance, the Department believes that the project’s benefits sufficiently outweigh its costs.” [Our emphasis]

Integra submits that there are additional compelling differences between the circumstances of the private properties discussed above in the context of the Moolarben Coal Project, and the “Dulwich” property in the context of the Project that support coal mining as the highest and best use for the land.

- At 10ha of Class IV Rural Land Capability, “Dulwich” is not viable as a farm.
- The landowner would not be deprived of an income producing asset and may benefit indirectly or directly from the continued requirement for professional mining related, geological consulting services in the area.
- The landowner does not have a long, multi-generational, historical association with the property. and
- Mining of the land will allow closure of the un-gated level crossing over the Main Northern Railway line on Middle Falbrook Road. “Dulwich” is the only private property requiring this level crossing for access.

The benefits of the Project, if mining takes place throughout the Full Pit Extent area, will be significant for the region and State. These benefits include:

- the extension of employment of approximately 250 full time employees currently working at Integra's South Pit for an additional nine years;
- the direct contribution of \$45.4 million per year to household disposable income in Australia, with \$18.2 million of that sum being contributed directly to households in the Singleton SLA;
- contribution of approximately \$41.2 million to the local, NSW and Australian Governments annually through taxation and royalties; and
- maximum resource utilization within and above CL 357.

Restricting mining of the Part Pit Extent will result in the following adverse impacts.

- Sterilization of 8Mt of ROM coal over an area of 49ha of CL357 of which 39ha is outside the “Dulwich” landholding;
- Reduction in mine life by 2 to 4 years dependent upon the rate of extraction;
- Reduction in contributions to the local community, local, NSW and Australian Governments of approximately 25% to those predicted above; and
- Reducing project revenue from coal sales over the life of mine by \$569 million.

Restricting operations to distances of 300m or 500m from “Dulwich” as opposed to the Project progressing to the Full Pit Extent will result in the following adverse impacts.

300m barrier:

- sterilization of 11Mt of ROM coal over an area of 60ha of CL357 of which 50ha is outside the “Dulwich” landholding;
- a reduction in mine life of 3 to 5 years dependent upon the rate of extraction;
- a reduction in contributions to the local community, local, NSW and Australian Governments of approximately 37% compared to those predicted for the Full Pit Extent; and
- reducing project revenue from coal sales over the life of mine by \$734 million.

500m barrier:

- sterilization of 15Mt of ROM coal over an area of 75ha of CL357 of which 65ha is outside the “Dulwich” landholding;
- a reduction in mine life of 4 to 6 years dependent upon the rate of extraction;
- a reduction in contributions to the local community, local, NSW and Australian Governments of approximately 49% compared to those predicted for the Full Pit extent; and
- reducing project revenue from coal sales over the life of mine by \$950 million.

5.7 Conclusion

Integra respectfully submits that the tangible social and economic benefits for the community which will result from the Project outweigh the interests of a single landowner, whose property is already isolated and adjacent to a large mining complex. Consequently, Integra is looking to obtain a Part 3A Approval which authorizes both the Part Pit Extent and, also the Full Pit Extent to cover the contingency that it may at sometime in the future be able to acquire the “Dulwich” property.

However, in the event that the “Dulwich” property is not acquired, Integra intends to continue to co-exist with the landowner as has been the case over the past 19 years: Integra will continue to consult and liaise with the Halls and provide assistance to them to mitigate any impacts of mining adjacent to their property. As an example of this liaison, Integra has recently engaged a heritage consultant to consult with the Halls to see if a similar property located elsewhere could be found that would meet their needs and allow them to relocate to a property outside the zone of impact of coal mines. To date two properties have been identified but have not met the expectation of Mr Hall.

6 Revised Statement of Commitments

Following consideration of the submissions on the EA received from Government agencies and members of the public, a number of amendments to the Statement of Commitments as exhibited, or additional commitments, have been made in order to minimize potential environmental impacts. **Table 6-1** provides a Revised Statement of Commitments which includes the amendments made in response to the various submissions received in response to the EA's exhibition.

Table 6-1 Revised Statement of Commitments

Item	Mitigation Measure and Commitment	Implementation
General		
A1	Integra will comply with all conditional requirements in all approvals, licences and leases.	Throughout the life of the Project.
A2	Integra will conduct all operations in accordance with all relevant documentation including: • Mining Operations Plan; • environmental procedures; and • safety management plans and/or site specific documentation.	Continuous as required
Soils and Land Capability		
B1	Strip material to the depths stated in Table 6-3 .	Continuous during operations
B2	Material will not be stripped in either extremely wet or dry conditions.	Continuous during operations
B3	Stripped material will be used immediately (where practicable) to avoid the requirement for stockpiling.	Continuous during operations
B4	Tracking over previously laid soil will be avoided to minimise compression effects.	Continuous during operations
B5	The surface of soil stockpiles will be left in as a coarsely textured a condition as possible to promote rainfall infiltration and minimise erosion.	Continuous during operations
B6	A maximum stockpile height of 3m will be maintained where practicable.	Continuous during operations
B7	Stockpiles will be positioned away from drainage lines and/or upslope water diversion banks or similar controls will be installed.	Continuous during operations
B8	Downslope sedimentation controls will be installed until the soil stockpiles are appropriately stabilised.	Continuous during operations
B9	If long-term stockpiling is planned (i.e. greater than 3 months), stockpiles will be seeded and fertilised as soon as possible.	Continuous during operations
B10	Prior to re-spreading stockpiled topsoil onto reshaped overburden, it will be decided if individual stockpiles require herbicide application and / or 'scalping' of weed species prior to topsoil spreading.	As required
B11	An inventory of available soil will be maintained to ensure adequate topsoil materials are available for planned rehabilitation activities.	Continuous during operations
B12	Topsoil will be spread to a nominal depth of 0.10m.	Continuous during operations
Groundwater		
C1	Standing water levels and groundwater quality will be assessed in accordance with Table 7.3 , Table 7.4 and Table 7.5 .	Continuous during and after operations
C2	All results will be reviewed and updated monitoring and remediation plans will be developed as required in consultation with DWE, DPI-MR and	Continuous during and after operations

Item	Mitigation Measure and Commitment	Implementation
	DECC.	
C3	If required, contingency measures will be developed to manage any adverse impacts identified by monitoring that may indicate unanticipated effects in the groundwater system's response to mining in the proposed Pit.	Continuous during and after operations
C4	If the impacts of mining on the alluvium and Foybrook Formation groundwater systems are demonstrated to be greater than anticipated, Integra will: • assess the significance of these impacts; • investigate measures to minimise these impacts; and • describe what measures will be implemented to reduce, minimise, mitigate or remediate these impacts in the future to the satisfaction of the Director-General.	Continuous during and after operations
C5	Rehabilitation of groundwater dependent ecosystems will be incorporated as part of the Offset Strategy (refer Commitment E10). Trigger thresholds for the groundwater management response will be identified and included in the Rehabilitation Strategy.	Continuous during and after operations
C6	The amount of water pumped into or out of the proposed Pit will be monitored to assess the actual volume of water stored within the pit as well as to assess the groundwater inflows and evaporation effects.	Continuous during operations
C7	All new bores will be installed by suitably licensed drillers after obtaining the relevant license from DWE.	Continuous during and after operations
C8	If monitoring results indicate the agreed standard or performance indicators are not being achieved, remedial actions will be implemented as appropriate.	Continuous during and after operations
C9	An annual report will be prepared by a qualified hydrogeologist and include a statistical analysis of the results of the parameters measured, an interpretation of water quality and standing water level changes.	Annually during and after operations
C10	All relevant monitoring and management activities for each year will be reported in the AEMR.	Annually
C11	ICO will adhere to the operating rules of the Hunter Regulated River Water Sharing Plan (HRRWSP) and the Hunter Unregulated River Water Sharing Plan (HURRWSP), thereby ensuring that the operation of the proposed extended Pit will protect Glennies Creek and its associated well connected alluvial water sources.	Continuous during and after operations
C12	Ongoing verification of the EA predictions and contingency measures will be attained by development and adherence to a surface water and groundwater monitoring and management plan (SW&GWMP) that will be prepared, in consultation with NOW. Cut off thresholds that relate to potential mining induced depressurisation impacts in the connected Glennies Creek Alluvium will be established and documented in the SW&GWMP.	Continuous during and after operations
C13	During excavation of the western periphery of the pit, geological mapping will be used to assess the potential southerly extension of a fault identified in the drift to the Integra Underground and, if identified, its significance. If the fault is present in the pit, it will be investigated to assess whether it can provide a connective hydrological pathway between the pit and the Glennies Creek alluvium through re-activation of the fault. If appropriate, the hydrological significance of the fault will be assessed through incorporating its hydrological properties into the existing FEFLOW groundwater model.	Continuous during operations

Item	Mitigation Measure and Commitment	Implementation
Surface Water		
D1	Construct diversions to direct clean water away from areas of disturbance, to a standard suitable to contain an ARI 50 year rainfall event.	Prior to and progressively during operations.
D2	Construct dirty water diversions to collect stormwater runoff from disturbed areas and deliver this water to sedimentation basins.	Prior to and progressively during operations.
D3	Construct sedimentation basins to treat disturbed area runoff prior to discharge.	Prior to and progressively during operations.
D4	Continue and extend existing Water Management System.	Continuous during operations
D5	Continue the existing Surface Water Monitoring Program and extend to include: - collection of grab samples along ephemeral watercourses such as Station Creek, during or immediately after surface runoff events; - monthly water quality sampling of water storages on the site; and - regular collection of data on water quality, storage water levels (including the Portal Sump) and pumping volumes between storages.	Continuous during operations
D6	All pumped inflows to dirty water storages will cease when the storage water level reaches a defined Maximum Operating Level.	Continuous during operations
D7	If the weather outlook indicates future significant rainfall, water will be pumped out of any dirty water storage (with the potential to discharge offsite) that is within 100 mm of spilling, provided that a suitable alternative storage location is available elsewhere on the site.	Continuous during operations
D8	In the event of a dirty water discharge offsite, water samples will be collected at the overflow from the spilling storage and at the surface water sampling locations along Station Creek (for spills within the Station Creek catchment). For a spill from Possum Skin Dam, a sample will be collected at the discharge point and at the point of inflow to Glennies Creek.	Continuous during operations
D9	If a spill occurs, an incident report will be prepared which documents the circumstances leading to the spill, the measures taken to prevent the spill, the estimated spill volume and duration, and the measured water quality results. Any spillage will be reported to DECC in accordance with the requirements of the site's Environment Protection Licence.	Continuous during operations
D10	After construction of drainage works is complete, disturbed areas will be topsoiled and revegetated using a combination of pasture grasses and cover crops to stabilise the ground surface.	During and following operations as appropriate.
D11	As part of the rehabilitation activities, above ground landforms will feature drainage provisions designed to effectively capture and divert surface water run-off to stable disposal areas prior to being discharged into surrounding watercourses.	During and following operations as appropriate.

Item	Mitigation Measure and Commitment	Implementation
Biodiversity		
E1	A Flora and Fauna Management Plan will be developed and include measurements for the minimisation or avoidance of impacts on native flora and fauna. This will include: • pre-clearance surveys; • groundcover clearance protocol; • site management measures such as a temporary exclusion fencing, maximum vehicle speeds and reducing the use of lighting to decrease impacts on nocturnal fauna; and • limiting vehicular and personnel entry into retained vegetation through temporary exclusion fencing, locating access roads and tracks to avoid habitat and use of signage where necessary.	Prior to commencement of operations.
E2	Fauna management procedures will include: • monitoring of trees for fauna before and during clearing operations; • avoiding trees with resident fauna as much as practicable; • demarcation and avoidance of identified hollow bearing trees wherever possible; • carefully sawing and placing intact hollow-bearing trunks and branches into adjacent areas of native vegetation; • replacing habitat, such as nest boxes, where habitat trees are to be removed; • maintaining existing maximum vehicle speed limits within the Open Cut Project Area to reduce fauna road fatalities; • limiting vehicular and personnel entry into retained vegetation through temporary exclusion fencing; and • directing lighting at operating equipment to reduce light spill onto nocturnal fauna species in adjacent vegetation.	Prior to and during operations.
E3	Pre-clearance surveys will involve: • diurnal searches for birds, nests and roosts including targeted searches for communal nests of the Grey-crowned Babbler; • active searches for microbats, including checking under exfoliating bark; and • nocturnal surveys, including stag watching of identified habitat trees, specifically focusing on observing use of trees by microbats.	Prior to clearing activities.
E4	If threatened species nests or nestlings are observed within or close to the Open Cut Area then clearing will be postponed until the nestlings have hatched and fully-fledged. If operational constraints mean that this delay is not practicable then DECC will be consulted to determine if relocating the species is acceptable.	Prior to and during clearing operations.
E5	A groundcover clearance protocol will be implemented and involve: • removal of large woody debris using excavator grabs or raking if practicable; • placing of intact large woody debris within adjacent areas of intact vegetation; • stripping and stockpiling leaf litter and topsoil separately from deeper fill material; and • reusing leaf litter and topsoil in rehabilitation works.	During clearing and soil stripping activities.

Item	Mitigation Measure and Commitment	Implementation
E6	Fencing will be implemented to exclude grazing by cattle within retained patches of remnant vegetation to improve habitat value and floral diversity.	Prior to, continuous, during and following operations.
E7	A weed and pest management plan will be prepared and implemented as part of management procedures in order to control feral animals and to limit the spread of weeds.	Prior to commencement of and during operations.
E8	Revegetation of suitable components of the Open Cut Area will be undertaken using species representative of the Ironbark Woodland.	During rehabilitation and revegetation programs.
E9	Subject to the receipt of all necessary approvals/permits, a creek rehabilitation program will be undertaken along Station and Glennies Creeks and will include: - erosion control, rubbish removal, complementary planting, weed control, habitat enhancement and exclusion of grazing stock from riparian zones; and - a monitoring and management program to identify and manage noxious weed infestations.	Prior to, continuous during and following mining operations.
E10	Integra will implement a biodiversity offset package in consultation with DECC to compensate for the potential clearing of 19ha of remnant native vegetation and will include: - Revegetation of suitable components of the Open Cut Area; - Conservation and rehabilitation of the degraded riparian and forest habitat along Glennies and Station Creeks; and - Identification and permanent conservation of a suitable woodland offset in the locality, a minimum of 30ha in size, in consultation with DECC. - Pending the satisfaction of the 3 components above, Integra will provide a bond or security to DECC which could be used in the event that Integra does not identify a suitable offset in the specified timeframe.	In accordance with Project Approval requirements.
Traffic and Transportation		
F1	Adhere to RTA and Council restrictions on transport hours and safety/warning requirements for transportation of oversize loads on local roads.	Continuous during operations.
F2	Minimise the duration of road closures on the southern end of Middle Falbrook Road during blasting.	When blasting within 500m of the open sections of Middle Falbrook Road.
F3	Blasting within 500m of the Main Northern Railway line will be controlled under the existing procedure (PRO_2029 Blasting Adjacent to the Main Northern Railway Line) that has been developed in consultation with ARTC.	When blasting within 500m of the Main Northern Railway Line.
F4	Provide notification on the morning prior to a blast of blast times to residents and others who request to be included on the blast notification list.	Prior to all blasts.
Noise and Blasting		
G1	Use noise mitigated mobile equipment to achieve the predicted noise emission levels at the identified receptors.	Continuous during operations
G2	Restrict evening and night-time mining operations, where practicable, to areas that minimise emission levels outside of the Project boundary.	Continuous during operations

Item	Mitigation Measure and Commitment	Implementation
G3	Undertake development activities such as tree clearing and soil stripping during day time operations only, where practicable.	Continuous during operations
G4	Refine on-site noise mitigation measures and operating procedures, i.e. based upon monitoring results.	Continuous during operations
G5	Initiate regular discussions with potentially affected residents to proactively identify noise-related issues of concern.	Continuous during operations
G6	Consider acoustic mitigation at residences where exceedances of the project specific criteria are substantiated by monitoring.	Continuous during operations
G7	Consider negotiated agreements with landowners where exceedances of the project specific criteria are substantiated by monitoring.	Continuous during operations
G8	Continued implementation of the existing Explosive Hazard Management Plan to ensure the safety of employees and the public during explosives handling and blasting operations.	Continuous during operations
G9	Restrict blasting to between the hours of 9.00am and 5.00pm Monday to Saturday, unless blasts outside this time are required for misfire re-blast, emergency or safety reasons.	Continuous during operations
G10	Blast design and implementation to be undertaken by a suitably qualified blasting engineer and/or experienced shot-firer to ensure ANZEC Guidelines are met at all non-project related residences surrounding the Open Cut Project Area.	Continuous during operations
G11	Refine blast mitigation measures and operating procedures as required, based on monitoring results.	Continuous during operations
G12	Provide notification on the morning prior to a blast of blast times to local residents and others who request to be included on the notification list.	Continuous during operations
G13	Use aggregate as the stemming material (not drill dust) in order to fully contain the explosives within the blasthole.	Continuous during operations
G14	In the case of the Part Pit Extent (i.e. Integra is unable to acquire Residence 153 or negotiate an agreement with the owner), blasting will not be undertaken within a 500m Exclusion Zone surrounding the 'Dulwich' residence and 200m from the property boundary until such time that it can demonstrate to the Director-General that blasting can be undertaken without an unacceptable risk to the resident, residents, their stock or residence.	Continuous during operations
Air Quality		
H1	Only the minimum area required for the operation of the Open Cut Project will be disturbed. Reshaping, topsoil emplacement and rehabilitation of overburden emplacement areas will occur as soon as practicable after the completion of overburden emplacement.	Continuous during operations.
H2	Coal handling areas/stockpiles will be kept in a moist condition using water carts to minimise wind-blown and traffic-generated dust.	Continuous during operations.
H3	Water sprays will be available for use on ROM coal stockpiles as required to reduce airborne dust.	Continuous during operations.
H4	All roads and trafficked areas will be watered when required using water trucks.	Continuous during operations.
H5	All haul roads would be clearly defined, especially where they cross overburden emplacement areas.	Continuous during operations.
H6	Development of minor roads will be limited and the locations of these will be clearly defined.	Continuous during operations.

Item	Mitigation Measure and Commitment	Implementation
H7	Minor roads used regularly for access etc will be watered.	Continuous during operations.
H8	Obsolete roads will be ripped and re-vegetated.	Continuous during operations.
H9	Access tracks used by topsoil stripping equipment during their loading and unloading cycle will be watered.	Continuous during operations.
H10	Long term soil stockpiles (not used for over 3 months) will be revegetated.	Continuous during operations.
H11	Dust aprons, dust extraction systems or water injection will be used during drilling operations.	Continuous during operations.
H12	Adequate stemming will be used during blasting.	Continuous during operations.
H13	A real-time PM ₁₀ monitor (TEOM) will be implemented at the location agreed with the DECC in accordance Conditions of Consent for North Open Cut (PA 06_0073). This will be located in the vicinity of Residence 48. Should the 24-hour average concentrations of PM ₁₀ approach the cumulative assessment criteria 150 µg/m ³ , the Operations Manager (Open Cut) of the mine would review the current Open Cut operations and take remedial action to ensure the impact on the property is kept below the criteria. Should the criteria be reached, then all Open Cut operations will cease.	Continuous during operations.
H14	A real-time PM ₁₀ (TEOM) will be located in the vicinity of Residences 108 to 112. Should the 24-hour average concentrations of PM ₁₀ approach the cumulative assessment criteria 150 µg/m ³ , the Operations Manager (Open Cut) will review the current Open Cut operations and take remedial action to ensure the impact on the property is kept below the criteria. Should the criteria be reached, then all Open Cut operations will cease.	Continuous during operations.
H15	Rather than establish an additional monitor at Residence 87, Integra will negotiate with Ashton mine the joint use of data from the existing real-time PM ₁₀ (TEOM) monitor at this location (see TEOM No. 3 on Figure 12-3 for location).	Continuous during operations.
H16	Integra will negotiate with Ashton Coal for the joint use of data from the other sites in the Ashton mine monitoring network (see Figure 12-3 for locations). This will enable real-time monitoring of the impacts of the operations to the west of the Open Cut Project Area.	Continuous during operations.
H17	The results from the dust monitoring program will be regularly reviewed to ensure the data being collected is meaningful. Where warranted, the program will be adjusted in consultation with DECC, with operating/management measures modified accordingly.	Continuous during operations.
H18	During Years 1 -3 of the Part Pit Extent (i.e. in the case that Integra is unable to acquire Residence 153 or negotiate an agreement with the owner), additional controls will be implemented and will include: • re-positioning of the main waste and coal haul routes to reduce impacts on Dulwich; • treatment of the main haul routes to achieve a level of dust control greater than 75%; • development of an Environmental Management Plan that will address environmental controls to be implemented as part of pre-operational phase soil removal activities; • control of emissions from drilling operations through the application of water; and • increasing the moisture content of the ROM coal in-pit.	Prior to the commencement of operations and continuous during operations.
Aboriginal Archaeology		

Item	Mitigation Measure and Commitment	Implementation
I1	All actions and strategies for the management of cultural heritage values will be defined in an Aboriginal Cultural Heritage Management Plan developed in consultation with participating Aboriginal groups.	Prior to the commencement of operations.
I2	Prior to any soil disturbing activities, archaeological surveys will be conducted in those areas within the Open Cut Area to be impacted but which have not been surveyed to date. These areas include the Dulwich Property.	Prior to commencement of operations within potentially affected area not previously surveyed.
I3	Sites which will not be impacted by open cut mining will be identified on mine plans with the requirement not to disturb the ground in these areas. If there is risk of impact, temporary fencing will be erected and restrictions placed on access.	Prior to commencement of operations.
I4	Sites which may be directly or indirectly impacted by activities associated with mining will be identified on mine plans with development avoiding impact to these sites. Where development associated activities occur in close proximity to sites, temporary fencing will be constructed. Where direct impact is unavoidable the strategies outlined in I5 will be followed.	Prior to commencement of operations.
I5	Sites which will be directly impacted by open cut mining will be subject to: - collection and recording of surface artefacts and storage in accordance with the requirements of Aboriginal Groups; and - targetted subsurface salvage excavation programs as determined in consultation with the Aboriginal stakeholders.	Prior to disturbance.
I6	A 'Keeping Place' will be provided for the secure storage of cultural material collected. The Keeping Place will be determined and agreed in consultation with the Aboriginal Groups during the formulation of the Aboriginal Cultural Heritage Management Plan. The Keeping Place will be retained in perpetuity subject to the recommendations of the Aboriginal Groups with regard to the long-term positioning of the sites.	Prior to commencement of operations.
European Heritage		
J1	Work Method Statements for archaeological investigation will be prepared for Zone 1 and, dependant on the acquisition of Dulwich, for Zone 2 as identified in Figure 14-2 .	Prior to commencement of operations within Zone 1 and/or 2.
J2	Project planning and timing will take into consideration any heritage management requirements.	Continuous during operations.
J3	If Dulwich is acquired, a WMS for heritage management and archaeological investigation will be prepared specifically for Zone 3 (Figure 14-2); or If Dulwich is not acquired, a Conservation Management Plan will be prepared to minimise and monitor project impacts on Dulwich.	Prior to commencement of mine operations in Zone 3. Prior to commencement of activities which may impact on Zone 3.
J4	A forensic anthropologist will be engaged to prepare a detailed management plan for the excavation of the grave of James Glennie.	Prior to commencement of mine operations within 200m of European Heritage Zone 2.
J5	Should any other burial sites be exposed during surface scraping operations within the Mine Area, work will cease and appropriate personnel and authorities informed. If the remains are identified as historical in nature, management for skeletal remains will be undertaken by appropriate personnel and a report issued to the Coroner.	Continuous during operations.
J6	In the case of an intersection between European and Indigenous management strategies, or any other environmental management strategy,	Continuous during operations

Item	Mitigation Measure and Commitment	Implementation
	Integra will co-ordinate appropriate consultation between the parties in order to develop and agreement on how to proceed.	
J7	Copies of final excavation reports will be issued to local libraries, historical societies, the NSW Heritage Branch Library and State Library of NSW.	On completion of excavation reports.
Visual		
K1	To the extent practicable, reduce the potential visual impact through the construction of visual amenity bunds/screens or soil stockpiles to temporarily screen views towards the proposed Open Cut Area.	Continuous during operations
K2	To reduce lighting impacts to sensitive receptors, work programs will be arranged, where possible, so that some activities that may be visible from surrounding view locations, occur within daylight hours of operation.	Continuous during operations
K3	Floodlights within the Open Cut Extension Area will be positioned to minimise the potential for lighting to impact sensitive receptors.	Continuous during operations
K4	Where possible, haulage roads and overburden tipping areas will be configured to minimise the potential impact associated with headlights and flashing lights associated with vehicles travelling across the Open Cut Project Area.	Continuous during operations
K5	Integra will consider any reasonable request by a residential receptor for assistance to establish a visual screen within their property through planting and/or landscape works, where such works would effectively reduce the visual impact of activities associated with the proposed Open Cut Extension.	Continuous during operations
Rehabilitation		
L1	Suitable species of vegetation will be planted and established to achieve the nominated post-mine land uses. The rehabilitation plan will clarify the projects rehabilitation goals and outcomes and will confirm the monitoring and management proposals.	Continuous during operations
L2	The majority of the post-mine landform will be revegetated with a combination of native and improved pasture species with scattered tree lots and tree corridors linking the surrounding rehabilitated areas, proposed tree planting corridors and surrounding existing native vegetation.	Progressively during operations
L3	The final landform will be stable and not subject to slumping or excessive erosion which would result in the agreed post mining landform not being achieved.	Prior to completion of Project activities and lease relinquishment
L4	The outside facing slopes of the post-mine landform will generally be a maximum of 10° where they are above the natural land surface. The internal facing slopes and those below natural surface reporting to the final void (including the low wall areas) will generally be a maximum of 18°.	Progressively during operations

