BIG ISLAND MINING PTY LTD

ABN 12 112 787 470

Response to Government Agency and Public Submissions

for the

Dargues Reef Gold Project

Major Project Application No.
PA 10_0054

December 2010

Prepared by:

R.W. CORKERY & CO. PTY. LIMITED

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for the

Dargues Reef Gold Project

Major Project Application No. PA 10_0054

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1. INTRODUCTION

Following the public exhibition of the *Environmental Assessment* for the proposed Dargues Reef Gold Project, submissions were received by the Department of Planning (DoP) from:

- eight government agencies;
- 12 individual members of the general public or private companies supporting the Project;
- 50 individual members of the general public or private companies opposing the project.
- 1 074 members of the public who submitted a form letter which, with minor variations;
- two specialists providing technical submissions; and
- ten special interest groups;

All non-confidential submissions were forwarded by the DoP to R.W. Corkery & Co. Pty Limited (RWC) for the preparation of a response to the issues raised. Each of the submissions from government agencies and non-confidential public submissions was comprehensively reviewed to enable an appropriate response to be prepared.

This document presents a consolidated set of responses prepared by RWC on behalf of the Proponent, Big Island Mining Pty Ltd. In addition, responses to maters of a technical nature have been prepared by the following specialist consultants.

- Ecology – Gaia Research Pty Ltd (Gaia).
- Heritage – Archaeological Surveys & Reports Pty Ltd (ASR).
- Noise and blasting – Spectrum Acoustics (Spectrum).
- Air quality and greenhouse gasses – PAEHolmes (PAEH).
- Surface water, soils and land capability – SEEC Pty Ltd (SEEC).
- Groundwater – Australasian Groundwater & Environmental Consultants Pty Ltd (AGE).
- Traffic and transportation – Transport & Urban Planning (TUP).

Where a response has been prepared by one of these specialist consultants, the response is prefaced by the relevant acronym noted above.

This document was reviewed by a range of employees of the Proponent, the Proponent's legal representatives and the Proponent's engineering consultants, namely Mining Plus.

This document is structured as follows

Section 1 Provides an introduction to the document and identifies the contributing authors.

Section 2 Provides an overview of principal the amendments that have been made to the Project description as a result of the submission received and information that has become available since the *Environmental Assessment* was made publicly available.

Section 3 Provides clarification and correction of a number of minor omissions in the *Environmental Assessment* that were identified through the submissions received. Where appropriate, further analysis of the anticipated environmental impacts are provided.

Section 4 Provides a response to those government agency submissions received. Where appropriate, the submissions have been reproduced in their entirety (in italics) and a response is provided (in normal text) to each issue raised. It is noted that a submission from the NSW Office of Water was not received until this document was in the final stages of preparation. As a result, a separate response has been prepared in relation to that submission

Section 5 Provides a response to those submissions received from the public. Those submissions have been divided into non-pro forma, pro forma, technical and special interest group submissions. Where appropriate, submissions have been reproduced (in italics) either as representative extracts or in their entirety, and a response is provided (in normal text) to each issue raised. Where an issue is addressed elsewhere in the document, a cross reference is provided.

Section 6 Provides an updated and final version of the Statement of Commitments originally included as Section 5 in the *Environmental Assessment*. Where the commitments have been amended, the amended text has been tracked and is underlined and in red

Appendices A range of supporting documentation is provided.

2. SUMMARY OF AMENDMENTS TO THE PROJECT

2.1 INTRODUCTION

The Proponent proposes the following minor amendments to the Project as a result of the submissions received.

- Reduced hours of crushing operations.
- Capping of the tailings storage facility.
- Hours of Off-Site Heavy Vehicle Movements.

This sub-section provides an overview of those amendments and an assessment of the anticipated impacts. It is noted that in both cased the Proponent contends that the environmental impacts associated with the amended Project would be less that those associated with the Project as described in the *Environmental Assessment*.

2.2 REDUCED HOURS OF CRUSHING OPERATIONS

2.2.1 Introduction

The Proponent notes that a significant number of submissions from the surrounding community identified noise-related impacts, particularly noise during the evening and night as an issue of concern. The Proponent notes that Spectrum (2010a) identifies that the Project, as presented in the *Environmental Assessment*, complied with all relevant noise assessment criteria. However, in recognition of the level of concern in relation to that aspect of the Project, the Proponent proposed to restrict the hours of crushing operations

This sub-section provides an overview of the proposed amended hours of operation and an assessment of the anticipated noise-related impacts in light of the amended hours of operation.

2.2.2 Hours of Crushing Operations

Section 2.11.2 of the *Environmental Assessment* identifies that processing operations, including crushing operations, would be undertaken 7 days per week, 24 hours per day.

The Proponent would, with the exception of 20 days per year, commit to restrict the proposed hours of crushing operations, including operation of the associated front-end loader, to 7:00am to 7:00pm, 7 days per week. The ability to undertake occasional or limited crushing operations 24-hours per day would be required to allow building of sufficient crushed ore stockpiles to permit ongoing processing operations during maintenance of the crushing circuit or to rebuild crushed ore stockpiles following an unplanned shutdown of the crushing circuit.

The Proponent notes that the crushing circuit was designed to operate at a greater capacity than the processing plant for the reasons identified in the previous paragraph. As a result, the Proponent originally intended that the crushing circuit would only operate for part of the any 24-hour period. It is acknowledged, however, that is was not identified in the *Environmental Assessment*. As a result, the proposed amendment would merely formalise the intended operational procedures for the crushing circuit.

No amendments to the proposed crushing and screening equipment would be required as a result of the proposed amendment.

The Commitment 3.1 has been adjusted to reflect the proposed amendment.

2.2.3 Potential Impacts

Crushing operations would be principally associated with the following environmental impacts.

- Noise - Table A1 in Appendix 1 of Spectrum (2010a) identifies the crushing plant and from-end loader as two of the most significant noise contributions in the noise model. This, combined with the fact that the crushing operations would be undertaken at a fixed, elevated location, means that the crushing plant and associated front-end loader are two of the most significant noise sources within the Project Site.

- Air quality - Crushing operations, by their nature, have the potential, in the absence of management and mitigation measures, to result in significant dust emissions. It is noted that PAEH (2010) determined that the Project, including 24-hour crushing operations, would not result in air quality impacts that would exceed the relevant air quality assessment criteria. As a result, reducing the proposed crushing operations to 11-hours per day would result in lower air quality impacts. As a result, no further assessment of air quality-related impacts is required.
- Visual amenity – 24-hour crushing operations would have required night-time lighting. While the Proponent would have designed the lighting to minimise impacts on surrounding residents, the lights may have still had an adverse impact on surrounding residents. As the proposed amended hours of crushing operations would be limited to the day time, such lights would, with the exception of a maximum of 20 days per year, not be used. This would result in reduced visual amenity impacts. As a result, no further assessment of visual amenity-related impacts is required.

Finally, it is noted that reduced hours of crushing operations would not have a significant impact on ecology, groundwater, surface water, Aboriginal or non-Aboriginal heritage, bushfire, traffic or soils-related matters. As a result, no further assessment of those aspects is required.

2.2.4 Assessment of Impacts

Spectrum Acoustics Pty Limited undertook an assessment of Noise Scenario 2, namely Project operation, in the absence of crushing operations. The resulting report is presented in **Appendix 1** and is referred to hereafter as Spectrum (2010b).

In preparing that assessment, Spectrum (2010b) used the same assessment methodology as that identified in Section 4.2.4 of the *Environmental Assessment* and 6.2 of Spectrum (2010a), with the exception of noise inputs from the crushing plant, rock breaker and the associated front-end loader.

Appendix 1 presents the results of that assessment. Those results may be summarised as follows.

- The anticipated operational noise levels at surrounding receivers are generally 3dB(A) to 4dB(A) lower that the predicted levels with crushing operations. As the predicted operational noise levels at all residences including crushing operations were lower than the relevant assessment guidelines, the predicted operational noise levels without crushing operations are also predicted to be all lower than the relevant assessment criteria.
- Spectrum Acoustics Pty Limited note that maximum noise levels (as opposed to operational $L_{Aeq(15minute)}$ noise levels) are generally attributable to the movement of a haul truck at the surface in the ROM area. Transportation of ore material would continue to be undertaken 24-hours per day. As a result, maximum noise levels

are not predicted to be reduced as a result of limitation of the hours of crushing operations. Spectrum, however, notes that these levels are at least 3dB(A) below the sleep disturbance criterion of 45dB(A),$L_{1(1minute)}$. Finally, the Proponent would limit surface operation of haul trucks during the night to the greatest extent practicable.

2.3 CAPPING OF THE TAILINGS STORAGE FACILITY

Section 2.14.8 of the *Environmental Assessment* identifies that the tailings storage facility was originally to be shaped to form a free draining landform and capped with suitable soil material prior to being revegetated. In light of comments received in the submissions, the Proponent would during rehabilitation of the facility, cap the upper surface with suitable clay material to limit the potential for infiltration of surface water. This amendment to the proposed rehabilitation operations would have no adverse environmental impacts.

2.4 OFF SITE HEAVY VEHICLE MOVEMENTS

The Proponent would commit to restricting all heavy vehicle movements to or from the Project Site between the hours of 7:00am and 8:30am and 3:00pm and 5:00pm on school days to avoid potential conflict with the local school bus services. Commitments 3.1 and 10.6 have been amended to reflect this change.

3. CLARRIFICATION AND CORRECTION OF THE ENVIRONMENTAL ASSESSMENT

3.1 INTRODUCTION

Following completion of the *Environmental Assessment*, the Proponent was made aware of a number of minor omissions in the document. These included the following.

- Omission of an approved but not constructed residence on Property 100.
- Omission of a reference to the ownership of Residence R33.

This section provides additional information in relation the omitted residence and property.

3.2 RESIDENCE R108

3.2.1 Introduction

A submission was received from John and Kate Spring stating that they owned Property 100, located, at its closest, approximately 400m west of the Project Site. Mr and Mrs Spring identified that they had received building approval from Palerang Council in April 2009 but had not commenced construction. As a result, the approved building location had not been assessed as a residence in the *Environmental Assessment*. Upon receiving the submission, the Proponent, through its community consultation consultant, contacted Mr and Mrs Spring with a request for further details in relation to the approved building location. That information was provided and the residence location, Residence R108, is shown on **Figures 1** and **2.**

Potential Project-related environmental impacts at Residence R108 include noise, groundwater, air quality, blasting and visual amenity-related impacts. The remainder of this sub-section provides an assessment of those potential impacts and a summary of discussions held with Mr and Mrs Spring in relation to those potential impacts.

3.2.2 Noise

Spectrum Acoustics undertook further point-to-point noise calculations for Residence R108. The resulting findings are presented in **Appendix 2.** In summary, noise calculations were performed for Residence R108 for all scenarios included in the original noise assessment and are summarised in **Table 1**. Descriptions the assessment criteria and methodology and scenarios assessed are provided in Section 4.2 of the *Environmental Assessment.*

Table 1
Noise Assessment – Residence R108

Criterion ($L_{eq(15\ minutes)}$, dB(A))	Predicted Noise Level ($L_{eq(15\ minutes)}$, dB(A))			Differential (dB)
	Neutral	Inversion	NNW Wind	
Scenario 1a – 24-hour Site Establishment – Excluding bulk earthworks				
35	20	34	33	-1
Scenario 1b – Site Establishment and initial Mine Development – including bulk earthworks				
35	33	-	-	-2
Scenario 2 – Project Operation (24 hours)				
35	28	34	30	-4
Sleep Disturbance				
45	-	41	-	-4
Source – Spectrum Acoustics (2010b)				

In summary, all relevant noise criteria are expected to be achieved at Residence R108. As a result, the Proponent contends that no further sound mitigation measures would be required at the ROM pad as requested by Mr and Mrs Spring. However, see Section 2.2 which identifies that the Proponent would commit to restricting crushing, screening and related operations during the evening and night-time.

In light of the request by Mr and Mrs Spring that noise levels be monitored regularly at their house site, the Commitment 15.2 has been amended to include Residence R108 in the list of regular noise monitoring locations. In addition, the Proponent would include Mr and Mrs Spring in regular consultation programs during the life of the Project and would ensure that any concerns raised are adequately addressed.

3.2.3 Blasting

As indicated in Section 4.2.6.5 of the *Environmental Assessment*, the blasting assessment concluded that relevant blasting criteria would be achieved at the closest non-project-related residence, namely Residence R31, located approximately 750m from the box cut. As residence R108 is located approximately 1 400m from the box cut and blasting impacts are proportional to distance from source to receiver, then the relevant blasting criteria would be achieved at Residence R108.

\\SERVER\RWC\752\75204\Cad\752EA_Response 1 Land Ownership.DWG

TN
MN

SEE INSET A

SEE INSET B

INSET A

INSET B

SCALE 1:15 000
250 0 250 500

Note: See **Table 4.3** of the Environmental Assessment for the Land Ownership details of each property

SCALE 1:25 000
250 0 250 500 750 1000 1250 m

SCALE 1:10 000
100 0 100 200 300 400 500 m

REFERENCE
Project Site Boundary
Cadastral Boundary
1 Landowner Reference
R1 Residence & Identifier
R108 Approved Residence - Yet to be Constructed

Land Ownership Source: Land and Property Management Authority - March 2010

Figure 1
SURROUNDING LAND OWNERSHIP - Amended

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TN
MN

INSET A

\\SERVER\RWC\752\75204\Cad\752EA_Response 2 Surround Residence.DWG

SCALE 1:15 000
250 0 250 500

SEE INSET A

SEE INSET B

1km

2km

INSET B

Majors Creek Rd
Ross St
Burke St
Hill St
Cloete St
Harold St E
Wallace St
Alfred St
Gold St
Major St
Edgar St
Bemboura St
Badgery St
New St
George St
Vale St
Hooper St
Griffin St
McLerie St
Seymour St
Araluen St
Hawker St
Peters St
Roberts St
Flacks Rd
Red Hill Rd

SCALE 1:25 000
250 0 250 500 750 1000 1250 m

SCALE 1:10 000
100 0 100 200 300 400 500 m

REFERENCE
Project Site Boundary
Cadastral Boundary
R1 Residence & Identifier
R108 Approved Residence - Yet to be Constructed
Distance from Processing Plant

Source: Big Island Mining Pty Ltd

Figure 2
SURROUNDING RESIDENCES - Amended

R.W. CORKERY & CO. PTY. LIMITED

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3.2.4 Groundwater

Mr and Mrs Spring have advised the Proponent that there is no bore located within their property and that they are not aware of any springs within the property.

3.2.5 Air Quality

As indicated in Table 4.42 of the *Environmental Assessment*, Project-related air quality emissions are not expected to result in exceedances of the relevant air quality criteria at any residences surrounding the Project Site, including Residence R31 which is located between Residence R108 and the proposed processing plant. As a result, compliance with those criteria at Residence R108 is also expected.

3.2.6 Visual Amenity

The Proponent acknowledges that the ROM pad and processing plant would be visible from Residence R108. In accordance with Commitment 12.6, the Proponent would consider favourably any request for assistance in creation of a visual screen. To this end, the Proponent will commence consultation with Mr and Mrs Spring in relation to identifying options for visual amenity screens and would ensure that any screens are planted/constructed as soon as practicable after receipt of project approval.

3.3 PROPERTY 115

A submission was received from Brian and Karis Sanderson (Submission 045). In that submission it was noted that while their residence (Residence R33) was included in the *Environmental Assessment*, specific reference to their property was not. **Figure 1** has been amended to include reference to the property, namely Lot 1 DP 1093136, as Property 115.

4. GOVERNMENT AGENCY SUBMISSIONS

4.1 Introduction

This sub-section presents the submissions received from relevant government agencies (in *italics).* A response to each issue raised is presented (in normal text). Where one of the specialist consultants identified in Section 1 has provided the relevant response, the response is prefaced with the consultant's acronym in parenthesis.

4.2 DEPARTMENT OF ENVIRONMENT, CLIMATE CHANGE AND WATER

4.2.1 Water

4.2.1.1 Discharges

Legislation that DECCW implements such as POEO Act, do not support the discharge of water into other water bodies unless Ambient Water Quality Objectives are met. Therefore if the proponent intends to discharge water into Majors and/or Spring Creek then that water should meet the ambient water quality objectives of both water ways. It may be in the proponent's interest to begin monitoring water quality in both waterways so that they can establish appropriate ambient water quality levels.

Response: The Proponent acknowledges that a licence under the POEO Act will be required for discharge of environmental flows to Majors Creek and that the quality of water released will be required to meet the relevant water quality criteria. The Proponent has undertaken long term monitoring of water within both Spring and Majors Creeks (see Section 4.6) and proposes to implement the monitoring program identified in the *Environmental Assessment* and this document as soon as practicable.

4.2.1.2 Tailings Storage Facility and Tailings Composition

Page 4-82, under "Design and construct the Tailings storage facility (TSF) as per section 2.7 ...":

- *dot point 2 - Ensure that the Tailings Storage Facility embankment is keyed into the underlying material in a manner that would prevent down slope migration of potentially contaminated groundwater from the facility;*
- *dot point 4 - "Construct seepage collection structures at the foot of the tailing storage facility embankment and ensure that any captured seepage is automatically pumped back to the tailings storage facility':· .*
- *dot point 5 - "Install piezometers at appropriate interval at the base of the tailings storage facility embankment and monitor these regularly to assess the integrity of the facility. "*

These points indicate potential contamination of the material to be placed in the TSF and therefore potential impacts on downstream ground and surface waters. The EA does not include sufficient information on the processing chemicals and whether they will be part of tailings generated through the project. The longer term fate of the material and water in the TSF is an issue, for example, there is no indication as to when seepage collection and integrity monitoring end after the completion of the mining activities. DECCW believes that the main contaminant appears to be salinity, as it will be the most mobile. However the information regarding process chemicals and their resultant volumes within tailings or other waste streams has not been provided in the EA.

DECCW requires this information in order to ascertain the suitability of tailings management and monitoring for the project.

Response: The Proponent does not anticipate that tailings material will pose any significant contamination risk. However, in line with best practice tailings management and taking into consideration the sensitivity of downstream environments and users of surface and groundwater, the Proponent proposes to construct an impermeable tailings storage facility with surface and sub-surface structures to capture and return any leakage from the facility and implement a monitoring program to test for leakage. This does not imply that the Proponent anticipates significant contamination-risks.

The Proponent notes that a report prepared for the Project feasibility study was received after finalisation of the *Environmental Assessment.* The following provides a summary of relevant information from that report

Acid Generation Potential

An analysis of the tailings material indicated that the tailings material has a very low sulphur content of 0.095%, with all sulphur occurring as sulphide. The maximum potential acidity was calculated at 2.6 kg H_2SO_4 /t which is considered very low. The acid neutralising capacity of the tailings was determined to be 89kg H_2SO_4 /t of tailings. As a result, the net acid producing potential of the tailings material is approximately -86 kgH_2SO_4 /t of tailings.

In addition, net acid generation tests were undertaken. These tests indicate that even under extreme oxidising conditions no measurable acid is produced and the pH of the solution remains alkali.

As a result, the tailings are therefore classified as Non Acid Forming.

Tailings Chemical Composition

Table 2 identifies the geochemical composition of the tailings material. These results are compared with average crustal abundance to give the geochemical abundance indices The Geochemical Abundance Index. The results of the analysis show that tailings solids contain a low number of elemental enrichments. Molybdenum and antimony are naturally enriched components of the ore and are classified as significantly enriched with silver slightly enriched. Boron is classified as slightly enriched but this is a result of the high detection limit for the test and the sample may not actually be enriched in boron.

The results of the analysis have also been compared to *National Environmental Protection Measures Investigations Levels for Assessment of Site Contamination* published by the National Environmental Protection Council in 1999. However guideline values for antimony and molybdenum, which were found to be enriched, were not available in this reference. To allow assessment of the antimony and molybdenum concentrations, the concentrations contained in the samples have been compared to *Netherlands National Institute of Public Health and Environment Intervention Levels for Soil* published by the Dutch National Institute of Public Health and the Environment in 1998 and ecological threshold concentrations for antimony in water and soil published by the European Centre for Risk Assessment in 2009. The results of this assessment indicate that the concentration of enriched elements are below ecological or health based investigation levels for all parameters except sulphur. The sulphur is found to be in relatively low concentration and there is sufficient neutralising capacity so as this does not present a risk to the environment or human health.

Table 2
Tailings Solid Multi-Element Results & Geochemical Abundance Indices

Element	Unit	Multi-Element Analysis Result	Average Crustal Abundance	Geochemical Abundance Index
Ag	ppm	0.45	0	**2**
Al	ppm	82890	82000	0
As	ppm	<2	2	0
B	ppm	<50	10	**2**
Ba	ppm	334	500	0
Be	ppm	2.7	3	0
Ca	ppm	34771	41000	0
Cd	ppm	0.1	0.1	0
Co	ppm	4.1	20	0
Cr	ppm	159	100	0
Cu	ppm	48	50	0
F	ppm	976	950	0
Fe	ppm	14800	41000	0
Hg	ppm	0.1	0.1	0
K	ppm	19222	21000	0
Mg	ppm	6298	23000	0
Mn	ppm	630	950	0
Mo	ppm	25	2	**3**
Na	ppm	30025	23000	0
Ni	ppm	125	80	0
P	ppm	712	1000	0
Pb	ppm	6	14	0
Sb	ppm	3.8	0.2	**4**
Se	ppm	0.06	0.1	0
Sn	ppm	3.3	2	0
U	ppm	3.13	2	0
V	ppm	88	160	0
Zn	ppm	34	190	0
Note1: Bold = slightly enriched. Highlighted and Bold – Significantly Enriched				
Source: Knight Piésold Pty Limited (2010) – Table 4.15				

Supernatant Water Quality

The supernatant water quality, namely the quality of water contained within the tailings paste pumped to the tailings storage facility, was assessed. The results of the testing give an indication of the water quality which is likely within the supernatant pond during operation.

Table 3 presents the results of that testing as well as West Australian water quality standard for release of water from mining operations and livestock drinking water. In summary, the supernatant water quality meets the guidelines for release and for livestock drinking water for all parameters analysed.

Table 3
Tailings Supernatant & Comparison to Release and Livestock Guidelines

Parameter	Reference Value (mg/L)	Assay results (mg/L)	Exceedance of reference (%)
pH	6 to 9	7.8	-
TDS	2000	630	-
Aluminium	5	0.16	-
Antimony	N/G	0.035	No Guideline
Arsenic	0.1	0.001	-
Barium	N/G	0.098	No Guideline
Boron	5	0.15	-
Cadmium	0.01	0.00012	-
Calcium	1000	55.88	-
Chloride	N/G	157.5	No Guideline
Chromium (total)	1	<0.01	-
Cobalt	1	0.0002	-
Copper	0.3	0.01	-
Flouride	2	1	-
Iron	2	0.22	-
Lead	0.1	<0.0005	-
Magnesium	2000	14.12	-
Manganese	N/G	0.16	No Guideline
Mercury	0.002	<0.0001	-
Molybdenum	0.15	0.01	-
Nickel	0.05	<0.01	-
Phosphorus	N/G	<0.1	No Guideline
Selenium	0.02	0.0016	-
Silver	0.5	0.00001	-
Sodium	N/G	127	No Guideline
Sulphate	1000	115.1	-
Tin	N/G	0.0036	No Guideline
Uranium	0.2	0.028	-
Vanadium	N/G	<0.01	No Guideline
Zinc	0.5	0.015	-

Note 1: Reference Value Source – West Australian water quality standard for release of water from mining operation and livestock drinking water.

Source: Knight Piésold Pty Limited (2010) – Table 4.17

Salinity

As the water to be used during processing operations is not significantly saline and that Braidwood Granodiorite does not contain elevated levels of salts, elevated salinity in pore water within the tailings material is not expected to be a significant potential contaminant. In addition, management and mitigation measures that would be implemented to prevent discharge of reagent-laden seepage from the tailings storage facility would also prevent discharge of salt-laden seepage.

Seepage Collection and Monitoring

Seepage collection and monitoring would continue from the commencement of tailings placement operations until continued collection and monitoring is deemed to be no longer required by the relevant government agencies. Commitment 15 has been amended to reflect this commitment.

The proponent is investigating alternative measures for managing the tailings that would be produced by the Project. This may include using tailings to backfill completed stopes within the proposed mine using a process referred to as "paste fill." The implications of any contaminants found to be present in the tailings might limit or prevent this use. The proposal to use the tailings in this manner should be further investigated and reported on prior to this activity commencing.

Response: However, it is noted that the use of paste fill techniques would result a significantly smaller tailings storage facility on surface and a greater degree of backfilling of the final slopes, resulting in more rapid groundwater recovery following completion of mining operations. As indicated in Tables 2 and 3, the Proponent currently understands that there are no deleterious elements within either the tailings material itself or within the supernatant water. As a result, no significant adverse environmental impacts are anticipated as a result of the use of paste fill techniques.

However, as investigations into the use of paste fill is ongoing, the use of this process is not proposed at this stage. A description was merely provided in the *Environmental Assessment* to highlight to readers that alternative tailings placement procedures were being considered and that subsequent applications may be made to permit this placement method.

DECCW note that after completion of mining operations the proponent does not intend to put a clay capping on the tailings storage facility (see Section 2.14.8). DECCW do not support this position as there will be potential implications for the amount of ongoing seepage from the tailings storage facility. Modelling the effect of saline seepage water on the salinity/conductivity levels in Majors Creek to see if environmental values could be compromised is something that the proponent should be required to undertake.

Response: The Proponent contends that surface water infiltration into the surface of the reshaped and rehabilitated tailings storage facility would not pose a significant risk to the post-mining management of the facility because the final landform would be shaped to be free draining and would be well vegetated. However, in light of the concerns raised by the Department, the Proponent would agree to construction of a suitable cap on the tailings storage facility during final rehabilitation to prevent surface water infiltration into the post-mining landform. The form that this cap would take, namely a clay liner or some other form of liner, would be determined in consultation with the relevant government agency during preparation of the *Closure Plan.* Commitment 16.12 has been amended to reflect this commitment.

4.2.1.3 Ore Processing Area

Previous DECCW comments on the proposal raised concerns with the recycling of water through the ore processing activities, particularly with the potential for contaminate concentrations to increase over time. DECCW is concerned that the exhibited EA did not fully address this issue, and believe that better controls around these processing areas are needed. This information will be relevant for licensing and setting licensing conditions. For example, does the proponent intend to put a bund around the area to capture major rainfall events, or have a catch dam close to the processing area that might discharge in a high rainfall event, or both? The proponent has also indicated that low grade ore would be used in the construction of the ROM pad, potentially becoming a source of acid mine drainage for the time it is emplaced. The proponent needs to consider these matters further and indicate how it will manage runoff and infiltration, and thus minimise the spread of contaminants.

Response: The Proponent proposes to have three classes of water within the Project Site, and three resulting water management areas. These would be as follows.

- Contaminated water – namely water with the potential to contain processing reagents, hydrocarbons, other chemicals or lowered pH as a result of natural oxidation of sulphide bearing materials. This water would be contained within a Contaminated Water Management Area that would be bunded to ensure no discharge of potentially contaminated water. In addition, the Proponent would ensure that the processing plant, reagent and concentrate storage area and hydrocarbon store are all contained within the Contaminated Water Management Area(s). All surface waters within the Contaminated Water Management Area would be retained and pumped to the Process Water Tank for use within the processing plant. Commitment 7.21 has been inserted to clarify this commitment.
- Dirty water – namely water with the potential to contain suspended sediment but not chemicals or other contaminants. This water would be managed through appropriately designed sediment control structures. Unless those structures are included in the Proponent's harvestable right, water would be released from the sediment control structures once required suspended sediment concentrations have been achieved.
- Clean water – all surface water within undisturbed sections of the Project Site would be treated as clean water. This water would be diverted around disturbed sections of the Project Site and would be directed to natural drainage or the proposed harvestable or existing dams.

As indicated in Section 4.5.7 of the *Environmental Assessment*, the Proponent would prepare a detailed *Surface Water, Sediment and Erosion Control Plan.* That plan would be prepared in consultation with Department of Environment, Climate Change and Water (DECCW) and other relevant government agencies and would provide detailed descriptions of the proposed surface water management structures, including design rainfall assumptions to ensure nil discharge from the Contaminated Water Management Area.

Finally, in light of the Department's concern in relation to the use of low grade ore material within the ROM pad, the ROM pad would be constructed entirely from waste rock material. Commitment 7.19 has been inserted into the Final Statement of Commitments to reflect this commitment.

4.2.1.4 Management of Surface Water, Pollutants and Erosion and Sediment

The proponent has proposed that they will develop a Sediment and Erosion Control Plan (as described in the Statement of Commitments). DECCW is concerned that this Plan does not sufficiently cover the ore processing area and run of mine pad well enough.

Response: The Proponent anticipates that the *Surface Water and Sediment and Erosion Control Plan* would be prepared in consultation with the Department and that all issues of concern to DECCW will be addressed in that document.

The proponent has committed to having various mitigation and control measures covering groundwater and surface water. These measures will be important but there are few other areas that need to be considered and addressed.

One aspect of mitigation and control that the proponent has not specifically discussed or committed to (eg see commitments 7.16 to 7.18) is how it will deal with the inevitable spills, leaks and maintenance activities that will occur in the area or areas where the ore will be processed (ie from grinding through to the final flotation concentrate). This is unsatisfactory. DECCW require that the proponent provides information on the management of processing chemicals, reagents and processing leachate within the processing areas so that DECCW can determine if the proposal complies with industry standards and includes sufficient pollutant prevention measures.

Response: As indicated in Section 4.2.1.3, the Proponent would ensure that the processing plant, reagent storage area and hydrocarbon storage area are all contained within the Contaminated Water Management Area and that appropriate surface water controls, including bunding and oil/water separators are installed to ensure no discharge of potentially contaminated water. In addition, detailed design parameters would be identified in the *Surface Water and Sediment and Erosion Control Plan* that would be prepared in consultation with Department of Environment, Climate Change and Water and other government agencies.

In addition, the Proponent has previously committed to implement the following management and mitigation measures during the life of the Project.

- All reagents would be stored and used in accordance with the manufacturer's instructions and the relevant Material Safety Data Sheets.
- All liquid reagents would be stored within a bunded area with a capacity of at least 110% of the capacity of the largest container.
- Reagents would not be stored with incompatible chemicals or chemicals that may cause a reaction in the event of a reagent spill.
- Only the minimum volume of reagents required for the ongoing operation of the Project would be stored within the Project Site.

- Material Safety Data Sheets and appropriate spill management equipment would be available in the vicinity of all reagent storage areas.
- A *Hydrocarbon, Chemical and Reagent Management Plan*, including emergency management procedures, would be developed and implemented throughout the life of the Project

Similarly, the company has discussed (but not tabulated a commitment covering) containment measures for the final floatation concentrate (see Section 2.6.5) There seems to be little or nothing said about containing and managing spills, leaks, overflows, wash down waters, oil and grease and runoff from treatment process areas prior to the final flotation concentrate area. Process streams in these areas will contain one or more of: recycled water with a build up of contaminants, elevated levels of metal sulphides, and process chemicals. The proponent needs to have some system(s) of contaminant minimisation and containment and water management in this/these areas otherwise contamination will spread downstream. This aspect needs to be explicitly addressed in detail and it needs to be done in the planning/design phase not retrofitted afterwards: Such a system would simplify licensing including supervision, monitoring and the number of discharge points. The detail of how the proponent plans to contain contamination and manage water should be a documented commitment describing how the matters will be explicitly addressed.

Response: As indicated in Section 2.6.5 of the *Environmental Assessment*, concentrate material would be placed within a covered area on a concrete sealed surface. As also indicated all surface water, including water draining from the concentrate material following stacking, would be directed to a sump and returned to the process water system. The concentrate storage area would be contained within the Contaminated Water Management Area and no surface water would be discharged. Commitment 7.1 has been amended to reflect the above.

DECCW recommend that prior to commencement of works, the proponent must develop and provide to DECCW for comment, a comprehensive Water Management Plan for the ore processing area and run of mine pad to manage, at source, potential pollutants spills of chemicals during processing or runoff from contaminants in the ore from the run of mine pad. The Water Management Plan must include measures to prevent pollution from the processing area and run of mine pad including:

- *limiting overland runoff from the run of mine pad and processing area for example use of additional bunding to contain the work area;*
- *minimising infiltration to groundwater from the run of mine pad and processing area;*
- *capturing and reusing or treating any runoff from the runoff mine pad and processing area, such as directing flows to detention basins adjacent to the processing areas and run of mine pad;*

Response: Section 4.5.7 of the *Environmental Assessment* identifies that a *Surface Water, Sediment and Erosion Control Plan* would be prepared. The Proponent anticipates that that plan, or a *Water Management Plan*, would:

- be prepared prior to the commencement of site establishment operations;

- include the matters identified by the Department; and
- be prepared in consultation with the Department.

If discharges are proposed from the processing area or run of mine area, wet weather discharge licence limits or monitoring conditions may be required for, but not limited to, process chemicals, pollutants mobilised from the ore, salinity, pH , suspended solids, oil and grease. It should be noted that DECCW does not support the pollution of waters and instead would require appropriate pretreatment options be identified prior to discharge to the environment.

Response: No discharges from the contaminated water management area are proposed.

Sediment and erosion control around the processing area and run of mine pad during construction and operational phase should be guided by "Volume 2E: Mines and quarries" from the Managing . urban storm water: soils and construction publications, available on the DECCW website at: http://www.environment.nsw.gov.au/stormwater/publications.htm

Response: Section 4.5.4 of the *Environmental Assessment* identifies that the proposed sediment and erosion control would be constructed to comply with the identified document.

4.2.2 Noise

The proponent has not determined what, if any, modifying factor adjustments should be made. It is considered that tonality / low frequency and/or impulsiveness will be an issue, and therefore adjusted levels could be 5 -10 dB(A) above their modelled LEq(15min) values. This may result in the proponent not being able to meet amenity criteria at a number of receivers under any stability conditions.

Recommendation: That the proponent investigate which modifying factor adjustments (detailed in section 4 of the Industrial Noise Policy (INP)) should be made to predicted noise levels at receivers, and report these adjusted values, with additional mitigation as necessary.

Response: (Spectrum) None of the noise sources (as used in the noise modelling and sourced from similar plant and machinery) is tonal, impulsive or contains sufficient low-frequency content to attract a modifying factor correction. Modifying factor corrections are, however, an important compliance issue and any future noise monitoring will be required to be in third-octave bands, both A- and C-weighted, and as assessment of modifying correction factors included in compliance reporting

The proponent has also not qualified which future drilling activities for exploration would occur on the licensed premises.

Recommendation: DECCW considers that any exploratory drilling proposed for the premises would constitute activities ancillary to the licensed activity. As that ancillary activity would be undertaken on the licensed premise, it would be captured under the EPL for the premises. The proponent should therefore detail and consider in their modelling, the cumulative impact of any exploratory drilling on predicted noise levels at receivers, and propose any additional mitigation measures as necessary.

Response: The Proponent notes that exploration is an intermittent activity that may be undertaken in a variety of locations using a variety of equipment. As a result, any modelling that may be undertaken is unlikely to reflect the actual noise impacts.

It is noted that exploration drilling operations have been undertaken intermittently within the Project Site since 2004. It is also noted that further drilling operations are likely to be undertaken during the life of the Project. As a result, the Proponent agrees that drilling operations should be considered to be ancillary to the proposed licenced activity and noise emissions should be covered by any Environment Protection Licence issued for the Project. This approach is consistent with recent discussions and agreements with Industry and Investment NSW in relation to proposed exploration operations within the Project Site.

The proponent has also not justified their assumptions about the duty cycles or locations used in the model (i.e. haul trucks and semi trailer had a "time-based correction" applied, but this correction has not been explained or justified).

Recommendation: That the proponent fully justify all assumptions made about the duty cycles of plant and equipment proposed for the premises, as well as adjustments made to plant noise levels based on location.

Response: (Spectrum) The time-based correction used in the noise assessment was a standard calculation for modelling noise sources that would not be present for an entire 15-minute period. It was estimated that a road truck would traverse the road from loading point to its junction with Major Creek Road in four minutes. A point source was located at both the northern and southern ends of the haul road and it was conservatively assumed that there could be two truck movements in a 15-minute period.

The correction factor for 2 x 2 minute occurrences of noise in a 15-minute period is $10\log_{10}(4/15) = -5$dB. Based on previously measured pass-by sound power level of 103 dB(A), each of the truck point sources was modelled as 98 dB(A),$L_{eq(15minute)}$.

The proposal is located within one kilometre of the Majors Creek State Conservation Area (SCA). At present the noise assessment does not address the potential for noise impacts on the amenity of this SCA.

Recommendation: That the proponent assess noise impact on the Majors Creek State Conservation Area via methodology detailed in the Industrial Noise Policy.

Response: It is noted that the Majors Creek Falls Reserve or Majors Creek State Conservation Area is located approximately 2.5km from the processing plant and ROM pad. It is also noted that the closest residence to those points is Residence R31 which is approximately 750m from the processing plant and ROM pad. As the noise assessment determined that all relevant noise assessment criteria would be achieved at Residence R31, the Proponent contends that all relevant noise assessment criteria would also be achieved at the Majors Creek Falls Reserve located three times as far away as Residence R31.

Spectrum Acoustics Pty Limited note that the relevant INP noise criterion for the reserve is 50dB(A), 15 dB higher than the criterion at residential receivers. In addition, Spectrum note that the reserve is located on the Araluen valley escarpment and is thereby shielded from the Project Site.

DECCW recommend that a Traffic Noise Management Strategy (TNMS) be developed by the proponent, prior to commencement of construction and operation activities, to ensure that feasible and reasonable noise management strategies for vehicle movements associated with the facility are identified and applied, that include but are not necessarily limited to the following;

- *driver training to ensure that noisy practices such as the use of compression engine brakes are not unnecessarily used near sensitive receivers,*
- *best noise practice in the selection and maintenance of vehicle fleets,*
- *movement scheduling where practicable to reduce impacts during sensitive times of the day,*
- *communication and management strategies for non licensee/proponent owned and operated vehicles to ensure the provision of the TNMS are implemented,*
- *a system of audited management practices that identifies non conformances, initiates and monitors corrective and preventative action (including disciplinary action for breaches of noise minimisation procedures) and assesses the implementation and improvement of the TNMS,*
- *specific procedures for drivers to minimise impacts at identified sensitive receivers,*
- *clauses in conditions of employment, or in contracts, of drivers that require adherence to the noise minimisation procedures and facilitate effective implementation of the disciplinary actions for breaches of the procedures.*

Response: Section 2.9 of the *Environmental Assessment* and Commitment16.1 identify that a *Traffic Management Plan* would be prepared. The Proponent would prepare the plan in consultation with DECCW and would ensure that the above matters are included in the document.

4.2.3 Air Quality

Page ES-7, Processing Operations, describes the proposed processing arrangements for the site. In this section it states" ..... . to produce a gravity concentrate. This would then be dried before being smelted to produce gold dore." Page 2-28 states that "The final gravity concentrate would be dried before being smelted with suitable fluxes to produce gold dore and slag." DECCW is concerned that if gold is being smelted on-site, that no details of this process have been included in the EA.

The air quality impact assessment does not provide any assessment of the smelting process.

An updated air quality impact assessment must be completed in accordance with the DGR's if gold is being smelted on-site so that DECCW can assess the potential for impacts on air quality of the proposed smelting. In addition DECCW requires information on the smelting process including a detailed process diagram and identification of the types of fluxes that will be used.

Response: The Proponent anticipates that any emissions to air from the smelting process would be minor, compared with emissions from other sources on the Project site, and unlikely to negatively affect air quality outside of the immediate process plant area. The principle gas emissions from the smelting process and quantity estimates are provided below:

- Carbon dioxide – 2.4kg/day
- Sulphur dioxide – 57.6kg/day
- Oxides of Nitrogen – 0.99kg/day
- Water – 18.7kg/day

These emissions are the result of the fluxes used in the smelting process, which includes silica, borax and sodium nitrate. Given the small quantities of gas emissions involved, the Proponent contends that the current Air Quality Impact Assessment adequately reflects the impacts on air quality associated with the Project.

4.2.4 Aboriginal Cultural Heritage

4.2.4.1 Literature review and archaeological significance

DECCW has previously indicated to the proponent that there is not an adequate review of previous archaeological work. The AHIMS database indicates that there are seven archaeological reports that are relevant to the study area (Attenbrow 1984, Barber 2000, Bonhomme 1984, Boot 1999, Byrne 1981, Grinbergs 1995 and Williams 1987). Most of these reports can be accessed at Hurstville or Queanbeyan. This information should be reviewed in order to complete and fully inform the Aboriginal Cultural Heritage assessment.

Response: This issue is addressed in Section 1 of Appendix 3.

The assessment of archaeological significance at page 5a-45 section 8.3 does not meet DECCW DGR's because only research value has been assessed. An adequate significance assessment must also consider representativeness (ie, how common are these sites locally and regionally), educational value and aesthetic value for each recorded site.

Response: This issue is addressed in Section 1 of Appendix 3.

4.2.4.2 Site cards

The recorded sites are still not listed on AHIMS, indicating that the proponent potentially has not submitted the site cards to DECCW. This is a potential breach of s89A of the National Parks and Wildlife Act 1979, which requires site cards to be submitted within a reasonable time of discovery.

Response: This issue is addressed in Section 1 of Appendix 3.

4.2.5 Biodiversity and Threatened Species

It is unclear if the eight water harvesting dams and associated pipelines have been included in the biodiversity assessment, especially in terms of quantification of impacts. DECCW would like this point clarified.

Response: The Proponent confirms that the water harvesting dams were included in the biodiversity assessment, however, the areas of those dams were not included in the areas shown on Figure 4.17 of the *Environmental Assessment* or in the Key Statistics table at the rear of the Executive Summary. **Table 4** presents the revised areas of disturbance, including the proposed harvestable rights dams. The Proponent notes that the inclusion of the dams in the areas presented in **Table 4** results in minor increases in the area of to be disturbed disturbance within:

- Community 3 - woody weed shrubland (from 0.1ha to 0.4ha);
- Community 4 – regenerating wattles (from nil to 0.1ha); and
- Community 7 – Native-dominated pasture (from 23.6ha to 23.9ha).

Table 4
Proposed Areas of Disturbance

	To be disturbed	Area not to be disturbed	Total within Project Site	Total within Biodiversity Area
Ribbon Gum Forest	nil[1]	28.1	28.2	8.7
Fragmented Ribbon Gum Forest	nil[1]	7.0	7.1	7.1
Woody weeds Shrubland	0.4	29.6	30.1	nil
Regenerating wattles	0.1	18.4	18.5	7.6
Exotic vegetation	0.2	5.4	5.6	5.1
Native grassland (non-viable)	0.2	nil	0.2	0.2
Native-dominated pasture	23.9	256.1	280.1	235.7
Exotic pasture	nil	2.5	2.5	2.5
Largely disturbed land	2.2	20.9	23.1	3.9
River Peppermint Open Forest	nil	1.3	1.3	1.3
TOTAL	**27.0**	**369.3**	**396.6**	**272.1**

Note 1: See Section 4.6 for discussion of Ribbon Gum forest impacts.

The principles of Avoid, Mitigate and Offset are applied to assessment of all Part 3A applications. It is extremely disappointing to see that the only patch of Natural Temperate Grassland that occurs on the site will be destroyed through the development process. DECCW do not concur with the consultant's view that this patch is "not viable." It is well known that native grasslands survive in small areas and continue to do so for many years.

Response: As identified in Section 6.1.2.4 of the Environmental Assessment, the Proponent is aware of the Department's requirement to Avoid, Mitigate and Offset impacts. While not identified in the *Environmental Assessment*, the Proponent considered a number of alternative locations for the tailings storage facility, including the following.

- A location on flat to gently sloping land in the northwest section of the Project Site. This location was not on a drainage line. However, its elevated location would result in significant visual amenity impacts for many kilometres. The proponent considered these impacts unacceptable.
- Alternative locations were considered in a number of valleys within the Project Site, including Spring Creek. However, each was considered to be unacceptable because they were either too low in the catchment, requiring significant surface water diversions and associated ongoing risk of failure of those structures in the long term or, in the case of Spring Creek, there was risks of groundwater contamination associated with the spring in the upper reaches of the creek.

In addition, as indicated in Table 4.16 of the *Environmental Assessment*, the small area of Natural Temperate Grassland within the Project Site is not considered to be non-viable because of the small size and very narrow width (<5m) of the community, rather because the community is located on an eroding bank of a creek which is likely to be lost to erosion in the coming years. Furthermore, erosion protection measures to prevent this loss would require substantial earthworks to re-shape the gully walls, which would result in the complete removal of the remnant grassland community.

Finally, the Proponent has committed to implement a Biodiversity Management Strategy that would seek to re-establish the Natural Temperate Grassland community through the northern section of the Project Site. The Proponent has commenced discussions with research officers of I&I NSW who have indicated that in their experience, agricultural areas such as the Project Site which have been subjected to base phosphate-based fertiliser use can be returned to native grasslands relatively quickly through appropriate grazing and land management practices.

The offset strategy for the project is vague. DECCW notes that there needs to be a net environmental benefit of the proposed offset and biodiversity management on the site and this is not a clearly identified outcome from the information provided in the EA. DECCW consider that the Biodiversity Management Plan is separate from the offset strategy. The BMP should guide biodiversity management on the site during the construction and operation phases and should therefore be completed prior to any works being started on the site. The offset strategy, which the proponent has stated will be a Property Vegetation Plan, is designed to offset the impacts of the project on biodiversity by protecting and improving biodiversity management on the site in perpetuity. This commitment needs to be reflected in any consent if it is granted for the project.

Response: It is noted that Biodiversity Offset Strategies are typically outlined in *Environmental Assessments* in broad terms, with a commitment that a detailed Biodiversity Management Plan or similar is prepared in consultation with DECCW during the initial stages of the Project. There is little value in spending considerable resources developing a plan when granting of project approval is not guaranteed.

As identified in Section 4.3.6.8 of the *Environmental Assessment,* Gaia Research undertook an assessment of the proposed biodiversity offset strategy as required by DECCW and concluded that the proposal to protect and enhance approximately 272ha of the northern section of the Project Site adequately offset the proposed impacts to approximately 0.2ha of non-viable Natural Temperate Grassland.

Finally, Section 4.3.6.8 of the *Environmental Assessment* and Commitment 16.1 identify that the Proponent would prepare a *Property Vegetation Plan* for the northern section of the Project Site.

DECCW require the proponent to clearly identify and implement protection works around key biodiversity areas before any work is undertaken on site. This specifically includes the remnant wooded vegetation, Gang-gang Cockatoo nest site plus buffer and the habitat for the Major's Creek Leek Orchid. These measures should be clearly articulated in the Statement of Commitments.

Response: The Proponent notes that the following Commitments are included in the *Environmental Assessment.*

- Commitment 5.1 – "Ensure that, with the exception of minor disturbance associated with, installation of water pipelines and management of existing tracks, no surface disturbing activities are being undertaken within areas of Ribbon Gum Forest and Fragmented Ribbon Gum Forest. No native vegetation over 3m high would be removed."
- Commitment 5.4 – "Fence all areas of Ribbon Gum Forest and Fragmented Ribbon Gum Forest and exclude stock from those areas." [It is noted that these areas include all Gang Gang Cockatoo nest sites]
- Commitment 5.5 – "Ensure that areas of habitat suitable for the Majors Creek Leek Orchid are appropriately identified and fenced and access restricted. Ensure no disturbance occurs within the fenced areas."

These fenced area surrounding the habitat suitable for *Majors Creek Leek Orchid* would include a buffer of approximately 20m Commitment 5.5 has been amended to reflect this.

In relation to commitment 5.6, DECCW recommend the proponent engage a suitable qualified wildlife carer or fauna ecologist to supervise activities that involve direct impacts to the wombat burrows.

Response: Commitment 5.6 has been amended to reflect the Department's request.

DECCW supports conditional consent to implement a Biodiversity Management Plan applied to the site during the construction, operation and rehabilitation phases of the project. In developing a plan DECCW suggest the proponent implement specific conditions that are transparent to avoid management actions that cause ambiguity and adverse effects on the environment. For example, weed management must be supported by detail which demonstrates, for example, type and number of treatments, species of particular interest, the frequency and methods for monitoring and reporting. General statements in management plans are not supported by DECCW.

The BMP will also include maps/figures that clearly define management actions across the site. For example, areas that will exclude stock grazing from those which have grazing restrictions set by biomass limits should be mapped.

Additionally, DECCW recommend the proponent considered these factors during the preparation of the BMP.

- *A sound strategy to " maintain or improve" habitat integrity and water quality of Majors Creeks*
- *A sound strategy to ensure tailings storage does not impact on the surrounding ecosystems and native species*
- *A sound strategy to ensure groundwater changes does not impact on the surrounding ecosystems and native species*
- *Rehabilitate degraded drainage lines*
- *A sound strategy to monitor and protect the Majors Creek Leek Orchid.*
- *Promote wildlife or vegetation corridors*
- *Eradicate weed and pest species, including exotic pasture species*
- *A grazing strategy based on biomass limits in addition to ground cover*
- *Sediment & Erosion Control*
- *Monitoring & reporting*
- *Site rehabilitation*

Response: The Proponent agrees with and supports the Department's suggestions.

4.2.6 Potential Impact on nearby Conservation Areas

Specialist Consultative Studies - Part 4: Surface Water Assessment 5.1.4 Return of baseflow to Majors Creek pg 4-23 *states "Big Island Mining Pty Ltd propose to 'return' water to the Majors Creek system at a rate commensurate with the modelled losses (i.e. up to 2.1L/s). „PWG believes that the proponent must apply the precautionary principle rather than rely on the accuracy of the modelled losses in determining the rate at which water is returned to the system. If modelled data is completely relied on, the potential remains that this rate could fall below the required baseflow to sustain ecosystems within the Majors Creek State Conservation Area (SCA) and beyond due to errors in such data. It is in our opinion that to ensure the natural baseflows are achieved, this rate should tested against historically monitored flow data for the Majors Creek and any available adjacent creek systems. If this information is not available, monitoring stations such as v-notch gauges should be established as soon as possible in order to gain robust data.*

Response: The Proponent notes that the proposed environmental flows are intended to replace lost base flows resulting from reduced groundwater seepage into a limited section of Majors Creek with a reach of approximately 1.5km. Groundwater seepage into the remainder of the creek both upstream of the anticipated groundwater impact area and downstream would be unaffected. As a result, the Proponent contends that a 3-dimentional numerical groundwater model is the most appropriate mechanism for determining the volume of the reduced groundwater seepage and therefore the most appropriate volume of water to be released.

However, the Proponent acknowledges the concerns of DECCW and notes that Commitment 6.5 states that the groundwater model would be updated and recalibrated with additional monitoring data within 2 years of the commencement of mining operations.

In addition, Commitment 15.14 has been inserted into the Statement of Commitments to indicate that surface water flows within Majors Creek would be monitored regularly and that the existing surface water flow monitoring within Spring Creek would continue. That data would be used to determine whether surface water flows within either creek would be impacted to a greater degree than the groundwater model suggests. If so, the Proponent would implement appropriate management measures. These management measures would be identified in the *Surface water, Sediment and Erosion Control Plan* that would be prepared in consultation with the Department and may include increased compensatory flows or provision of water from other sources to impacted residents.

Environmental Assessment - Section No. 4: Assessment and Management of Key Environmental Issues. 4.5.7 Monitoring pg 4-111 *states that the results of [surface water] monitoring "would be presented in the Annual Environmental Management Report ... ". PWG notes that any changes to the baseflow, turbidity and chemical properties of water entering Majors Creek has the potential to affect the ecosystems that rely on this creek particularly those contained within the Majors Creek SCA. Unlike the detailed description of the monitoring and ameliorative action process made on pg 4-97 and 4-98 in relation to groundwater, we note that there is no such commitment to take ameliorative action based on the results of the surface water monitoring program. This is absence is also reflected in the Draft Statement of Commitments on pg 5-18.*

Response: Section 4.5.4 of the *Environmental Assessment* identifies that a *Surface Water, Sediment and Erosion Control Plan* would be prepared in to support the Project. That document would be prepared in consultation with DECCW and would include detailed ameliorative actions in the event that identified surface water triggers are exceeded. These would include but not be limited to the following.

- Review and adjustment of the proposed rate of discharge of water for environmental flows.
- Review and modifications to the proposed surface water and sediment and erosion control structure and procedures to ensure that water is only discharged once the required water quality criteria have been achieved.

Commitment 7.1 has been amended to reflect the above.

Draft Statement of Commitments: point 5.7 pg 5-6 *The PWG manages the Majors Creek SCA which is located downstream of the proposed project site. PWG notes that the site contains large expanses of woody weeds containing declared class 4 noxious weeds such as Scotch Broom and Blackberry. There is clear evidence that these species have migrated down the Majors Creek catchment and are impacting on lands such as the SCA and beyond. Good catchment management requires threats such as noxious weeds to be controlled at the head of the catchment before sustainable progress can be made downstream. As this site is at the head of the catchment, PWG supports the stated commitment to continue ongoing control of Blackberry and Broom in the south of the site.*

Response: The Proponent notes that it purchased the northern section of the Project Site in 2008. Since that time, extensive weed management programs have been implemented and that as noted in Section 4.3.4.3 of the *Environmental Assessment*, that section of the Project Site is now largely free of noxious or other weeds.

In addition, the southern section of the Project Site was purchased by the Proponent in 2010. It is acknowledge that sections of the newly purchased land have extensive weed issues. However, the Proponent has commenced and proposes to continue its successful weed management program within the newly purchased land and anticipates that this issue will be significantly reduced in significance in the next two growing seasons

Environmental Assessment - Section No. 4: *Assessment and Management of Key Environmental Issues. 4.4.5.6 Impact on groundwater dependent ecosystems pg 4-94 This section states that the project is "not expected to result in adverse impacts to groundwater dependant ecosystems as none are likely to exist within the site". In 4.4.2.2 Regional Groundwater Setting pg 4-72 the proponent assumes the fractured rock (granodiorite) is "hydraulically tight" and not able to transmit groundwater flow. This statement is in direct contrast to that of the Specialist Consultative Studies - Part 3: Groundwater Assessment which on pg 3-25 9.3.1 Distribution and Yield states that paired monitoring bores indicate "the two [granodiorite and regolith] aquifers are in direct hydraulic connection". Therefore any changes in the granodiorite will affect the groundwater level in the two other aquifers and surface water systems not supplemented with compensatory baseflows such as Majors Creek. This is evidenced in Appendix 6: Drawdown and recovery contours - Years 1-8.*

Response: The text referred to in Section 4.4.2.2 of the Environmental Assessment states in full that

> *the [fracture-controlled granodiorite] aquifer may be categorised a hydraulically "tight" massive granodiorite with little or no primary permeability and localised fracture or fault systems which may be open and transmit groundwater flow.*

This is a factually correct statement and does not imply that the aquifer is "not able to transmit groundwater flow".

As indicated in Section 4.4.2 and 4.4.5 of the *Environmental Assessment*, it is acknowledged that the regolith, granodiorite and alluvial aquifers are hydraulically connected and that impacts in one aquifer will affect the others.

As indicated in Section 4.4.5.6 of the *Environmental Assessment*, there are no groundwater dependent ecosystems within the Project Site as a result of prior land disturbance. It is also noted in Section 4.4.5 of the *Environmental Assessment* that groundwater-related impacts would be limited to approximately 2.5km from the proposed Dargues Reef Mine. As a result, direct impacts on groundwater dependent ecosystems within the Project Site are not considered to be likely.

However, it is acknowledged that the Project would result in impacts to the base flow in Majors Creek through reduced groundwater seepage into the creek and its tributaries during periods of low rainfall. This has the potential to result in indirect impacts to groundwater dependent ecosystems downstream of the Project Site. As a result, the Proponent proposes to implement an environmental release program as identified in Section 2.10.2.4 of the *Environmental Assessment*. This would ensure that groundwater dependent ecosystems downstream of the Project Site in the vicinity of Majors Creek are not impacted as a result of reduced base flow in Majors Creek.

Finally, as indicated previously, the groundwater modelling indicates that groundwater impacts associated with the project would be limited to approximately 2.5km from the proposed Dargues Reef Mine. As a result, groundwater dependent ecosystems not associated with Majors Creek and located more than 2.5km from the proposed Dargues Reef Mine, namely outside the area shown on Figure 4.26 of the *Environmental Assessment*, would not be directly impacted by the Project because no springs or seeps would outside that area would be impacted.

PWG would like to make reference to the occurrence the Endangered Ecological Community Araluen Scarp Grassy Forest in the South East Corner Bioregion contained within and around the Majors Creek SCA. This community and the SCA occurs less than 1 km from the modelled extent of the groundwater 1 m drawdown contour. The final determination for this community expressly states that "The community is susceptible to extreme dry spells" and that "Field sampling in 2003-04 identified extensive dieback of eucalypt crowns and understoreys attributed to recent extended drought, particularly on the spurs of the escarpment" which testifies the importance of groundwater security for this community.

Response: Reference is made to the previous response which identifies that no groundwater-related impacts are expected outside the area shown on Figure 4.26 of the *Environmental Assessment.* As the ecology assessment did not identify the Araluen Scarp Grassy Forest in the South East Corner Bioregion within the Project Site and DECCW identifies that the community is located outside the area of predicted groundwater impacts, then no adverse impacts associated with Project-related groundwater drawdown are expected.

However, as indicated in Section 4.4.6 of the *Environmental Assessment*, extensive groundwater monitoring would be undertaken prior to, during and following mining operations. This monitoring would identify if actual impacts are greater than those anticipated and remedial action would be implemented. In addition, Commitment 10.15 identifies that the groundwater model would be revised within two years of the commencement of mining operations in light of receipt of ongoing monitoring data. This would allow further assessment of the potential impacts on this community.

Additionally, a number of vegetated streams feeding Majors Creek outside of the proposed site still fall within the 1 m drawdown contour, one at least falling within the 5m contour. It is likely that in times of drought, the vegetation contained within these stream corridors relies on groundwater for survival. Groundwater seepage would appear to be a key contributor in the replenishment of pools and freshes within the streambed and thus be utilised by a range of native fauna species during dry times. It is of our opinion that impacts from the changes to groundwater levels on the ecosystems of the Majors Creek SCA namely the Araluen Scarp Grassy Forest in the South East Corner Bioregion and impacts on the fauna and vegetation utilising streams adjacent the project site should have been considered in the EA.

Response: Figure 4.16 of the *Environmental Assessment* identifies the vegetation within the creek lines identified by DECCW as Ribbon Gum Forest, not Araluen Scarp Grassy Forest in the South East Corner Bioregion.

It is acknowledged that groundwater discharge, particularly in Spring Creek which has a measured base flow of approximately 0.3L/s, fills pools and hollows in the creeks within the Project Site. However, it is also noted that the creeks are typically steeply incised with steep banks of up to approximately 10m in height. As a result, it is unlikely that vegetation within the Ribbon Gum Forest would rely on groundwater seepage into the creeks for water. As a result, the Project is not expected to result in significant impacts on the Ribbon Gum Forest as a result of reduced groundwater discharge to Spring Creek and other unnamed tributaries.

Specialist Consultative Studies - Part 2: Ecology Assessment 6.TSC Act Detailed Impact Assessment pg 2-66 *PWG believes this does not adequately address the Director Generals Requirements (DECCW) for threatened species and for all other species, populations and ecological communities that may be potentially impacted by the proposal, particularly in relation to altered noise, light and vibration pg 2-103 Table 1 (c) v. and (c) viii. We note that there has been very little or no attempt to quantify the impacts of noise and vibration on the fauna of the surrounding area, at this point we draw your attention to the proximity of the Majors Creek SCA which is located less than 1 km from the project site. It is of our opinion that this potential impact must be addressed as failing to may have unknown consequences for ecosystems within and surrounding the reserve.*

Response: (Gaia) It is noted that noise, lighting and blasting impacts within the Project Site were assessed in Gaia (2010). In particular, it was noted that Gang-gang Cockatoo were observed to be breeding in the immediate vicinity of the ongoing exploration operation which were being undertaken 24-hours per day, and included the use of night-time lighting. As a result, no adverse impacts associated with noise and lighting within the Project Site are anticipated. Similarly, given the distance from the Project Site to the Majors Creek State Conservation Area, no noise and lighting-related impacts are anticipated.

It is also noted that blasting operations during establishment of the box cut would be limited in duration and that ongoing underground blasting operations would use significantly smaller maximum instantaneous charges than those used during box cut establishment. As a result, no significant vibration-related impacts on threatened species within or surrounding the Project Site are anticipated.

(Spectrum) In addition, as noted in Section 4.2.2, the Majors Creek SCA is located approximately 2.5km from the principal noise sources, namely the processing plant and ROM pad. It is also noted that the closest residence to those points is Residence R31 which is approximately 750m from the processing plant and ROM pad. As the noise assessment determined that all relevant noise assessment criteria would be achieved at Residence R31, the Proponent contends that all relevant noise assessment criteria would also be achieved at the Majors Creek Falls Reserve located three times as far away as Residence R31. Spectrum Acoustics Pty Limited note that the relevant INP noise criterion for the reserve is 50dB(A), 15 dB higher than the criterion at residential receivers. In addition, Spectrum note that the reserve is located on the Araluen valley escarpment and is thereby shielded from the Project Site. As a result, the Proponent contends that noise-related impacts within the Majors Creek SCA would be negligible.

4.2.7 Statement of Commitments

4.2.7.1 Operating Hours

DECCW will only support blasting between 9.00 am and 3.00 pm, Monday to Friday.

The SoC should be modified to reflect standard definitions of Daytime etc:

- *Day is defined as the period from 7am to 6pm Monday to Saturday and 8am to 6pm Sundays and Public Holidays,*
- *Evening is defined as the period from 6pm to 10pm on any day,*
- *Night is defined as the period from 10pm to 7am Monday to Saturday and 10pm to 8am Sundays and Public Holidays*

Response: The Proponent would consent to restricting surface blasting operations to 9.00 am to 3.00 pm Monday to Saturday. However, the Proponent contends that underground blasting 24 hours per day, 7 days per week is appropriate for the following reasons.

- Underground blasting is typically undertaken at shift changes when the mine is evacuated. Indicatively, shift changes would occur at approximately 6:00am and 6:00pm each day.
- Underground blasting typically fragments smaller volumes of material than surface blasting. As a result, more frequent blasts are required to operate the mine.
- Based on a likely Maximum Instantaneous Charge of 150kg and a distance to the closest residence, namely Residence R31, of 1km, Spectrum Acoustics advise that the anticipated ground vibration at Residence R31 would be approximately 1.5mm/s. This is considerably less than the relevant blast criteria of 5mm/s. Underground blasting would not have any air blast overpressure impacts at surrounding residences.

The Statement of Commitments has been amended to reflect the above. In addition, Commitment 3.1 has been amended to reflect the standard *Industrial Noise Policy* time-of-day definitions.

4.2.7.2 Noise and Blasting

DECCW will only support blasting between 9.00 am and 3.00 pm, Monday to Friday.

Response: See Section 3.2.7.1.

Noise monitoring should be undertaken by a suitably qualified and experienced acoustical consultant. The SoC should be modified to make this explicit.

Response: Section 4.2.7 of the *Environmental Assessment* identifies that a *Noise and Vibration Management Plan* would be prepared in consultation with the Department. This would include requirements in relation to qualifications and experience of the person undertaking the monitoring. Notwithstanding this, Commitment has been amended to reflect the Department's suggestion.

The Noise Management Plan should be prepared prior to any works occurring on-site. The SoC should be modified to reflect this change in timing.

Response: Commitment 15.2 has been amended to reflect the Department's suggestion.

4.2.7.3 Groundwater

Remove reference to "where practicable" in SoC 6.7, 6.8, so that a commitment to achieve these restrictions is made by the proponent.

Response: Large and less mobile equipment, including bulldozers, excavators, scrapers, vibrating rollers and underground loaders and drill rigs, would, as is standard practice in mining operations, be refuelled in their work area by a suitably equipped service vehicle. That vehicle would be equipped with appropriate spill management equipment and the operators would be trained in the use of that equipment.

Similarly, large and less mobile equipment would, as is also standard practice in mining operations, be serviced within their work area. These operations would also be supported by a suitably equipped service truck and would be undertaken by suitably qualified and trained individuals.

4.2.7.4 Surface Water

Discharging water from sediment basins, as detailed in 7.6, does not appear to be compliant with s120 of the'POEO Act and should be modified.

Response: RWC has previously been advised by DECCW that, unless included in the Proponent's harvestable rights, potentially sediment-laden water collected within sediment basins or other sediment control structures may only be retained until such time as the sediment concentration has been reduced to below the required concentration, typically 50mg/L. The Proponent would construct the required sediment basins and other structures in accordance with *"Volume 2E: Mines and quarries"* from the *Managing urban storm water: soils and construction* publications. In addition, as previously indicated, the Proponent would ensure that potentially contaminated water within the Contaminated Water Management Area is not permitted to enter the sediment and erosion control system.

4.2.7.5 Aboriginal Heritage

Buffer area stated in 8.1 should be 20 m not 15 m, SoC should be amended to reflect this change.

Response: Commitment 8.1 has been amended.

4.2.7.6 Traffic and Transportation

The reference to "where practicable" should be removed from 10.6, and a strong commitment to achieve these restrictions made.

Response: The Proponent notes that it does not control all heavy vehicle movements to or from the Project Site. For example, fuel and consumable deliveries are managed by other organisations and while the Proponent would request that these deliveries be restricted to the identified times, it cannot guarantee compliance. In light of this, Commitment 10.6 has been amended to commit the Proponent to ensuring that all heavy vehicle movements directly controlled by the Proponent would comply with the restricted hours of operation and that the Proponent would require, where practicable, that non-Proponent-controlled heavy vehicles also comply with the restricted hours of operation.

4.2.7.7 Air Quality and Energy

A dust management plan should be prepared for the site that identifies control methods and appropriate areas for dust monitoring.

Response: Section 4.10.8 of the *Environmental Assessment* and Commitment 16.1 identify that an *Air Quality Monitoring Program* would be prepared in consultation with DECCW and the surrounding community.

4.3 NSW OFFICE OF WATER

A separate response will be provided to the NSW Office of Water submission following a meeting between the Proponent and its advisors and the Department

4.4 INDUSTRY AND INVESTMENT NSW

4.4.1 Mineral Resources

Section 2.14.1 in the EA states that a Rehabilitation Environmental Management Plan (REMP) will be prepared. The Department is concerned that the requirement to prepare a REMP may create confusion as the proposed REMP guideline has not, as yet, been finalised and the REMP provision of the Mining Amendment Act 2008 has not commenced.

The Department believes that the best way to incorporate the REMP provision of the proposed Mining Amendment Act 2008 for the Dargues Reef Gold Project would be to specifically require a "Rehabilitation Plan" in the project approval conditions rather than a REMP. The Rehabilitation Plan would need to be prepared in accordance with the relevant I&I NSW

Guideline so that such a plan can satisfy the requirements under the Mining Act 1992. This approach allows I&I NSW to manage the transition from a Mining Operations Plan (MOP) to a REMP. Given I&I NSW role of managing rehabilitation, any rehabilitation plan must be approved by the Director-General of I&I NSW in consultation with Department of Planning.

Response: Agreed.

The retention of the box-cut in the final landform is not supported by I&I NSW for the following reasons:

- The box-cut landform is not consistent with the proposed final land-use of agricultural grazing and the existing topography of gently sloping hills and valleys; and
- Ongoing maintenance will be required for the box-cut fence and safety bund, which will be passed onto subsequent landowners.

I&I NSW recommends that the retention of the box-cut is either removed from the final revised version of the EA or a condition is specified by the Department of Planning that the box-cut be rehabilitated to a landform consistent with the pre-mining topography. The eventual rehabilitation of the box-cut must be planned for in the initial stages of the mine development (i.e. stockpiling suitable quantities of fill material and topsoil). This process can be managed through the "Rehabilitation Plan".

Response: As indicated in an email dated 7 September to Kane Winwood, the Proponent contends that back filling of the box cut would not be appropriate or reasonable for the following reasons.

- Backfilling the box cut would be contrary to I&I NSW's stated objective to ensure that resources are not sterilised. Backfilling the box cut would make it harder for the Proponent or subsequent operators to recommence mining operations within the Dargues Reef mine following cessation of mining activities.
- Bunding and fencing is typically regarded as a suitable closure mechanism for open cut mines and extractive industries in NSW. There are numerous precedents for retaining box cuts and open cuts in recently approved mining and extractive industry-related applications for project approval provided suitable mechanisms are in place to ensure the safety of people, domestic animals and wildlife in the long-term.
- It is noted that material to backfill the box cut would not be available within the Project Site at the cessation of mining operations. As a result, material would be required to be brought in from another location, with the resultant environmental impacts, including traffic, road maintenance, noise and dust-related impacts. In addition, importation of the required material would impose a significant cost on the Proponent that would not result in significant environmental benefits,

Notwithstanding the above, however, the Proponent would be willing to negotiate a suitable final landform with I&I NSW during preparation of the initial MOP/REMP and/or *Rehabilitation Plan*. This may include reducing the angle of the walls of the box cut to an angle suitable for placement of soil material and revegetation.

4.4.2 Fisheries

All the proposed safeguards, monitoring and mitigation actions listed in the EA and Appendices (including Ecology Assessment by Gaia Research P/L dated September 2010 and Surface Water Assessment by SEEC dated September 2010) should be included in any project approval, and listed in the Construction and Operation Environmental Management Plans (CEMP and OEMP) and fully implemented by the proponent and its contractors.

Response: Agreed.

I&I NSW also recommends that any project approval require that the design and construction of new or upgraded access road crossings of on-site waterways must be undertaken in accordance with I&I NSW 'Policy and Guidelines for Fish Friendly Waterway Crossings (2004) and Why Do Fish Need to Cross the Road? 'Fish Passage Requirements for Waterway Crossings (2004)'. These documents are available on our website www.dpi.nsw.gov.au under 'Aquatic Habitats' and 'Publications'.

Response: Agreed.

4.4.3 Agriculture

The proponent is to ensure that all top soil is removed from planned sites for the mine development itself, the waste rock emplacement area, roads, car parks, workshops, stores and other mine facilities. The top soil should be stored on site and stabilised for use when the site is decommissioned and rehabilitation is undertaken.

Response Agreed. Sections 2.2.3 and 4.12 of the *Environmental Assessment* include commitments similar to the above.

Section 2.5.2 of the EA (p2.24) states that testing of waste rock indicated that acid leachate is not likely to be produced. However, as there is a possibility that the rock may produce leachate, mitigation measures should be put in place should leachate be detected.

Response: Agreed. Condition 7.20 has been inserted to reflect the above.

To protect livestock, the proponent is to ensure that any livestock is separated from all mine infrastructures by fences and appropriate access structures.

Response: Agreed. This commitment would be reflected in the proposed *Property Vegetation Plan* that would be prepared for the Project.

4.5 SYDNEY CATCHMENT AUTHORITY

The SCA has completed its review of the Environmental Assessment report and is satisfied that the report provides adequate information with regard to the potential contamination and water management issues for the construction and operation stages of the development.

Given the information contained in the EA report, the SCA considers the proposal is likely to achieve a neutral or beneficial effect on water quality providing the following conditions are included in the approval:

1. *Any road construction within the Sydney Drinking Water Catchment is to include an Erosion and Sediment Control Plan in accordance with Managing Urban Stormwater: Soils and Construction Volumes 2C Unsealed Roads (DECC, 2008);*

2. *The SCA is to be included in the consultation regarding the review of the analysis and verification of groundwater modelling;*

3. *The SCA is to receive a copy of the Annual Environmental Management Report containing results and analysis of groundwater monitoring.*

Response: The Proponent agrees with the above.

4.6 SOUTHERN RIVERS CATCHMENT MANAGEMENT AUTHORITY

The EA does not adequately address the impacts on the Tableland Basalt Forest Endangered Ecological Community (EEC) (2-76). If the groundcover disturbance and the vegetation impacts were assessed under the Native Vegetation Act 2003 (NVA), it is likely that the project would be refused on the basis that the vegetation community (Ribbon Gum Narrow Leaf Peppermint Grassy Open Forest) is considered an over cleared vegetation community under the NVA.

Response: (Gaia – Mr Greg Stone) Amendments under consideration since finalisation of the *Environmental Assessment* to the broader classification of the *Tableland Basalt Forest in the Sydney Basin and South Eastern Highlands Bioregions* Endangered Ecological Community (Tableland Basalt Forest EEC) incorporates several vegetation types, including *Ribbon Gum - Narrow-leaved Peppermint grassy open forest on basalt plateaux, Sydney Basin and South Eastern Highlands.* That vegetation community may be considered equivalent to the Ribbon Gum – Snow Gum Grassy Open Forest (Ribbon Gum Forest), of which approximately 35.3ha was identified within the Project Site. As a result of these recent amendments, the Ribbon Gum Forest within the Project Site may be classified as Tableland Basalt Forest EEC. As a result, the following provides an assessment of significance in accordance with the requirements of Section 5A of the *Environmental Planning and Assessment Act 1979*.

(a) in the case of a threatened species, whether the action proposed is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction,

No Threatened species of flora listed in Schedule 1 or 2 of the *Threatened Species Conservation Act 1995* (TSC Act) were identified within the Project Site.

(b) in the case of an endangered population, whether the action proposed is likely to have an adverse effect on the life cycle of the species that constitutes the endangered population such that a viable local population of the species is likely to be placed at risk of extinction,

No endangered populations listed in Part 2 of Schedule 1 of the TSC Act or Part 2 of Schedule 4 of the *Fisheries Management Act 1994* were found on site.

(c) in the case of an endangered ecological community or critically endangered ecological community, whether the action proposed:

(i) is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or

(ii) is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction,

Tableland Basalt Forest listed under Schedule 1 of the TSC Act occupies an area of 35.3ha within the Project Site .

Tableland Basalt Forest is dominated by an open eucalypt canopy of variable composition. *Eucalyptus viminalis, E. radiata, E. dalrympleana* subsp. *dalrympleana* and *E. pauciflora* may occur in the community in pure stands or in varying combinations. The community typically has an open canopy of eucalypts with sparse mid-story shrubs (e.g. *Acacia melanoxylon* and *A. dealbata*) and understory shrubs (e.g. *Rubus parvifolius*) and a dense groundcover of herbs and grasses, although disturbed stands may lack either or both of the woody strata. The structure of the community varies depending on past and current disturbances, particularly fire history, clearing and grazing. Contemporary tree-dominated stands of the community are largely relics or regrowth of originally taller forests and woodlands, which are likely to have had scattered shrubs and a largely continuous grassy groundcover. At some sites, mature trees may exceed 30m tall, although regrowth stands may be shorter than 10m tall.

Tableland Basalt Forest is currently found in the Eastern Highlands and Southern and Central Tablelands, covering the local government areas of Bathurst Regional, Goulburn Mulwaree, Oberon, Palerang, Shoalhaven, Upper Lachlan and Wingecarribee. The community, however, may be found elsewhere within the designated bioregions.

Tableland Basalt Forest occurs within areas with a mean annual rainfall varying from approximately 750 mm up to 1100 mm. It typically occurs on loam or clay soils associated with basalt or, less commonly, alluvium, fine-grained sedimentary rocks, granites and similar substrates that produce relatively fertile soils. The species composition of Tableland Basalt Forest varies with average annual rainfall. On basalt or plutonic substrates east of Mittagong and Moss Vale, at the eastern edge of its distribution where average rainfall exceeds 1000-1100mm per year, the community is replaced by Robertson Basalt Tall Open-forest and Mount Gibraltar Forest. Its distribution spans altitudes from approximately 600m to 900m above sea level, usually on undulating or hilly terrain.

(i) The Proponent does not intend to disturb remnant Tableland Basalt Forest at the site. An initial proposal that approximately 0.2ha of the community would be disturbed was made by the Proponent as a contingency for the ongoing maintenance of existing tracks and construction and maintenance of buried water pipelines.

In light of the potential reclassification of the community as an EEC, the Proponent would ensure that no ground disturbing activities would be undertaken within identified areas of Ribbon Gum Forest. In addition, Commitment 5.4 identifies that all areas of Ribbon Gum

Forest would be fenced to exclude stock. These areas would be managed to maintain and improve the biodiversity values of this community. Commitments 5.1 and 5.4 have been amended to reflect these commitments.

In light of the above, the proposed action is considered unlikely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction.

(ii) In light of the above, it is considered unlikely that proposed action would substantially or adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction.

(d) in relation to the habitat of a threatened species, population or ecological community:

(i) the extent to which habitat is likely to be removed or modified as a result of the action proposed, and

(ii) whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed action, and

(iii) the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species, population or ecological community in the locality,

Tableland Basalt Forest listed under Schedule 1 of the TSC Act occupies an area of 35.3ha within the Project Site. In light of the above commitments:

(i) no habitat is likely to be removed or modified as a result of the action proposed;

(ii) no area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed action; and

(iii) no habitat of importance to the long-term survival of the species, population or ecological community in the locality is likely to be removed, modified, fragmented or isolated

(e) whether the action proposed is likely to have an adverse effect on critical habitat (either directly or indirectly),

The DECCW website was searched for critical habitat listed in the Register of Critical Habitat kept by the Director General of Department of Environment and Climate Change. Currently (last updated March 2008) critical habitat has been declared for Little Penguin population at Sydney's North Harbour, Mitchell's rainforest snail in Scotts Island Nature Reserve, Wollemi Pine and Gould's Petrel. There are two recommendations for critical habitat one for the Eastern suburbs Banksia scrub endangered ecological community and the Bomaderry Zieria within the Bomaderry Creek bushland.

The action proposed shall not have an adverse effect on critical habitat.

(f) whether the action proposed is consistent with the objectives or actions of a recovery plan or threat abatement plan,

A recovery plan or threat abatement plan has not been prepared for Tablelands Basalt Forest.

(g) whether the action proposed constitutes or is part of a key threatening process or is likely to result in the operation of, or increase the impact of, a key threatening process.

The removal of native vegetation is considered a key threatening process under Part 4 of the TSC Act. It is presently proposed that clearing of the remnant Tableland Basalt Forest will not be required and therefore the action proposed does not constitute a key threatening process for Tablelands Basalt Forest.

Conclusion

It is concluded that the action proposed is unlikely to significantly affect *Tableland Basalt Forest in the Sydney Basin and South Eastern Highlands Bioregions* Endangered Ecological Community or its habitat.

The EA does not adequately address the removal and disturbance of bushrock as defined under the Threatened Species Conservation Act 1995 (2-78)

Response: The Proponent notes that no bush rock occurs within the Project Site and that none would be disturbed by the Project.

The project proposes to offset groundwater losses into the mine void with surface water captured in harvestable right farm dams and augmented with water drawn from old mines (4-22, 4-23). This presents a number of issues of concern. The first is the loss of normal surface water flows into Majors Creek through the construction of eight new farm dams (in addition to the 14 existing farm dams on the property). The second is the quality of water from the two sources that will be released during periods of low flow. Given the analysis of water samples from the old mines stated in 3-32 of the EA, this represents a real risk to downstream water quality and the users of this water. In the event that the project is approved, Southern Rivers CMA recommends that the eight new harvestable right dams be removed and the dam sites rehabilitated to return natural surface flows to Majors Creek at completion of the project. Southern Rivers CMA is also concerned by the potential long term loss of groundwater to Majors and Spring Creek beyond the working life of the mine. There is no indication in the EA that groundwater flows will be returned to the pre-mine conditions or that these losses can be mitigated in any way post-mining.

Response: The following presents a response to each of the issues raised.

Loss of surface water flows through the construction of the harvestable rights dams

As identified in Section 2.2.4 of the *Environmental Assessment*, the harvestable rights dams would be constructed under the Proponent's rights under Section 53 of the *Water Management Act 2000*. The Proponent has been advised by the NSW Office of Water (NOW) that as long as the total volume of storages within the Proponent's land is less than 34.5ML and that all dams are constructed on first or second-order streams only, the dams may be constructed without further approvals from NOW. As a result, construction of these dams is a right currently held by the Proponent and should therefore not be considered a "loss to normal surface water flows into Majors Creek."

In addition, the Proponent contends that removal of the dams at the end of the life of the Project would be unreasonable for the reasons identified previously.

Quality of water to be released through the environmental flows program

Figure 3 presents an overview of the results of surface water quality monitoring undertaken between 2006 and April 2010 at a range of locations within the Project Site (**Figure 4**). In summary, the results indicate the following.

- The pH of surface water within the Project Site is consistently between 6.5 and 8.0.
- The electrical conductivity of surface water within Spring Creek is typically between 1 000µS/cm and 1 200µS/cm. Samples taken in September 2009 were collected following a rainfall event and the lower electrical conductivities recorded during that sampling program are the result of dilution by surface water flows. All other sampling programs are likely to be representative of low or base flow conditions. These results indicate that electrical conductivities within Spring Creek significantly exceeds the ANZECC (2000) water quality guidelines for upland rivers of 30-350µS/cm.
- The electrical conductivity of surface water within Majors Creek is typically between 200µS/cm and 400µS/cm. These results indicate that electrical conductivities within Majors Creek are at the upper end or exceed the ANZECC (2000) water quality guidelines for upland rivers of 30-350µS/cm.

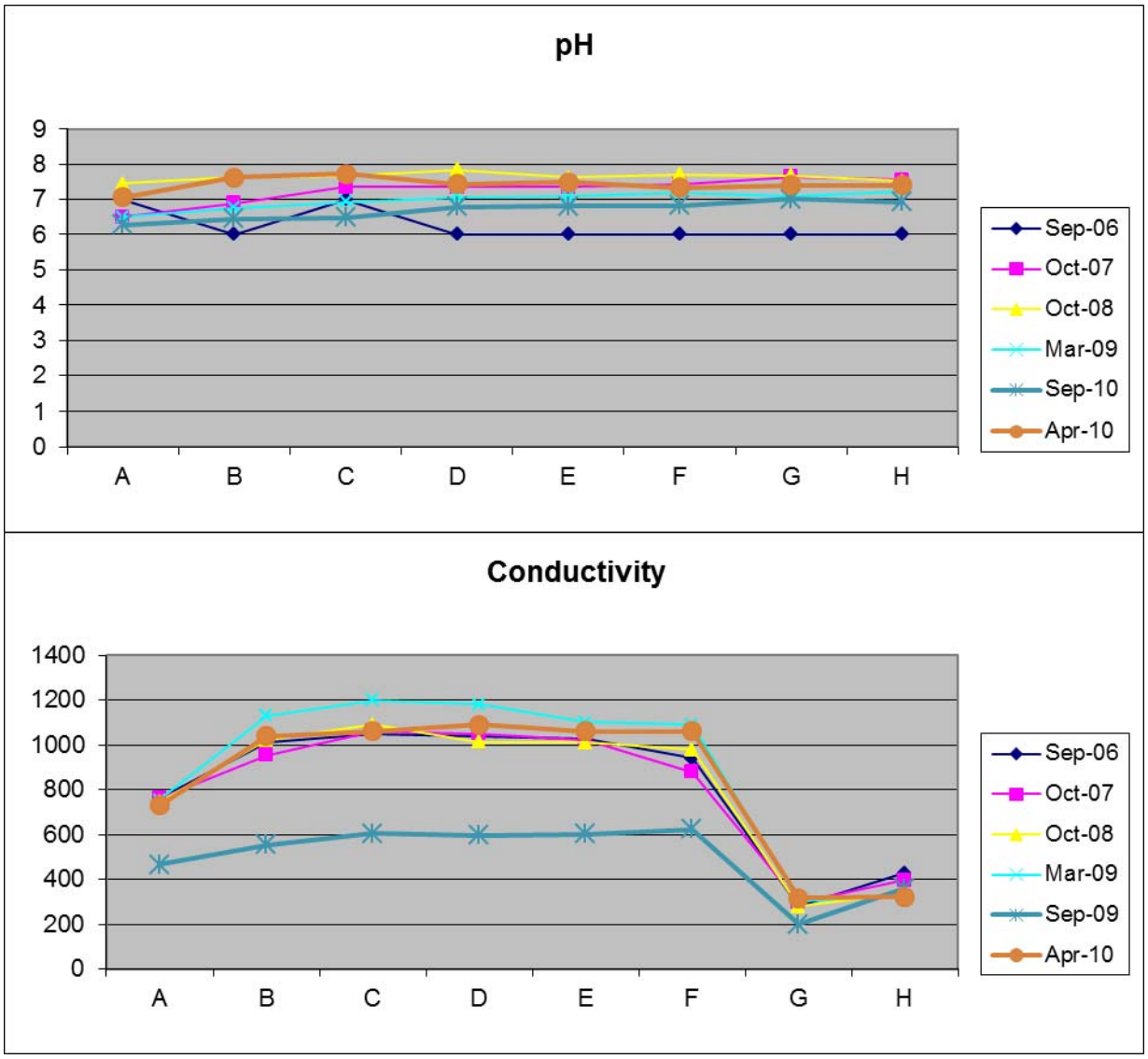
It is noted that water to be released to Majors Creek through the compensatory flow program would be sourced principally from the harvestable rights dams and that water quality within those dams is likely to be within the relevant ANZECC (2000). It is also noted that the surface water modelling identified that based on a maximum rate of release of 66.2ML per year, 100 years of rainfall data and a range of conservative assumptions, that the harvestable rights dams could provide sufficient water for the compensatory release program on 97% of all days modelled.

As indicated in Section 2.10.2.6 of the *Environmental Assessment*, the Proponent would, if required, source water for the from the historic Snobs, United Miners or Stuart and Mertons workings for compensatory flows should the harvestable rights dams not be able to provide the required water. Table 4.19 of the *Environmental Assessment* provides an overview of the quality of water within the monitoring bores constructed for the groundwater assessment.

Given that electrical conductivities of water within Spring Creek significantly exceed the ANZECC (2000) guidelines and that water within Majors Creek is at the upper end or exceed those guidelines, the Proponent contends that the proposed compensatory release program does not "represent a real risk to downstream water quality and the users of this water" for the following reasons.

- The compensatory flow program is designed to compensate for reduced groundwater discharge to Spring and Majors Creeks. Table 4.19 of the *Environmental Assessment* identifies the quality of groundwater within the Project Site. In summary, water within the granodiorite aquifer typically has electrical conductivities in the range of 530µS/cm to 1 300µS/cm.

Figure 3 Surface Water Quality Results



- Water within the harvestable rights dams would be likely to have electrical conductivities significantly lower those measured in groundwater within the Project Site. As a result, the compensatory flow program would result in <u>improved</u> water quality within Majors Creek.
- In the unlikely event that water would be required to be drawn from the historic workings for the compensatory flow program, the quality of the water that would be discharged would be equivalent to the quality of the water that the program is designed to replace. As a result, the program would result in a negligible change in groundwater quality within Majors Creek.

Long-term recovery of groundwater levels

This issue will be addressed in the response to the submission provided by the NSW Office of Water.

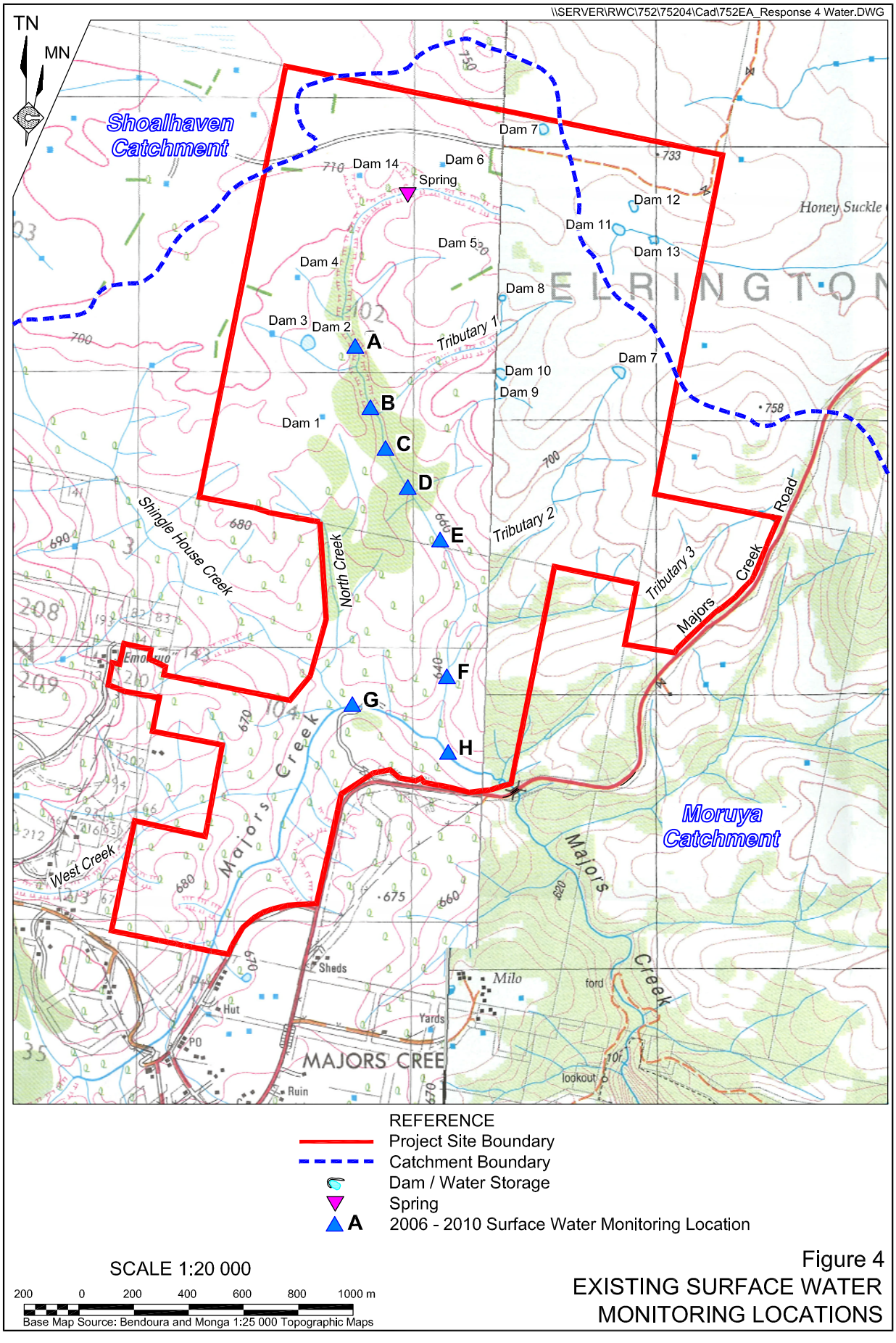


Figure 4
EXISTING SURFACE WATER MONITORING LOCATIONS

The EA does not address climate change. Southern Rivers CMA would apply a precautionary approach to water use from Majors Creek, as stream flows are already diminishing. An appropriate management response would be to disallow further groundwater licensing on Majors and Springs Creek, unless appropriate flow, surface and groundwater modelling indicates that the proposed water use is proved feasible.

Response: It is noted that the Director General's Requirements do not require the Proponent to assess the Project in light of potential changes to the local climate as a result of Climate Change. In addition, it is noted that determining likely changes to aspects of the environment with certainty within and immediately surrounding the Project Site would not be possible. As a result, such an assessment would be likely to be highly subjective and imprecise. As a result, decisions in relation the further allocation of groundwater licences should be matter considered on a catchment or regional basis, not a project by project basis.

The MUSIC modelling does not provide an accurate assessment of the catchment hydrogeology. Default, one off figures have been used with minimal monitoring. In addition, the historic data used is often for periods of high rainfall in the region. In fractured rock geology, high quality monitored data is required to model the predictability of the hydrogeology. Currently there are no thresholds set within the modelling, or any details on how the proponent will carry out contingency planning once those thresholds have been reached.

Response: (SEEC) MUSIC modelling was conducted to assess surface water quality, not catchment hydrogeology. MUSIC modelling was conducted in accordance with the guidelines set out by the Sydney Catchment Authority (SCA). These guidelines represent some of the most recent and most stringent for modelling using MUSIC Australia-wide. In many cases, default, one-off values were not used in the models; source nodes were significantly modified from the MUSIC defaults to reflect the present and expected land use, plus the inherent runoff and infiltration characteristics within the Project Site. Modifications were, in most cases, derived from the SCA's guidelines or from site and soil observations.

Rather than using threshold values, a longer-term neutral or beneficial effect was sought on water quality, as is required by the SCA in their area of operation (i.e. on lands immediately to the north of the Project Site).

The rainfall template used in MUSIC was developed by the SCA and aims to represent a longer-term average rather than wetter or drier periods, which can skew water quality results. Note that wetter years tend to produce more favourable results in MUSIC for highly pervious catchments rather than highly impervious (i.e. developed) catchments. As such, the use of a higher-than-average rainfall template does not necessarily generate results in favour of the proponent.

High-quality, long-term water flow monitoring data is not available for the immediate receiving waters (i.e. Majors Creek) to allow back-calibration of the MUSIC modelling parameters. However, pervious-area runoff, infiltration, soil storage and groundwater recharge/discharge figures were all set according to the SCA's guidelines and Macleod (2008), with input also coming from the groundwater consultant regarding likely runoff percentages to assist source node calibration.

Risk of groundwater contamination from the tailings dam. The EA requires further detail to address surface and groundwater contamination mitigation and contingency planning. It is noted that section 6-7 of the Soil and Land Capability Assessment report states that tailing structures should be lined to make them effectively impermeable. However no detail on how this would be achieved is provided.

Response: A detailed description of the management of the tailings storage facility is provided in Section 2.72 of the *Environmental Assessment*.

Risk of downstream surface water contamination from the tailings dam in the event of the design parameters for the structure being exceeded. The EA needs to have a contingency plan for dealing with an Average Recurrence Interval in excess of 1 in 100 year given that it is wholly reliant on a single tailings dam.

Response: As indicated in Section 2.7.2.2 of the *Environmental Assessment*, the tailings storage facility would be a 'prescribed dam' under the *Dams Safety Act 1978* and the design, construction and operation of the dam would be overseen by the Dam Safety Committee. The Proponent would ensure that the all required measures are implemented, including construction of surface water structures to the required annual recurrence rainfall event.

In addition to the recommendations for soil management provided in section 8-1 of the Soil and Land Capability Assessment report, Southern Rivers CMA advocates the use of recycled organics in covering mounds of stripped topsoil and subsoil to achieve the 70% vegetation cover within 10 days of formation. This is deemed necessary due to the weak structure of the topsoil and the dispersible characteristics of the subsoil. The recycled organics should be used in accordance with Best Management Practice Guidelines for the Beneficial Use of Recycled Organics in Land Rehabilitation and Catchment Management (DECCIDPIIHNCMA 2006)

In addition to the recommendations for soil management provided in section 8.5 of the Soil and Land Capability Specialist Report, Southern Rivers CMA advocates the use of recycled organics in site rehabilitation. The recycled organics should be used in accordance with BMPs (as stated in the above point).

Response: Commitment 13.5 has been amended in light of the above.

*The Southern Rivers CMA follows the principles of "Ask First: A guide to respecting Indigenous heritage places and values" produced by the Australian Heritage Commission and DECCW Aboriginal Cultural Heritage Consultation process documentation. Within 4-114, the proponent should demonstrate that the community have a **full** understanding of the impacts of the mine and the recorded Aboriginal sites. Southern Rivers CMA supports the recommendations by the Aboriginal Community (4.6.7). In addition, the consultation process needs to be continued in a group forum, so issues can be raised with everyone present. Otherwise the perception in community that issues can be played off against different groups will persist. This is also consistent with the Southern Rivers CMA Aboriginal Cultural Heritage Policy which advocates inclusive, open and fair consultation.*

Response: As indicated in Section 4.6.2.1 of the *Environmental Assessment*, consultation for the Aboriginal heritage assessment was undertaken in accordance with the *Guidelines for Aboriginal Cultural Heritage Impact and Community Consultation* published by then Department of Environment and Climate Change in 2005. It is noted that the DECCW has subsequently released further consultation guidelines, namely *Aboriginal Cultural Heritage Consultation Requirements for Proponents* dated April 2010.

The Southern Rivers CMA has reservations about the backfilling of stopes with tailings/concrete mix because of the uncertainty of contamination risk of groundwater. Southern Rivers CMA recommends further testing of the tailings and the proposed tailing backfill mix prior to any backfilling operations.

Response: This issue has been addressed in Section 4.2.1.2.

Any erosion control works, weed removal or land rehabilitation work proposed on Majors Creek should be in consultation with the Majors Creek Landcare Group, the Aboriginal community and the Southern Rivers CMA.

Response: The Proponent agrees with the above recommendation.

The Araluen Valley has experienced periods of extreme drought and lowering of water tables. Further testing is required to ensure that the surface and groundwater needs of the mine do not impact on the current water users and the Landcare efforts to improve water quality within the catchment.

Response: Detailed groundwater and surface water monitoring programs are presented in Sections 4.4.6 and 4.5.7 of the *Environmental Assessment*. In addition, the Proponent anticipates that a detailed Water Management Plan and Monitoring Program or similar document will be required to be prepared in consultation with DECCW, NOW and the SRCMA.

A Conservation PVP in perpetuity can only place on title areas that are to be 'maintained and improved', not areas that would be adversely impacted. The 'maintain and improve' outcomes assessment underpinning the Native Vegetation Act would preference a Conservation PVP over the remainder of vegetated areas of the entire property (grassland and woodland), not just within the proposed 'Biodiversity area'. The Conservation PVP area would be managed to improve the quality of habitat. As a minimum, the area would be fenced to exclude stock, with weed and feral animal control programs implemented and possible replanting in certain areas of the property. An indicative offset ratio of 1 :20 would be appropriate for the impacts in question.

Response: The proposed biodiversity strategy is focused on the northern section of the Project Site because, as indicated in Section 4.3 of the Environmental Assessment, the southern section of the Project Site has been heavily disturbed by prior land uses and is heavily weed infested. As indicated in Section 3.2.6 of this document, the Proponent proposes to progressively remove the identified weeds within the newly acquired section of the Project Site as it has done on those sections it has owned for some time. As a result, the Proponent does not believe that DECCW would view the southern section of the Project Site as an appropriate biodiversity offset area.

It is noted that the EA identifies that a PVP would be entered into within 12 months of receipt of project approval (4-56). Southern Rivers CMA recommends that the Conservation PVP is finalised prior to the commencement of the construction phase of the project.

Response: The Proponent proposes to consult widely during the preparation of the Property Vegetation Plan. As a result, the Proponent contends that requiring the plan to be prepared prior to commencement of construction of the Project would result in unnecessary delays in the Project or a plan that would be prepared with insufficient consultation.

4.7 ROADS AND TRAFFIC AUTHORITY

The RTA has reviewed the submitted information and does not object to the project in principle as it is considered that traffic generated by the project will not have a significant impact on the classified road network.

Response: Noted

4.8 PALERANG COUNCIL

4.8.1 Road Access

The traffic counts for the study were undertaken over a seven day period only. Conclusions drawn that there will not be a significant increase in heavy vehicle movements cannot be made with any accuracy from this extremely limited traffic count. Majors Creek Road is currently not a haulage route for heavy vehicles. There are no quarries or timber operations using the road. Most of those counted as heavy vehicles in the applicant's count would be light trucks, usually fairly empty, used by tradespeople and local rural properties.

Response: (TUP) Standard practice[1] in traffic engineering is that vehicle volume and classification counts are undertaken for a one week period (7 days) in a representative period, to obtain accurate daily traffic volumes as well as vehicle classifications using particular roads. Majors Creek Road is not subject to the type of land use activities or seasonal variations that would significantly vary the number of vehicles using the road near the Majors Creek township on different weeks throughout the year.

The count period of 12 – 18 February was considered to be a representative non-school holiday period and the traffic volumes collected during this week representative of an accurate traffic count of the usage of Majors Creek Road by vehicles. Two way week day traffic volumes are 337 vehicles per day of which 23 vehicles were heavy vehicles (ie. Austroads Class 3 and above). It is agreed that the majority of the heavy vehicles are rigid trucks and or buses (ie. Austroad Class 3 – 5 vehicles).

[1] Counting for a 7 day period in a representative period (ie. outside school holidays) is standard practice for the NSW Roads and Traffic Authority and local Councils in New South Wales, as well as for traffic engineering consultants undertaking work for these authorities. As long as the road is not subject to large seasonal variations in traffic usage, then a single week of count data should establish accurate traffic volumes for the road including vehicle classifications.

It is clear that there will be a significant increase in laden semitrailer movements on the route to and from the mine, post approval. The EA indicates that there will be 9 extra movements in each direction.

Obviously this will have a significant impact on the roads leading to the mine and especially on Majors Creek Rd. The passing of extra vehicles on the narrow crests and curves are a particular safety concern. The fairly light pavement of the road will also be damaged by the trucks delivering materials and plant to the mine and hauling the concentrate from the mine.

However, Council is satisfied that the applicant will address these issues as Cortona has recently written with an offer, that Council has subsequently accepted, to enter into a planning agreement, where Cortona will make payments to Council for it to carry out necessary road upgrading to deficient parts of the route and for Council to also make repairs to the pavement resulting from the haulage operations. These arrangements are as contained in the attachment (letter from Cortona dated 24 September 2010).

A planning agreement is currently being developed between the parties and it should now be listed as a condition of consent (if DA approved) to ensure that road impacts are addressed to Council's satisfaction.

Response: This confirms with the Proponent's understanding of the current arrangements with Council.

4.8.2 Haulage Operations

Council is in agreement with the Operation Controls listed in Section 4.9.4.2 relating to truck movements. It would particularly like to see a condition requiring the movement of heavy vehicles, to and from the Project Site, not to be permitted during the hours of 7.00am to 8.30am and 3.00pm to 5.00pm on school days to avoid potential conflict with the local school bus services.

Response: Condition 3.1 has been amended to reflect the above.

4.8.3 Entrance to Mine

The applicant has proposed an entrance point to the mine off Majors Creek Road approximately 9.3 km south of Araluen Rd. While the sight distances at this location appear to be adequate for the design speed of the road, the applicant's proposal to provide only a BAR/BAL standard treatment is in conflict with recommendations made by the Local Traffic Committee. Considering the area that potential employees may be sourced from, Council does not believe that the statement that a bus will transport the majority of employees, adequately reflects what the traffic movements will actually be. Individual staff vehicle trips need to be factored into the assessment, especially in relation to numbers of vehicles turning at intersections.

Council has accepted advice from the local traffic committee that, due to the intersection being on a 6 % grade, the treatment at the intersection needs to be an AUR/BAL configuration with an acceleration lane uphill towards Braidwood.

The additional acceleration lane for the loaded trucks leaving the site up hill is required to reduce the impact on the existing road users (e.g. residents of Majors Creek and beyond). While motorists will be delayed behind the slow trucks, it is also likely that the truck drivers will want to be courteous and will tend to leave as much space as possible to be overtaken. However this will mean that the trucks will travel at the western edge of the road including on the inadequate shoulder area and cause edge break and deformed shoulders. For these reasons there needs to be a purpose-built, separate acceleration lane for the trucks towards the top of the hill. These works are not part of the planning agreement.

Response: **(TUP)** As indicated in Section 2.2.3 of the *Environmental Assessment*, the Proponent proposes to provide a BAL and BAR treatment in Majors Creek Road for the left and right turn movements into and out of the Project Site. This is considered appropriate in light of the small traffic volumes that currently use Majors Creek Road and the future traffic generation of the Project which will also be quite small.

Existing hourly traffic volumes using Majors Creek Road on an average weekday are very low and between 6.00am and 6.00pm are as follows:

- Northbound – 7 to 23 vehicles per hour (ie. 1 vehicle every 2.6 minutes to 8.5 minutes);
- Southbound – 2 to 26 vehicles per hour (ie. 1 vehicle 2.3 minutes to 30 minutes).

The maximum hourly traffic generation of the mine would be 10 vehicles per hour (ie. ie. 1 vehicle every 6 minutes) at shift change over times. Even if some workers chose to drive rather than use the employee bus as suggested by Council, the traffic generation is unlikely to exceed 20 vehicles per hour (ie. 1 vehicle every 3 minutes) at shift change over times and the traffic volumes will still be low in real terms. Heavy vehicles (other than the employee bus) coming to the mine will be a maximum of 7 vehicles per day between 7.00am and 10.00pm (ie. 7 vehicles in and 7 vehicles out) which is the equivalent of 1 vehicle every 1 hour or so arriving and or departing the Project Site.

To justify an AUR and AUL treatment at the intersection based on the RTA's and/or Austroads warrants for rural turn lanes, there would need to be an existing volume of between 180 to 300 vehicles per hour using both directions of Majors Creek Road, depending on whether 20 or 10 vehicles turned into or out of the mine entrance in the same hour. Therefore the volumes required to meet the normal warrant are in order of 10 times greater than the current traffic volumes using Majors Creek Road.

Council states that its Traffic Committee considers that the AUL with an acceleration lane for northbound traffic from the Project Site entrance should be built to allow northbound vehicles using Majors Creek Road to pass slower vehicles exiting the mine due to the uphill grade, which is 6%.

A grade of 6% does not justify the provision of an AUL and an acceleration lane. While the grade needs to be considered, it is not a critical factor. The most important critical factors are the volume of northbound traffic using Majors Creek Road and the number of heavy vehicles turning left out of the Project Site.

The distance to the top of the hill from the Project Site intersection is around 500 metres. A light vehicle such as a car would normally average a speed of 80km/h over this distance due to the up hill grade and would require approximately 23 seconds to traverse this distance. A fully laden truck turning out of the Project Site would average a vehicle speed of between 30km/h to 40km/h, depending on the type of truck. A truck would require between 46 seconds and 60 seconds to traverse the 500 metres depending on its speed.

Therefore the overall delay to a car travelling northbound on Majors Creek Road which is caught behind a truck which has turned left from the Project Site would be in the order of 23 to 47 seconds until both vehicles reached the top of the hill. This is a relatively small delay. However, the chances of this occurring are also relatively small given:

- the frequency of truck movements which is 1 every hour; and
- the volume of the northbound traffic which is 7 to 23 vehicles per hour (ie. 1 vehicle every 2.6 minutes to 8.5 minutes) between 6.00am and 6.00pm.

Light vehicles turning left out of the Project Site would travel at higher speeds and would be unlikely to cause any delay to any northbound vehicles using Majors Creek Road between the Project Site entrance and the top of the hill.

It is concluded that there is no justification or need for the Proponent to provide and AUL and or AUR treatment for the left and right turns at the Project's site entrance in Majors Creek Road based on the current standards used by road authorities. The proposed BAL and BAR treatments would be adequate for this intersection and would provide a safe intersection.

It should be noted that there are no AUR and or AUL treatments at any of the major intersections on the regional and major local road network between Braidwood and the Project Site. This includes the intersections of:

- Majors Creek Road / Araluen Road; and
- Araluen Road / Captains Flat Road.

These intersections carry much higher traffic volumes than the proposed Project Site intersection in Majors Creek Road will, yet neither of these intersections have AUR and or AUL treatments. Both of these intersections have BAL and BAR treatment for the left and right turn movements to and from the major road.

The existing southern access to the site is at a poor location and is very sub-standard. It should be closed as an access point to the mine. All traffic should be required to enter the mine site from the northern entrance.

Response: As indicated in Section 2.9.2.1 of the *Environmental Assessment*, the Proponent proposes to close the existing southern entrance to the Project Site once the proposed northern entrance is established. However, the southern entrance will be required for emergency access. At other times the access gate will be locked and all vehicles will be required to enter and leave the Project Site via the proposed northern entrance.

Considering the heavy vehicles that will be using the internal road, it is Council's opinion that this internal road should be sealed to reduce the impact of dust on the locality and the potential for erosion of the road.

Response: As indicated in Section 4.10.7 of the *Environmental Assessment*, the air quality assessment concluded that there would be no dust-related impacts associated with the Project. As a result, sealing the entire length of the site access road would be unreasonable. However, as indicated in Section 2.2.3 of the *Environmental Assessment*, the Proponent would seal the initial 200m of the site access road to prevent tracking of mud and sediment onto Majors Creek Road.

It is noted that the applicant has made statements at 2 different places in the EA about the distance from the intersection that the internal access road will be sealed. At page 2-9 it advises 200m and at page 4-141 it advises 50m. Council prefers the full length to be sealed but at least 200m as a minimum.

Response: It is acknowledged that reference is made in Section 4.9.4.3 of the *Environmental Assessment* to a 50m sealed section of the site access road. This should refer to a 200m sealed section of the road.

4.8.4 Hours of Operation

The environment surrounding the mine has an existing noise level below 30dB(A). The Guideline used to assess the impact of the proposed development on the surrounding area is the NSW Industrial Noise Policy (INP) produced by DECCW. The INP specifies two noise criteria – an intrusiveness criterion and an amenity criterion. Pg 4-29 of the EA states that only the intrusiveness criterion was considered in setting the project operational noise levels. Whilst Council staff are concerned that the EA sets a sleep disturbance criterion of 45dB(A) when the existing background noise is 30dB(A). There appears to be an error in the report, as the maximum 45dB(A) which has been adopted for the EA was taken from Table 2.1 on page 16 of the INP, which relates to Amenity Criteria, which the EA states was not used as a criteria due to there being no existing major industry dominating noise levels at residences. Therefore staff consider that the appropriate noise level for evenings would be 35dB(A) (5dB(A) above normal background noise) as set on page 14 of the INP.

Table 4.10 of the EA has the predicted operational noise levels for a variety of residences in Majors Creek and all of them are over 35dB(A).

Response: (Spectrum) The noise report correctly establishes a sleep disturbance criteria of 45dB(A),$L_{1(1minute)}$ in accordance with the Environmental Noise Control Manual (ENCM). Reference has not been made to the Acceptable Noise Levels (ANL) in Table 2.1 of the INP. Predicted levels in Table 7 of the report are all below the sleep disturbance criterion.

It is considered that the prudent thing would be to restrict the hours of operation to 15 hours per day (6.00am to 9.00pm) for above surface works, until the site is operational and further noise testing can be carried out to ensure that the night time disturbance meets the required dB(A). This precautionary approach would allow the mine to become operational and real data used to determine the noise levels, as opposed to the modelling contained within the EA.

Response: As identified in Section 4.26 of the *Environmental Assessment*, the Project is not expected to exceed the relevant noise assessment criteria. Notwithstanding this and in light of the community's concern in relation to noise during the night, the Proponent proposes to limit night-time crushing and screening operations. Section 2.2 of this document provides further description of this and assesses the anticipated implications for noise emissions at surrounding residences.

4.8.5 Water Quality and Quantity

The proposed project relies heavily on the use of groundwater extracted from old workings and de-watering of the proposed mine itself. Table 5 section 3.32 of the EA reproduces water quality data that was measured from groundwater at the site. The method used to obtain the samples appears to comply with accepted monitoring standards. However, the water quality itself is of concern. The water in 2 samples appears to be basic (alkaline) and in one case extremely basic. This water with a pH value of 12.2 would be toxic to aquatic organisms and highly corrosive. The EC of the groundwater is consistently above ANZECC 2000 guidelines and would appear to be highly saline/sodic. The nutrients Nitrate and Phosphorus generally exceed the ANZECC guidelines and if that water was introduced at surface would result in further eutrophication of receiving waters. The Water quality objectives for the Moruya River are quoted in the EA and yet the groundwater they are proposing to use to replenish lost water from Majors Creek has significantly higher concentrations of Nitrogen and Phosphorus than is required under those same objectives for upland rivers.

Response: This issue is discussed in detail in Section 4.6 of this document

The modelling completed to predict how much water was going to be used to replenish surface flow lost to Majors Creek is flawed by the omission of recent rainfall data, therefore implying greater reliance on groundwater than is reported.

The EA uses Braidwood Rainfall Data and state that in 1981 (665mm) was the worst year on record. The assessment then states that the harvestable right dams would run dry for 182 days (EA 4-25)

Rainfall records used in the water modelling for the EA stop at 2002, which is very perplexing considering records are available to 2009. The Braidwood Rainfall Data from 2003-2009 that was not included in the assessment states the yearly rainfall as follows:

- *2003 – 647mm*
- *2004 – 539mm*
- *2005 – 666mm*
- *2006 – 474mm*
- *2007 – 806mm*
- *2008 – 602mm*
- *2009 – 438mm*

Average rainfall for 2002-2009 = 575mm. The average for the whole period that the weather station has been in operation 1887-2010 is 717mm. This is lower than the 728mm for their selected 100 year period. This means the dams would run dry for longer periods of time and that more polluted water for environmental flows would have to be pumped from the old mines. The additional volume that they pump out will have to be compensated by additional environmental flows. The figures also haven't factored in Climate Change which has resulted in a reduction of 40-50mm in rainfall over the last 4 decades.

Response: (SEEC) The Braidwood (Wallace St, station 69010) rainfall data was selected over Majors Creek (The Old School, station 70061) because it is a longer record (123 years vs 112 years), and is significantly more complete (98% complete vs 68% complete). Both data sets are of high quality (99% and 100% respectively).

In conducting the modelling, we identified that 1981 was the worst year on record in terms of water availability in the harvestable-right dams. This does not imply that 1981 was also the lowest rainfall year on record. Water supply from harvestable-right dams is determined by a number of factors, not just the total amount of rain in any given year. The pattern of that rainfall has a significant bearing on how much water can be drawn from dams. So while 1981 was not the driest year on record, during that year the dams were unable to supply water on 182 days, most likely due to the pattern that rainfall occurred at that time.

The modelling was re-run to include the most up-to-date and quality-checked data available from the Bureau of Meteorology, using a 100-year record from 1910 to 2009 (note that the model is limited to a 100-year record). Rainfall data was from the Braidwood (Wallace St, 69010) station. The results of that modelling are detailed in **Table 5**, and graphs showing dam levels and dry periods are in **Figures 5** and **6**. In summary, the revised modelling indicates the following. Numbers in parenthesis are results from modelling using the 1903 to 2002 data set.

- The average annual rainfall during the modelling period was 732mm/yr (728mm/yr).
- The worst year on record for supply from the dams remains 1981, when they were dry for 182 days (1981/182 days).
- A four-year dry period from 1981 to 1984 resulted in a total of 357 days within those four years when the dams would have been dry.
- A three-year dry period from 2003 to 2005 resulted in a total of 193 days within those three years when the dams would have been dry.

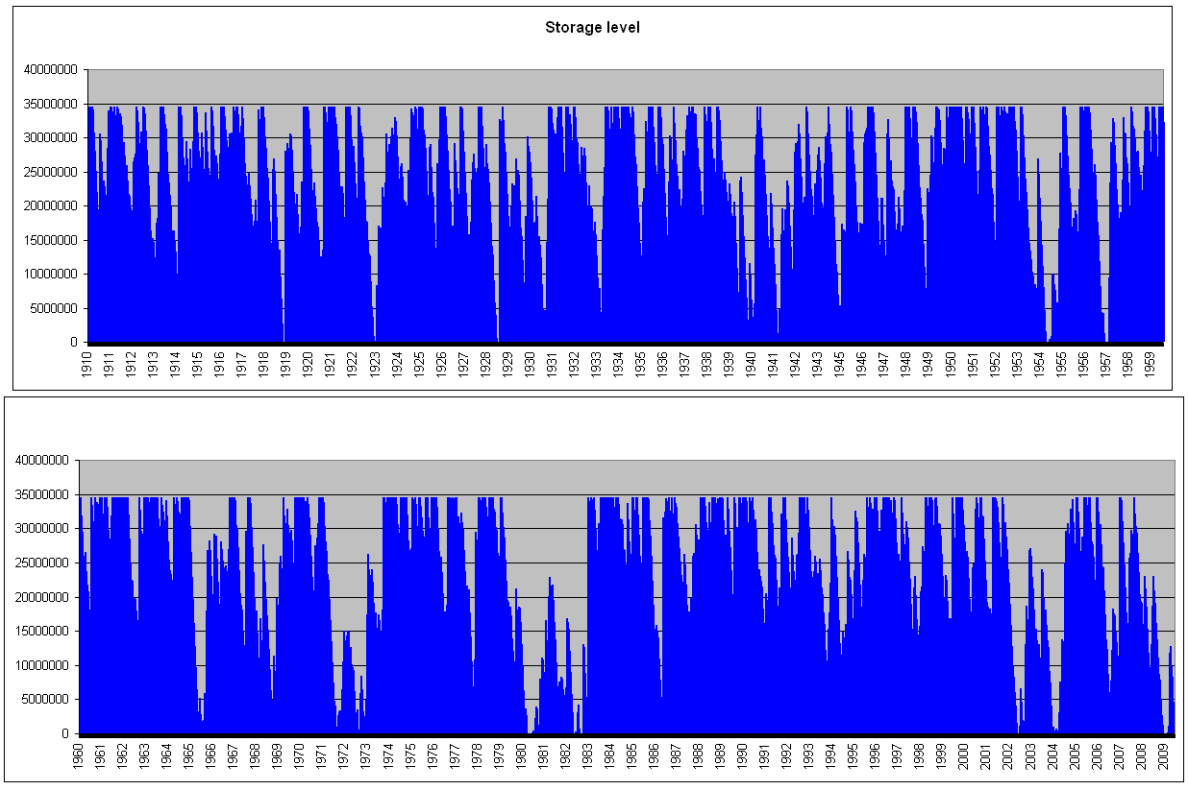
From this modelling we presume that, although the drought of the most recent decade was a significant climatological event and might have resulted in numerous lower-than-average rainfall years, the dams did not suffer as many dry days as in the early 1980's because the overall pattern of rainfall was more favourable. In addition, it is noted that the average annual rainfall for the period 1910 to 2009 was higher than the average rainfall for the period 1903 to 2002, indicating that rainfall during the period 1903 to 1909 was lower than the rainfall during the period 2003 to 2009.

Table 5
Results of Modelling Using 1910 to 2009 Rainfall Data

Parameter	Results[1]
Percent of time during the modelling period that demand for water return to Majors Creek was met by the harvestable right dams.	96.6% (97%)
Average amount of water required from the historic workings per year to make up the average 3.4% shortfall.	Approx 2.2ML/yr (Approx 2ML/yr)
Worst year in the model record - number of days the harvestable right dams were dry.	182 days (in 1981) (182 days (in 1981))
Worst year in the model record - amount of water that would be required from the historic workings in that year.	33ML/yr (approx.) (33ML/yr (approx.))
Number of years in the model record when the harvestable right dams ran dry for at least one day	28 years (29 years)
Median number of days the harvestable right dams ran dry within those 28 years	18 days - equates to approximately 3.3ML of water demand

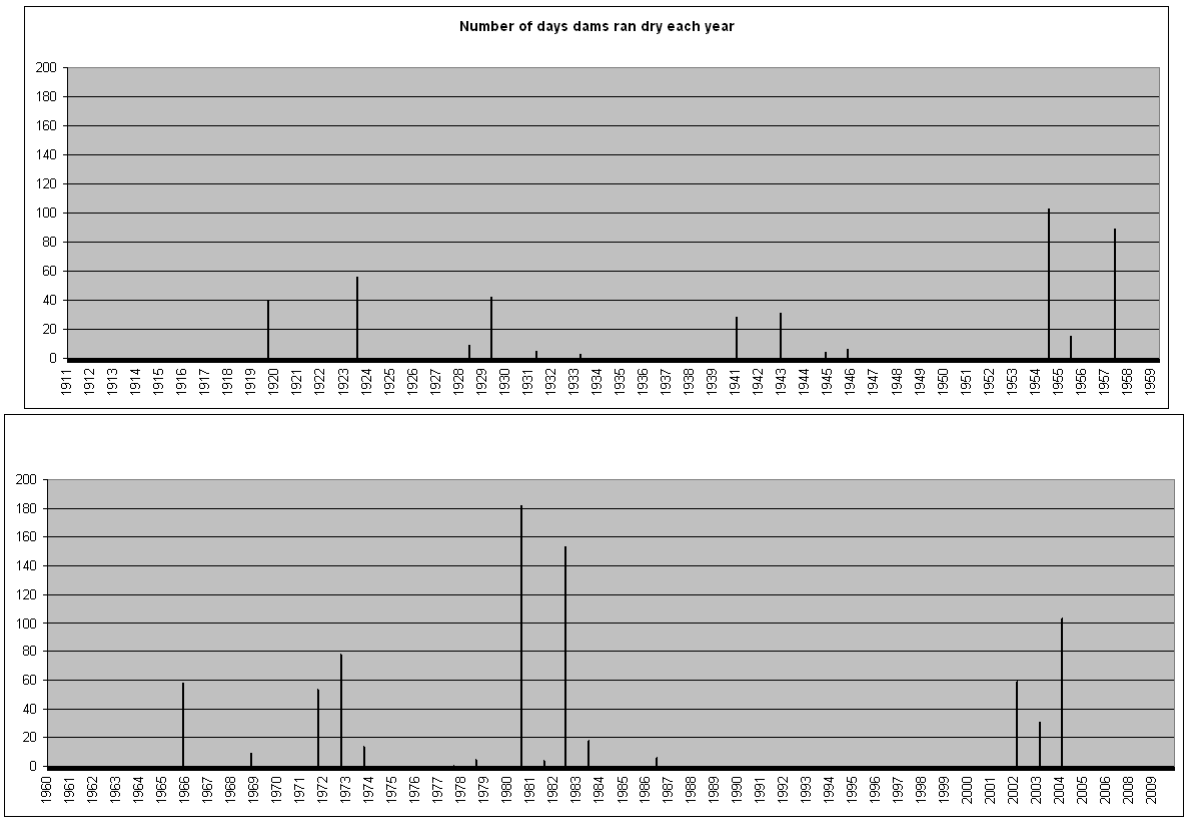
Note 1: Results in parenthesis = results using the 1903 to 2002 data set
Source: SEEC

Figure 5 Harvestable-right Dam Storage Levels (1910 to 2009 rainfall data)



Source: SEEC

Figure 6 Number of Days the Harvestable-Right Dams Ran Dry Each Year (1910 to 2009 data)



Source: SEEC

To assess what impacts climate change in the past four decades might have on the modelling results, a separate model was set up using only data from 1969 to 2009, again using rainfall from Braidwood (69010). During this period the average rainfall was 725mm/yr. The results of modelling are summarised in **Table 6**.

Table 6
Results of Modelling Using 1969 to 2009 Rainfall Data

Parameter	Results
Percent of time during the modelling period that demand for water return to Majors Creek was met by the harvestable right dams.	94.7%
Average amount of water required from the historic workings per year to make up the average 5.3% shortfall.	3.4ML/yr (approx.)
Worst year in the model record - number of days the harvestable right dams were dry.	182 days (in 1981)
Worst year in the model record - amount of water that would be required from the historic workings in that year.	33ML/yr (approx.)
Number of years in the model record when the harvestable right dams ran dry for at least one day	13 years
Median number of days the harvestable right dams ran dry within those 13 years	31 days (equates to approximately 5.5ML of water demand)

Source: SEEC

Table 6 shows that, although the overall supply confidence was slightly lower than for the long-term rainfall model (94.7% vs 96.6%), this represents a change of less than 2%. This is despite the relative number of years in which a dry-dam spell occurred being higher (13 years in

40, or 33% vs 28 years in 100, or 28%). We conclude that, although the rainfall record for the last 40 years is slightly lower than that for the longer term, this does not have a significant impact on the reliability of the proposed surface water management strategy.

4.8.6 Effect on the Visual Amenity of the Surrounding Locality

Whilst the mine will be screened by some vegetation and mounds, it is considered that there will be an impact on the visual amenity on the surrounding locality. It is considered appropriate to request further tree planting as part of any approval, especially along the southern edge of the property which is bounded by the Majors Creek Road.

Response: As indicated in Commitment 12.3, the Proponent would continue to undertake additional plantings within the Project Site in consultation with the local community and other interested parties, including Palerang Council.

4.8.7 Recommended Conditions of Consent

4.8.7.1 Planning Agreements

The applicant is to enter into a planning agreement with Palerang Council to address impacts to the public road network with the details to be in accordance with Cortona's letter of offer to Council dated 24 September 2010.

Response: Agreed.

The applicant is to enter into a planning agreement with Palerang Council to provide a financial contribution towards the upgrading of the Braidwood Recreation Grounds in order to address impacts of increased demand on public facilities. The details of the agreement are to be in accordance with Cortona's letter of offer dated 24 September 2010.

Response: Agreed.

4.8.7.2 Road Works

The following treatments be constructed by the applicant at the site of the entrance from Majors Creek Road, in accordance with RTA's Road Design Guide:

- Intersection in accordance with RTA's AUR/BAL standard treatment
- Acceleration lane on Majors Creek Road on the up-grade towards Braidwood.

Response: This is not considered to be justified. See Section 4.8.1.

Obtain a construction certificate from Palerang Council or an appropriately accredited private certifier before undertaking any roadworks. Forward a copy of any construction certificate issued by a private certifier to Palerang Council at least 2 days before undertaking any work in accordance with that construction certificate.

As consent is required under section 138 of the Roads Act 1993 i (for works within the public road reserve) provide a copy of construction drawings to Palerang Council for approval prior toissue of any construction certificate.

Response: Agreed.

Section 138 consent

Obtain consent under section 138 of the Roads Act 1993 from Palerang Council before any work is undertaken in the public road reserve. A security deposit of $5000 is required to be lodged with Council prior to the issue of the S138 consent.

Response: Agreed.

Provide engineering design drawings, and supporting information, to standards in AUS-SPEC #1 as amended by Council, for all proposed roadworks for approval by the principal certifying authority prior to issue of any construction certificate.

Engineering drawings are to include a note that "All work is to be constructed in accordance with AUS-SPEC#1 Development Specification Series as amended by Palerang Council, and the terms of the Development Consent.".

Response: Agreed.

4.8.7.3 Certification of Completed Civil Works

At the completion of works the superintendent of works shall present to Palerang Council a Certification Report for Construction Works as set out in AusSpec#1 Clause CQC7(1), and will also include copies of any approvals outlined in this development consent and report on the current status of environmental restoration and revegetation. The superintendent of works shall be a Civil Engineer or suitably experienced and accredited Registered Surveyor as set out in AusSpec#1 Clause CQC7(3).

Response: Agreed.

4.8.7.4 Works as- executed plans

Provide one copy of works as-executed plans to Palerang Council, showing any variations from the approved designs. The works as-executed plans are to be prepared in accordance with the requirements set out in Aus-Spec #1 as amended by Council.

Response: Agreed.

4.8.7.5 Internal Road

The access road within the development site to be bitumen sealed for a minimum of 200m from the entrance on Majors Creek Road.

The existing southern entrance to the property is to be closed and all traffic to and from the site is to gain access via the main entrance.

Response: Agreed, with the addition of the following after the words 'main entrance.'

', except in the case of emergency or closure of the main site access road.'

4.8.7.6 Dust Suppression

Respond to Councils direction to provide dust suppression on roads leading to, adjacent to and within the development site in the event that weather conditions and construction traffic are giving rise to abnormal generation of dust.

Response: Agreed.

4.8.7.7 Haulage Trucks Hours of Operation

Haulage truck operations on the public roads are to cease during the period when school buses may be encountered on the roads - between the hours of 7.30 - 9.00 am and 3.00-5.00 pm on school days.

Response: Agreed, with addition of the following after the words 'Haulage truck operations.'

'controlled directly by the Proponent.'

4.8.7.8 Hours of Operation for Processing

Hours of operation for above surface processing will be 6.00 am to 9.00 pm for the first full year of operation to allow for real data to be used to determine the noise levels after 9.00 pm.

Response: Not accepted. See Sections 2.2 and 4.8.4 of this document

4.8.7.9 Waste Management

The applicant is to prepare a waste management plan with objectives to minimise waste and maximise recycling at the site. Under no circumstances shall waste from the mine be taken to any of Council's landfills except for the Braidwood landfill where putrescible waste may be dumped under a fee for service arrangement with Council.

Response: Agreed.

4.8.7.10 Landscaping

Provide a landscaped buffer to the southern edge of the property to reduce the visual appearance of the built form within the landscape. The landscape buffer is to be planted with advanced stock and incorporate native species including trees capable of achieving mature heights of at least 5 m and understorey vegetation capable of achieving heights of 1.5-2.0m. Details of the proposed landscaping are to be approved by Palerang Council prior to commencement of planting.

Landscaping is to be carried out prior to the commencement of operation of the mine.

Response: Agreed with the exception of the following.

- The landscaped buffer is to be planted in a manner determined in consultation with the local community and other interested parties. "Advanced stock" may not be the most appropriate mechanism to vegetate the buffer area.
- The landscaping shall be commenced within 12 months of the commencement of mining operations. It may be that seasonal conditions are not appropriate for planting operations and it would not be reasonable to delay construction operations as a result.

4.8.7.11 Local approval – on-site sewage management system

Prior to the installation of any on-site sewerage management system, a Local Approval under s.68 of the Local Government Act 1993, must be obtained from Palerang Council.

Response: Agreed.

4.8.7.12 Construction & occupation certificates for building works

Obtain a construction certificate from Palerang Council or an appropriately accredited private certifier before undertaking any building work. Forward a copy of any construction certificate issued by a private certifier to Palerang Council at least 2 days before undertaking any work in accordance with that construction certificate.

Response: Agreed.

Appoint a principal certifying authority before any building work is undertaken. Provide details of the appointed principal certifying authority (if not Palerang Council) to Palerang Council at least 2 days prior to any work being undertaken.

Response: Agreed.

Do not occupy or use the premises until an occupation certificate has been issued by Palerang Council or an appropriately accredited private certifier. Provide a copy of any occupation certificate, issued by a private certifier, to Palerang Council no later than 2 days after the occupation certificate is issued.

Response: Agreed.

The final occupation certificate must not be issued until all conditions of consent have been satisfactorily complied with and all mandatory stage/required plumbing inspections undertaken. Plumbing and drainage must be inspected by Palerang Council at the relevant stages of construction in accordance with the required Local Approval and a final plumbing certificate obtained prior to issue of any occupation certificate.

Response: Not accepted. It is likely that a number of conditions of consent will not become due or will not be applicable until after commencement of construction or mining operations. As a result, the suggested condition would result in inconsistency with the remainder of the consent.

All work is to comply with the current edition of the Building Code of Australia.

Response: Agreed with the addition of the words 'where applicable' at the end of the sentence.

4.9 EUROBODALLA SHIRE COUNCIL

The EA did identify and consider risks related to local drinking water users, particularly groundwater users and the Araluen village, however, in neglecting to consider Eurobodalla's water supply it has failed to assess potential risks to a peak population of over 100,000 people. Furthermore, the EA did identify water as an environmental issue, ranking groundwater 3rd and surface water 4th on the basis of unmitigated risks (although the Eurobodalla drinking water supply was not considered as part of this risk assessment). The methodology used for this ranking appears to be flawed as the rankings were determined by the number of potential low risk impacts. Based on the number of high and extreme events, surface water should rank 2nd. This rank is prior to any additional assessment of risk relating to impact upon drinking water supply.

Response: It is noted that the risk analysis was undertaken based on the understanding during the early stages of preparation of the *Environmental Assessment* of likelihood and consequences of particular events occurring. Water, both groundwater and surface water, were both identified as significant issues. However, whether these issues should be ranked second or third is not relevant as the Proponent is required by the Director General's requirements to adequately identify and address the anticipated impacts, irrespective of the comparative risk allocated to the particular issue.

Further, there are a number of water quality issues associated with both the operations and the rehabilitation of the tailing dam. Insufficient information has been provided in the EA with regard to the consequence categories for a dam failure. It is possible that the consequences have been under estimated as the proponent failed to identify ESC water supply as a downstream user. In the unlikely event of a tailings dam collapse, it is possible for sludge to be released downstream, be retained in downstream pools and release heavy metals into Eurobodalla's water supply for a number of years.

Response: As indicated in Section 2.7.2.2 of the *Environmental Assessment*, the tailings storage facility would be a 'prescribed dam' under the *Dams Safety Act 1978* and the design, construction and operation of the dam would be overseen by the Dam Safety Committee. In addition, the Proponent would ensure that the facility is constructed and monitored to industry best practice standards. As a result, failure of the structure is considered to be extremely unlikely. In the unlikely event that structural issues do arise, the Proponent notes that the facility would be the subject of regular inspections by a suitably independent, qualified and experienced consultant under the requirements of the Dam Safety Committee and that the resulting reports would be scrutinised by the committee for adequacy. These inspections would identify any structural issues early and the Proponent would then be required to implement a management plan and rectify the issue.

Finally, the Proponent is not aware of a single tailings or water storage dam constructed and monitored in accordance with the requirements of the *Dams Safety Act 1978* that has suffered a catastrophic failure.

1. *Eurobodalla Shire Council is provided with an opportunity to review and comment on plans (and subsequent revision of plans) to manage risks which have the potential to impact on the water supply including but not limited to those identified below:*

    a) *Eurobodalla Shire Council is consulted during the preparation of management plans associated with surface waters, and that these take into account drinking waters downstream of the site.*

    b) *Eurobodalla Shire Council is consulted in the preparation of the Rehabilitation and Environmental Management Plan.*

    c) *Eurobodalla Shire Council is consulted in the development of the Tailings Management Plan.*

    d) *Eurobodalla Shire Council is consulted in the development of the Surface Water, Sediment and Erosion Control Plan.*

    e) *Eurobodalla Shire Council is consulted in the development of the Dam Safety Emergency Plan.*

    f) *Eurobodalla Shire Council is consulted in the development of the Mine Safety Management Plan.*

    g) *Eurobodalla Shire Council is consulted in the development of the Hydrocarbon, Chemical and Reagent Management Plan.*

    h) *Eurobodalla Shire Council is consulted in the development of the Mining Operations Plan (MOP).*

Response: The Proponent would be pleased to consult Eurobodalla Shire Council during the preparation of any relevant management plans.

2. *An on-site Environmental Management position shall be employed for the duration of the project.*

Response: The Proponent has commenced advertising for an on-site Environmental Manager for the Project. That position would remain in place for the life of the Project.

3. *Eurobodalla Shire Council shall be given the opportunity to participate in each annual environmental performance review of the mining activities.*

Response: Participation in Annual Environmental Management Review (AEMR) reviews is a matter for I&I NSW. However, the Proponent understands that all relevant government agencies would participate in that process, including Eurobodalla Shire Council should they believe that they have an interest in the Project.

4. *Eurobodalla Shire Council Water Supply contacts shall be included as primary contacts in any pollution incident and emergency response plan.*

Response: Agreed

5. *Eurobodalla Shire Council shall be provided with prompt notification of and access to*

   a) any discharge or overflow from the tailings dam,

   b) results of any chemical analysis of seepage water (groundwater and surface water) from the tailings dam.

Response: Agreed

6. *Surface water monitoring shall include:*

   a) ICP-MS scan for metals, plus specific testing for mercury and lead, on a quarterly basis during normal flow conditions downstream of the site plus events to be taken during high flow storm events (based on a flow rate trigger).

   b) E. coli and Clostridium perfringens monitoring downstream of the site to assess impacts from on-site sewage management facilities on a monthly basis during normal flow conditions downstream of the site plus events to be taken during high flow storm events (based on a flow rate trigger).

Response: Section 4.5.7 of the *Environmental Assessment* identifies that a detailed *Surface Water, Sediment and Erosion Control Plan*, including detailed surface water monitoring would be prepared. This would include a description of the frequency and location of monitoring and parameters to be analysed. This plan would be prepared by a suitably qualified and experienced water consultant in consultation with Eurobodalla Shire Council. As a result, the above can be included in that Plan if required.

7. *Groundwater monitoring in tailings dam monitoring bores shall include real time monitoring of pH and EC.*

Response: The Proponent contends that due to the relatively slow response of groundwater systems, even in close proximity to structures such as the proposed tailings storage facility. As a result, real-time monitoring of groundwater composition is unlikely to be justifiable. However, the Proponent notes that it would initially implement a high frequency monitoring program in the vicinity of the tailings storage facility until the performance of the facility has been established. The frequency of that initial program would be determined during preparation of the *Surface Water, Sediment and Erosion Control Plan* in consultation with relevant government agencies, including the Eurobodalla Shire Council. In addition, any proposal to reduce the frequency of monitoring would be required to be approved by those same government agencies.

8. *Eurobodalla Shire Council shall be provided with all water quality monitoring information collected on a quarterly basis within 60 days of the end of each quarter.*

Response: The Proponent anticipates that it will be a condition of consent that all monitoring data will be made publicly available on the Company's website.

9. *The rehabilitation securities required by NSW Department of Industry and Investment associated with the project take into account the ongoing use of the Moruya (Deua) River as a major source of drinking water for the Eurobodalla Regional Water Supply Scheme.*

Response: This is a matter for I&I NSW to consider during preparation of the *Mining Operations Plan / Rehabilitation and Environmental Monitoring Plan.*

10. *The proponent shall meet reasonable costs associated with Eurobodalla Shire Council's review of environmental management plans, water quality data and involvement in the annual environmental performance review of the mining activity.*

Response: The Proponent contends that reviewing environmental management plans, monitoring data and involvement in the AEMR process should be a normal component of Council's role as a regulator. As a result, the Proponent does not believe that covering Council's costs to undertake these tasks is reasonable. However, the Proponent does note that there is opportunity for co-operation between the Proponent and Council in a number of areas that would result in benefits to the residents of Eurobodalla Shire and that this is a matter for negotiation between the Proponent and Council.

The achievement of the EA claim that the quality of water discharged from the site will be improved shall be dependent on the competent preparation, implementation, maintenance and review of the numerous plans, strategies and programs that the EA undertakes to prepare. It is considered that it is important that the Department of Planning acknowledge and ensure that ESC shall be involved in consultation and review of management plans as system failure has the potential to impact Council's water supply source.

Response: As indicated previously, the Proponent would be pleased to consult Eurobodalla Shire Council during the preparation of any relevant management plans.

5. PUBLIC SUBMISSIONS

5.1 INTRODUCTION

This section provides a response to the public submissions received following the exhibition period. As indicated in Section 1, the following public submissions were received in relation to the Project.

- 12 individual members of the general public or private companies supporting the Project;
- 50 individual members of the general public or private companies opposing the project.
- 1 074 members of the public who submitted a single form letter which, with minor variations;
- two specialists providing technical submissions; and
- 10 special interest groups;

This section provides a response to those issues raised in the above submissions. In addition, the section concludes by identifying a range of factually incorrect statements made in public non-proforma submissions.

5.2 OBJECTIONS – NON-PROFORMA SUBMISSIONS

5.2.1 Introduction

This sub-section provides an overview of the non-form submissions that were received by way of objection.

In order to limit repetition and allow the matters raised in the submissions to be adequately and efficiently addressed, each submission was reviewed and the matters raised were categorised into 33 issues. The identified issues are as follows.

- Issue A – Noise – 24-hour Operation
- Issue B – Noise – Operational Noise
- Issue C – Noise – Traffic Noise
- Issue D – Blasting
- Issue E – Ecology – Project-related Impacts
- Issue F – Ecologically Sustainable Development
- Issue G – Water – Accuracy of the Groundwater Model
- Issue H – Water – Extent of Groundwater Impacts
- Issue I – Water - Impacts on Majors Creek Water Supply
- Issue J – Water - Impact on Downstream Water Users

- Issue K – Water – Impacts on Groundwater Dependent Ecosystems
- Issue L – Water – Accuracy of the Water Balance and Use of Data
- Issue M – Water – Location of Environmental Flow Release Point
- Issue N – Aboriginal Heritage
- Issue O – Bushfire
- Issue P – Traffic – impacts in Braidwood
- Issue Q – Traffic – Impacts on Road Network/Safety
- Issue R – Air Quality
- Issue S – Visual Amenity
- Issue T – Environmental Monitoring
- Issue U – Use of Cyanide
- Issue V – Tailings – Tailings Storage Facility
- Issue W - Reagent Management
- Issue X - Waste Rock Balance
- Issue Y – Climate Change
- Issue Z – Property Values
- Issue AA – Application of the EPBC Act
- Issue AB – Life of the Project
- Issue AC – Economic and Community Contribution
- Issue AD – Outcome of the Risk Analysis
- Issue AE – Sealing of the Site Access Road
- Issue AF – Bush Rock Removal

Table 7 provides a list of the non-form submissions received and the issues raised in each submission. It is acknowledged that classification of individual issues is subjective and that individual respondents may classify issues raised in their own submission in a manner different to the way that they are classified in this document.

The following sub-sections provide, for each issue raised, extracts from a range of submissions (typically every third submission) in *italics*, as well as a consolidated response to that issue.

Responses to the form submission, Submission 35 and the technical submissions are provided in Sections 5.3, 5.4 and 5.5 respectively.

5.2.2 Issue A – Noise – 24-hour Operation

This is a very quiet neck of the woods neighbouring some pristine areas of bushland. Mining activity and the partial crushing of the rock will severely affect the amenity of the local residents. A 24 hour a day operation will be intolerable for the local residents.

Submission No. 009 – Anonymous 3

I believe the 24 hour per day operation of the mining facility is totally unacceptable.

Submission No. 013 – Byrne

Cortona propose to hard rock mine 354,000 tonnes of ore and lo process this on site using two ball crushers operating 24/7 (2tlhrs,7 days a week)this amount of noise will not be acceptable being so close to the village of Majors Creel<. The compromise of limited above ground works to 12houd per day on Monday to Friday's and 6 hours on Saturday's for the first L2- months of full operational production is essential to gauge the extent of noise pollution and other effects that may endure upon our community. If the levels are found to be acceptable then the operational hour can be reviewed and permitted if needed.

Submission No. 023 – Harrex

Majors Creek is a particularly quiet spot and the amenity of the residents will be impacted by the noise from the crushing and milling on site. All processing should be soundproofed indoors and an alternative to truck reversing being should be found.

Submission No. 028 – Anonymous 4

A mine operating 24 hrs, 7 days a week in a quite rural area very close to the village of Majors Creek.

Submission No. 034 – Lemin

The Report predicts likely noise and vibration levels during mine establishment and subsequent 24/7 activities, including from blasting, machinery operation and vehicle movements. It is not clear however if the as needs use of the hydraulic rock breaker will include its night time operation. The transmission of sound and vibration through the air and ground strata, and the effects in and upon buildings are not easy to predict; this is presumably reflected in the range of locations nominated for monitoring. For houses closest to the mine in particular, levels of noise and vibration monitored throughout operations should include a frequency analysis, since this affects both transmission and the ear's response. ln addition there should be reliable published procedures for reporting, and for remedial action in case regulatory levels are exceeded.

Submission No. 045 – Sanderson

As we have been highly impacted for many days and nights during the aggressive exploration drilling (late January to and including May) at which point they were told to stop night drilling by the Dept. of Industry and Investment due to noise. We are greatly concerned the Project, mine and it's site establishment and Construction will have a more pronounced Environmental Noise impact. THEREFORE WE RECOMMEND DAY TIME HOURS ONLY.

Table 7
Submissions Received and Issues Raised

No	Respondant	Support/object	Issue																													
			A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA	AB	AC	AD	AE	AF
Public submissions																																		
001	Danny King	Support																																
002	John And Kate Spring	Concerned																																
003	Christine James	Support																																
004	Arno and Nel Stuzina	Object																						X										
005	Anonymous 1	Support																																
006	Martyn Phillips	Object										X													X									
007	Anonymous 2	Support																																
008	David Lever	Object										X										X												
009	Anonymous 3	Object	X							X								X					X											
010	Jane Ahlquist	Object	X							X	X							X	X					X										
011	David Anthony	Object	X	X		X		X	X	X		X		X	X							X	X		X	X	X							
012	Jeff Aschmann	Object										X																						
013	Janita Byrne	Object	X	X						X						X		X	X	X				X				X	X					
014	Robyn Clubb	Object					X					X		X			X							X	X		X			X				
015	Peter Cormick	Object																																
016	Phil & Lisa Cram	Object	X																X												X			
017	Matthew Dickinson	Object	X	X	X		X	X	X	X		X	X	X				X		X	X	X		X				X				X		
018	Will Douglas	Object										X	X						X					X										
019	Jennifer Edwards	Object										X	X											X	X									
020	Richard Fisher	Object																						X										
021	Joe Friend	Object											X																					
022	Andrew Gow and Antony Davies	Object				X				X									X															
023	Murray Harrex	Object	X									X																						
024	Frances Harrison	Object								X			X	X																				
025	Warren Harrison	Object	X								X			X					X		X													
026	Dominick ter Huurne	Object	X									X						X	X	X				X				X	X					
027	Peg Job	Object							X	X		X	X					X																
028	Anonymous 4	Obejct	X									X						X	X															
029	Cathy Owen	Object	X							X						X		X	X	X				X				X	X					
030	Simon Kaminskas	Object										X	X						X					X										
031	Sam Kidd	Object																X																
032	Sky Kidd	Object																																
033	Sophie Lee	Object	X							X						X		X	X	X				X				X	X					
034	Marjorie Lemin	Object	X							X									X											X				
035	Anonymous 5	Object																																
036	Philip Machin	Object					X			X												X		X							X			
037	Peter Malone	Object	X																X												X			
038	Angela Marshall	Object											X											X										
039	Maureen McAuliffe and Peter Gillespie	Object	X							X									X															
040	Marshall and Sandra McCarron	Object				X																												
041	Terence O'Brien	Object																						X		X					X			
042	Allan Perry	Object										X													X									
043	Cheryl and Don Raper	Object																X	X															
044	Donald William Robertson	Obejct			X		X			X				X					X															
045	Dr Brian and Dr Karis Sanderson	Object	X								X																			X	X			
046	Mark Selmes	Object											X																X					
047	Angelo Rossi	Object	X							X						X		X	X	X				X				X	X					
048	Bryan Sullivan	Object					X			X		X										X		X				X						
049	Dr Barry McGowan	Qualified Support																						X										
050	Jennifer Anne Tozer	Object												X										X										
051	Robin and Virginia Wallace-Crabbe	Object								X																								
052	Sarah & Gordon Waters	Object	X	X																		X						X			X			
053	David Watson	Object		X			X												X					X			X							
054	Jeff Wolford	Object	X																X	X				X				X			X		X	
055	Chris Kowal	Object		X			X					X						X				X			X		X				X			X
056	Randall Lemin	Object						X	X																									
057	AR Bradley	Support																																
058	Andrew Cairns	Support																																
059	Karen Cairns	Support																																
060	Ian Cargill	Support																																
061	John Dawe	Support																																
062	Fay Griggs	Support																																
063	Anne Homann	Support																																
064	Dr Lado Ruzicka and Professor Penny Kane Ruzicka	Support																																

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It should be a condition of the EA that they work day light hours only. DAY LIGHT HOURS ONLY this will eliminate NOISE, LIGHT, DUST and TRAFFIC impact at NIGHT giving the proponent mining and residents nil impact at night. Saving energy and water. I believe there is a precendnet set that the proponent was told to work day light hours only during exploration. Copies of letters from the Minister of mining and Dept of I&I attached.

Submission No. 054 – Wolford

NO ABOVE GROUND OPERATION it should be a condition of the EA that all operations should be conducted underground when the Portal is established; ie mill, crusher and all motors. This practice is common in the northern hemisphere.

Submission No. 054 – Wolford

The proposed 24 hour mine brings significant industrial activity to the area, one kilometre from the village proper. As Majors Creek is a rural-residential area, this appears inappropriate at best.

Submission No. 010 – Ahlquist

Response: Detailed responses to noise-related issues are provided in Sections 4.2.2. In addition, Section 2.2 identifies that the Proponent would, with the exception of a maximum of 20 days per year, reduce the proposed hours of crushing operations from 24-hours per day to 7:00am to 7:00pm.

The Proponent notes that noise assessment determined that the Project, as originally proposed, was likely to comply with all relevant noise assessment criteria. However, in light of the concern that this issue has generated within the community, the Proponent has elected to restrict crushing operations. Further restriction of the hours of operation of other components of the Project such as processing operations would not be feasible or would impact on the Project to the degree that the Project would no longer be economically viable.

In light of the above, the Proponent contends that the proposed measure identified in Section 2.2 would address the majority of concerns in relation to 24-hour operation of the Project. In relation to specific matters raised by respondents, the Proponent notes the following.

- Section 4.2.3.3 of the *Environmental Assessment* identifies that the minimum default background noise level of 30dB(A) was assumed during the noise assessment.
- Section 4.2.5 of the *Environmental Assessment* identifies that the crushing operations would be undertaken within a structure that would ensure a minimum 12dB(A) noise attenuation. Commitment 4.14 has been amended to ensure that all mobile equipment operating on the surface is fitted with frequency modulated reversing alarms.
- Construction of a processing plant underground would not be feasible.

5.2.3 Issue B – Noise – Operational Noise

I believe that if the locality surrounding the mine (any residence within a 5km radius of the subject site), has an existing ambient noise level below 30dB(A) between the hours of 7pm and 7am, that ANY increase in this level is totally unacceptable, and if the mine should operate under the proposal as set forth, I should have legal grounds to claim against the shareholders, directors, managing directors and all others concerned with Big Island Mining Pty Ltd (or as we know them Cortona), the local council (Palerang), the State Government or the Federal government.

Submission No. 013 – Byrne

All the noise studies are based on modelled and assumed data not real data.

What are the noise generation characteristics of the hydraulic rock breaker to be used to process oversize ore?

What noise attenuation measures are proposed to reduce the residential amenity impacts of this operation?

Why is there no discussion of the acoustic treatment of dwellings that may be adversely affected by noise?

A difference of 5 dB may occur within a 180 degree range in relation to the wind direction at the same distance from the site.

The noise assessment of the noise attenuation effects of the interaction of the prevailing winds and natural topography have not adequately been dealt with. These effects are significant given the location of the mine and the sites topography. These effects can often reduce the effectiveness of sound barriers and increase noise levels by 10dBA.

Submission No. 011 – Anthony

The mine will be too close to the settlement and although the EA does not reflect this, there is a strong possibility that it will cause noise problems for residents, particularly at night and particularly in winter when the inversion occurs which magnifies noise. There will be considerable vehicle noise due to truck movements on local roads. The residents were there first. Their needs must come before that of a development company.

Submission No. 053 – Watson

Response: As indicated in Section 4.2.3.1 of the *Environmental Assessment*, the noise assessment was undertaken in accordance with the *Industrial Noise Policy*. In addition, as indicated in Section 4.2.4, of the *Environmental Assessment* the noise assessment utilised RTA Software's *Environmental Noise Model*, a widely used noise model that has previously been accepted by DECCW as an appropriate method for estimating noise impacts associated with a proposed activity. This model takes into account the following.

- The location and anticipated sound power levels of equipment likely to be used within the Project Site.
- Surrounding topography.

- Climatic conditions that would be likely to enhance noise transmission. In the present case, three climatic conditions were assessed, namely
  - calm (neutral) conditions;
  - inversion (+4°/100m) conditions; and
  - north-northwest winds (3m/s).
- Location of surrounding residences.
- Two scenarios which have been conservatively established based on the concurrent operation of all equipment in the most exposed locations that they would be likely to be operated in.

As a result, the Proponent contends the methodology used to estimate the noise impacts associated with the Project is robust. In addition, Section 4.2.7 of the *Environmental Assessment* indicates that routine compliance monitoring would be undertaken initially quarterly to determine compliance with the relevant noise criteria. In addition, the Proponent anticipates that a condition of consent will require compliance noise monitoring on receipt of a noise-related complaint.

In relation to specific matters raised by respondents, the Proponent notes the following.

- The method for establishing background noise levels is established by the *Industrial Noise Policy* and the noise assessment has adopted the lowest or default background noise level, namely 30dB(A).
- Section 4.2.2 of the *Environmental Assessment* identifies attended noise monitoring that was undertaken.
- Section 4.2.5 of the *Environmental Assessment* identifies noise management and mitigation measures that would be implemented.
- Acoustic treatment of residences, if required, would be a matter for discussion between individual residents and the Proponent.

5.2.4 Issue C – Noise – Traffic Noise

The location of my home (R27) means that I hear the sound of trucks travelling up Wombat Hill on their way in to Braidwood. This noise has been occasional and not too intrusive although the use of exhaust brakes by trucks associated with the mine is excessive. The noise of large trucks removing the very heavy concentrate from the mine and then negotiating the intersection (proposed) with Majors Creek Road, the return of the same trucks, the movements of service vehicles, staff vehicles, industrial loading and dumping vehicles are going to increase the traffic noise substantially. The sheer number of traffic movements including large noisy trucks associated with the mine represents a radical change for not only me but the wider Majors Creek community.

Submission No. 017 – Dickinson

Response: Section 4.2.6.4 of the *Environmental Assessment* presents the results of the traffic noise assessment which indicates that anticipated road traffic noise at a point 20m from the road edge would be 10dB(A) lower than the relevant day time road traffic noise criteria. It is noted that Residence R27 is located approximately 1.7km southwest of the site access road intersection and that all heavy vehicle traffic would travel north from the Project Site, away from Residence R27.

Table 2.9 of the *Environmental Assessment* identifies that the Project would result in an average of 14 heavy vehicle movements and 4 bus movements per day during operation of the Project. Also, as committed to in Commitment 10.6, all Proponent-controlled vehicle movements would be limited to the hours of 7:00am to 6:00pm and would not result in disturbance to residents during the evening and at night when road traffic is most likely to adversely impact on residents amenity.

Notwithstanding the above, the Proponent would include in the Drivers Code of Conduct a requirement to minimise the use of engine breaks. Commitment 10.7 has been amended to reflect this commitment. In addition, the Proponent would approach Palerang Council with a view to erecting signs in appropriate locations requesting heavy vehicles to consider residents and limit noisy driving practices. Commitment 10.8 has been inserted to reflect this commitment.

5.2.5 Issue D – Blasting

Impact and vibration on buildings: we are currently restoring several historic buildings on our property, including a home and a 4 storey brick and stone flour mill. Both buildings have survived for 150 years with no sign of structural damage and we hope that provisions can be made to ensure that the buildings are not subject to damage from this proposal. We also hope that provisions will ensure that should any damage eventuate, restitution can be provided.

Submission No. 022 – Gow and Davies

Why haven't any of the following Best Practice Noise Management in Mining measures been discussed?

- *Reducing the maximum instantaneous charge (MIC).*
- *Altering the blast drilling pattern and delay layout.*
- *Using the minimum sub-drilling possible.*
- *Using alternative rock breaking techniques.*
- *Blasting at times that suit local conditions. (This is a critical action given the almost silent nigh time acoustic amenity of the locale).*
- *Conduct blasts at a set time or use a pre-warning system.*
- *Implementing an effective monitoring and community liaison program.*

Submission No. 011 – Anthony

Response: Section 4.2.3.6 of the *Environmental Assessment* identifies the blasting assessment criteria that the Proponent anticipates will be required for the Project. Section 4.2.6.5 of the *Environmental Assessment* identifies that, based on a Maximum Instantaneous Charge (MIC) of 105kg, air blast overpressure levels would be less than or equal to the relevant 95% criteria at the closest residence, while the ground vibration levels would be one-tenth of the relevant 95% criteria. In addition, it is noted that these criteria are established based on human comfort, not structural damage. Similarly, Section 4.2.7.1 of this document identifies that the same applies to an underground blast with an MIC of 150kg. Structural damage criteria, even for historic buildings, are significantly higher than the human comfort criteria. As a result, the Proponent does not anticipate that blasting operations would result in structural damage of buildings surrounding the Project Site.

5.2.6 Issue E – Ecology – Project-related Impacts

There are a number of wombats in the mining area of operations. Whilst they are described as ?common wombats?, and they are not endangered, nobody knows how many exist, as the NSW research has not been done. Table 5.1 provides a draft Statement of Commitments. It is noted at 5.6 with regard to wombat habitat, that effort will be made to undertake ?ground disturbance? a few days before and then inspect all (wombat) burrows to ensure they have vacated the proposed area of disturbance. It is likely that this approach will take considerably longer than a few days and one wonders where the animals will go. Perhaps development can be staged and the area avoided initially during construction to allow the animals to move away over several months. And what about other native animals? Will they be ?relocated? too? The suggestion that native animals (in this case wombats only) will be saved is commendable, but the approach is not convincing.

Submission No. 036 – Machin

There is no assessment beyond the mine site, of the impact of a reduction in water flows on native vegetation, and the subsequent impact on native bee population.

Submission No. 014 – Clubb

Also, there are significant concerns about the initial and on-going disturbances to wildlife habitats, in and around the site. I am requesting a more thorough investigation of the mine's impact upon such habitats, adjoining nature reserves and the national park, not just at the footprint fringes, but well beyond, to corridors and migratory locations and habitats which may be under additional threat.

Submission No. 044 – Robertson

That Cortona pay for independent flora and fauna studies of the Major's Creek National Park Reserve, to document the endangered and critically endangered species at risk; or if not, that we be given a year to commission such studies. (The year is necessary as some of the endangered bird species are migratory, and the powerful owl can only be reliably recorded during late winter when its call can be heard. The grey-headed flying fox is also seen only towards the end of summer.)

Submission No. 048 – Sullivan

Response: As indicated in Section 4.3.3.1 of the *Environmental Assessment*, the ecology assessment was undertaken in accordance with the following guidelines.

- *Threatened Biodiversity Survey and Assessment: Guidelines for Development and Activities (Working draft),* prepared by the Department of Environment and Conservation (2004).
- *Draft Guidelines for Threatened Species Assessment* prepared by the (then) Department of Environment and Conservation and Department of Primary Industries (2005).

In addition, the Proponent notes that Project-related ground disturbance would be limited to relatively small sections of the Project Site. With the exception of limited road works along Majors Creek Road, no ground disturbing activities would be undertaken outside the Project Site. In addition, as indicated in Sections 4.4.5 and 4.5.6, of the *Environmental Assessment* groundwater and surface water impacts have been assessed and no significant Project-related impacts are expected downstream of the Project Site (see Sections 5.2.8 to 5.2.14 for further discussion of this point). Finally, as identified in Section 4.2.6, noise, dust and lighting impacts are not considered to be significant for surrounding flora and fauna.

As a result, the Proponent contends the following.

- The ecology assessment adequately assesses the likely ecology-related impacts associated with the Project;
- There is no requirement to further assess ecology-related impacts outside the Project Site as the potential for off-site impacts is minimal;
- There is no requirement to undertake further assessments over a longer period of time because:
  - information for the ecology assessment was drawn from work undertaken between 2007 and 2010, as well as anecdotal evidence over a longer period; and
  - all listed species with the potential to occur within or surrounding the Project Site have been assumed to be present and assessed based on their habitat preference , whether observed or otherwise,
- As the ecology assessment took the precautionary principle into account, namely, if habitat for a particular threatened species is present within the Project Site, the species was assumed to be present, there is no requirement for a longer survey period.

In relation to specific matters raised by respondents, the Proponent notes the following.

- Commitment 5.6 identifies that a management plan would be prepared in consultation with relevant experts and the surrounding community to ensure that wombats (and other species) within the proposed area of disturbance are not harmed during site establishment operations. The detailed procedures for ensuring that this occurred would be included in that management plan.

- Potential impacts (including downstream impacts) associated with reduced water flow in Majors Creek are addressed in Sections 5.2.11 and 5.2.12.

5.2.7 Issue F – Ecologically Sustainable Development

There is no discussion of adaptive management in the proponents environmental assessment - Many of the most critical issues such as noise and water could be easily ameliorated by scaling back production to a sustainable rate including restrictions on night time noise generation. The rate and scale of production should be determined by the amount of Harvestable Right water available (including provisions for environmental flows because of groundwater gradient reversal resulting from mine dewatering). In calculating the adequacy of this supply, due consideration should also be given to the possible impacts of climate change. Any higher rate of production (and thus unsustainable use of water) would be inconsistent with Ecological Sustainable Development criteria as required under law.

Submission No. 011 – Anthony

Response: A detailed discussion of Ecologically Sustainable Development is included in Section 6.1.2 of the *Environmental Assessment*.

In addition, the contention that Project-related impacts may be reduced through a lower rate of production is not correct. While there may be some limited noise-related benefits, the area of disturbance would remain the same and the duration of impacts, including impacts on groundwater discharge, merely extended over a longer period. Also, the potential noise-related impacts that may result through a lower rate of production would be likely to be similar to the anticipated reduction in the noise-related impacts associated with the Proponent's commitment to limit crushing and screening operations to 7:00am to 10:00pm (see Section 2.2.2).

Finally, Sections 4.8.5 and 5.2.26 provide additional information in relation to rainfall and climate change.

5.2.8 Issue G – Water – Accuracy of the Groundwater Model

Many of the specialist investigations contained in the environmental assessment (EA) for this proposal, especially the groundwater modelling which is underpinned by highly subjective assumptions and is used to construct the groundwater draw down gradients, cannot claim as the proponent does in the assessment, to contain a high degree of certainty. This high degree of uncertainty could be of easily remedied by undertaking the various analyses with real data based inputs into statistically robust time series as opposed to uncertain modelled data contained in the assessment.

Leakage from the Alluvial Aquifers i.e. "seepage from the alluvium to the mine or shafts where the groundwater flow gradient has been reversed... is embargoed water"(3-54 Report 752105) The hydrological impact on Majors Creek due to mining related activities constitutes an unlicensed extraction of embargoed water . This leakage has been grossly understated and only superficially modelled and as more water will be required from the dewatering of old mine workings to supply for operational and environmental flows it is likely to increase.

Will the cone of drawdown and extent of depressurisation of the granodiorite and regolith aquifers extend to the Araluen escarpment and the town ship of Majors Creek if more operational and environmental flow water is required to be extracted from old mine workings? If only 64,700m of waste rock, a small proportion of the estimated total of 510,375m that is expected to be generated by the project, is to be used for stope backfilling there will be a huge underground void that will have major impacts on groundwater behaviour in the area for many years after the mining operations have ceased. Can these impacts be fully explained and clarified and with what certainty?

Given that the groundwater modelling used contains "numerous qualitative and subjective interpretations" what degree of confidence can be had in the outputs generated by the model especially considering the high degree of uncertainty associated with the modelling and the potential implications and impacts of the modelled results?

This radical uncertainty could easily be reduced through collection of real data this should be done in a way that produces a statistically robust time series of observations and the model recalibrated accordingly.

No long term monitoring has been undertaken as a basis for the modelling contained in the EA. Only a one off steady state calibration was undertaken with the assumption that the water levels in the bores selected for steady state calibration were representative of the long term average (steady state) groundwater levels.

Submission No. 011 – Anthony

Response: The Proponent acknowledges the extent of concern in relation to potential groundwater impacts associated with the Project. In relation to the groundwater assessment, the Proponent notes the following.

- The groundwater assessment was prepared by Australasian Groundwater and Environmental Consultants and was overseen by Mr Errol Briese. Mr Briese has over 34 years of experience as a highly respected hydrologist who has worked on over 90 mining-related projects.
- The groundwater assessment was undertaken using the MODFLOW code, a numerical modelling code that is the most widely used groundwater modelling methodology and is currently considered industry standard.
- The groundwater model covered an area of 6km by 7km, centred on the proposed Dargues Reef Mine.
- The model was calibrated using 35 existing exploration drill holes and 8 purpose-drilled monitoring bores within the Project Site and was calibrated to ensure that it could accurately reproduce the existing observed groundwater environment.
- Wherever practicable, the groundwater model incorporated conservative assumptions. As a result, the anticipated groundwater impacts determined by the model may be considered to be maximum likely impacts.
- Commitment 5.6 identifies that the groundwater model would be reviewed within two years of the commencement of mining operations to incorporate further long-term groundwater monitoring and to further refine the model.

Notwithstanding the above, the Proponent undertook a peer review of the groundwater assessment. That review was undertaken by Aquaterra and determined that the data analysis and model conceptualisation, design, software and calibration are broadly consistent with standard industry practice.

5.2.9 Issue H – Water – Extent of Groundwater Impacts

The cone of groundwater drawdown is currently estimated at 1m within 500m of the escarpment - where is the drawdown zero in relation to the escarpment?

Will the cone of drawdown and extent of depressurisation of the granodiorite and regolith aquifers extend to the Araluen escarpment and the town ship of Majors Creek if more operational and environmental flow water is required to be extracted from old mine workings?

Submission No. 011 – Anthony

The research so far conducted relates only to 42 square km in Majors Ck itself, with vague assurances that there will be no effect downstream (apart from asserting that the groundwater will 'recover' within 2 years').

Submission No. 027 – Job

To suggest that the removal of circa 66.2 megalitres of water from surface and underground tables (at depths of 1 to 10 metres), will have minimal or acceptable impact on the quantity and quality of the Majors Creek catchment is absurd. Also, to suggest that this impact will be limited to the adjacent aquifer cannot be taken as correct and should be tested. Whenever mining disturbs the immediate and fragile water table and feed-flow systems, such impacts invariably impact negatively upon surface and underground catchments well beyond the operational footprints. In this case, there must be detailed consideration given to this impact. There must be a complete study of the water table to the 10 kilometre radius points to assess the long term environmental impacts of such large scale water capture.

Submission No. 044 – Robertson

A further Environmental Assessment be requested, with a hydrological report and study of six kilometres downstream from the proposed mine, with particular attention to the region six kilometres from the proposed mine site.

Submission No. 048 – Sullivan

When do the drawdown impacts on spring creek finally recover after the five years post mining?

Submission No. 011 – Anthony

More testing should be done to make sure the Araluen aquifers are not affected, even with the most catastrophic natural event – such as flooding or seismic activity.

Submission No. 009 – Anonymous 3

Impact on groundwater: drinking water for ourselves and our animals is drawn from groundwater, which has serviced this property for the past 150 years. Provisions must be made to protect all local groundwater supplies and to provide restitution should the worst case scenario be born out and supplies are affected.

Submission No. 022 – Gow and Davies

Effect on the water table and hence the future livelihood of farmers and residents to the area.

Submission No. 034 – Lemin

Response: A number of respondents raise concerns in relation to the extents or out limits of the anticipated groundwater impacts. Figure 4.26 of the *Environmental Assessment* and Appendix 6 of the Groundwater Assessment (Part 3 of the *Specialist Consultant Studies Compendium*) provide an overview of the anticipated extent of groundwater impacts during the life of the Project. As identified in Section 5.2.8, the groundwater assessment was prepared by a highly experienced hydrologist using industry standard modelling methodology and conservative assumptions. In addition, that assessment has been peer reviewed by a similarly qualified and experienced independent hydrologist who determined that the data analysis and model conceptualisation, design, software and calibration are broadly consistent with standard industry practice. As a result, the extent of groundwater impacts shown in those figures is considered to represent the maximum anticipated groundwater impacts that would be likely to occur.

In relation to specific matters raised in submissions, the Proponent notes the following.

- The 1m drawdown contour was used to determine the limit of Project-related impacts as natural variability in groundwater levels is typically around 1m. Where Project-related impacts are less than 1m, they cannot be distinguished from natural variation in groundwater levels.

- The relationship between the anticipated groundwater levels at the end of mining operations and the Araluen Valley Escarpment is presented in Section 5.2.12.

- The area of the groundwater model is determined based on the extent of impacts. Where the extent of groundwater impacts approach the model boundaries, the model is expanded and re-run to ensure that the area of anticipated impacts is fully contained within the model boundaries. There is, therefore, no benefit extending the model to some arbitrary distance from the proposed Dargues Reef Mine because the extents of the impacts are dependent on assumptions used to create the model, not the boundaries of the model. In addition, extending the model would not alter the results of the assessment and would merely increase the models complexity, potentially reducing the reliability of the results.

- The Proponent acknowledges that the information presented in Table 4.20 of the *Environmental Assessment* indicates that base flow in Spring Creek would not recover within five years of the completion of dewatering operations. This issue is addressed in detail in the separate response to the submission from NOW. However, in summary, AGE indicate that base flows within Spring Creek are

expected to recover within approximately 8 years following the completion of mining operations. However, AGE note that the flows are so low they are within the limitations of the model.

- Commitment 6.1 identifies that the Proponent would undertake consultation with the owners of bores that are predicted to be adversely impacted by the Project to ensure that those impacts are adequately mitigated or the owners compensated. Options include deepening or redrilling and re-equipping the existing bores or providing additional water from another source to compensate for the reduced groundwater supply. The Proponent would extend this commitment to include owners of other existing bores or users of springs where an independent hydrologist has determined that reduced groundwater levels are the result of the Project. Commitment 6.1 has been amended to reflect this commitment.

5.2.10 Issue I – Water - Impacts on Majors Creek Water Supply

There are people in Majors Creek who rely upon water pumped from springs, from the Creek and from bore water. The Araluen Valley (next to Majors Creek and downstream) is a major stone-fruit growing district and requires bore water.

Submission No. 010 – Ahlquist

Response: Section 4.4.5.8 of the *Environmental Assessment* identifies that Majors Creek is upstream of all anticipated Project-related surface water and groundwater-related impacts. As a result, no adverse impacts on the water supply of residents within Majors Creek is anticipated.

5.2.11 Issue J – Water - Impact on Downstream Water Users

My major concerns therefore are of the effects that the proposed mine will have on the catchment and thus the Deua River and what specific safety arrangements will be provided to guarantee that there will be no adverse effects.

Submission No. 006 – Phillips

There are numerous riparian users downstream of the site who use the Deua as a potable water supply. What does the proponent propose to safeguard these users from a major pollution event?

My property is located immediately downstream of the proponents landholdings and therefore is the property most likely affected by water pollution and/or reduced flows. I would like to know how Cortona, it's subsidiaries and contractors will recompense me for loss of what has up until now been a very reliable water supply?

I have one spring fed creek on my property (unnamed) and one other spring that is 100m up from the bridge on Majors Creek Road. both of these springs are locally known to be very reliable water sources, the former supplying 2 households with domestic and stock water.

Any changes to the flow patterns of either of these springs will have a profound effect on the value of my property and the lifestyles of my neighbours' who use that water. What does Cortona Resources or it's subsidiary, Big Island Mining propose to do to compensate me or my neighbour's for loss of what has until now been a reliable water supply and any consequent depreciation in land value?

Furthermore, the EA states that the project will augment surface flows with accumulated water drawn from previous mine workings should this become necessary. The quality of this water needs to be assessed prior to considering its use on the surface. Groundwater is typically cold and deoxygenated, its introduction into a surface water stream will have a negative impact until it has become oxygenated and its temperature has been raised to that of the receiving waters assuming it is not carrying a heavy metal burden in solution or any other pollutants for that matter.

The cone of groundwater drawdown is currently estimated at 1m within 500m of the escarpment. This means that groundwater drawdown of 1m will occur on my property. The result of this will be a complete drying of Majors Creek on my property. The proponent suggests they will add water from various sources to replace the water lost to the mine and they will do this outside the cone of drawdown. This would mean that the creek on my property will be dry for the life of the mine and at least 5 years after. The proponent has not contacted me regarding this matter. The EA states that they will seek an arrangement with landholders affected in this way. I am an aquatic ecologist by professional qualification and the natural waterway on my property is the principal reason I purchased the property.

The proposed project relies heavily on the use of groundwater extracted from old workings and dewatering of the proposed mine itself. Table 5 sec 3.32 reproduces water quality data that was measured from groundwater at the site. The method used to obtain the samples appears to comply with accepted monitoring standards. However, the water quality itself is of concern. The water in 2 samples appears to be basic and in one case extremely basic. This water with a pH value of 12.2 would be toxic to aquatic organisms and highly corrosive. The EC of the groundwater is consistently above ANZECC 2000 guidelines and would appear to be highly saline. The nutrients Nitrate and Phosphorus generally exceed the ANZECC guidelines and if that water was introduced at surface would result in further eutrophication of receiving waters. The Water quality objectives for the Moruya River are quoted in the EA and yet the groundwater they are proposing to use to replenish lost water from Majors Creek has significantly higher concentrations of Nitrogen and Phosphorus than is required under those same objectives for upland rivers. This is unacceptable and I would like to know how the proponent will address it? Furthermore, Chromium and Zinc exceed the ANZECC guidelines and use of the water for the purpose intended would be a knowing pollution of the receiving waters.

Submission No. 017 – Dickinson

Another deep concern is the proposed extraction of groundwater for mining use, how will this effect our residents and water users further downstream? Surely this will have to be monitored to reduce over extraction.

Submission No. 023 – Harrex

No investigation has been made of the impact of the proposed mine on the flora, fauna or orchard and market garden businesses directly downstream, even though investigation has been made of the areas that are least likely to be affected by the mine.

Cortona has repeatedly ignored professional hydrological assessments of the possible impact of the mine on the Araluen valley, and has not included that material in its assessment.

Submission No. 048 – Sullivan

Environmental Flows

As it stands, the Environmental flow regime proposed in the EA to ameliorate the reverse gradient effects on the embargoed alluvial aquifer of Majors Creek would result in the serious pollution of Majors Creek and the Araluen, Deua and Moruya River Systems. Section 2, Description of Project (2-45) states that:

"The Proponent would ensure, where practicable that the water released conforms to water quality criteria."

This statement reflects the fact that the harvestable right dams do not have the capacity to adequately supply environmental flow requirements and that polluted old mine water would have to be used (Harvestable Right 38ML stated environmental flows 66.2ML). The quality of the old mine water fails both the conservative ANZECC, 2000 water quality standard for aquatic ecosystems and the Moruya River Water Quality Objectives. Some of the allowable parameters for particular indicators are exceeded by more than 300%.

Submission No. 011 – Anthony

Further testing and study into the possibility of contamination of the Araluen (Upper Duea Catchment) water supply should be completed.

Submission No. 028 – Anonymous 4

I am not satisfied with the assessment and undertakings noted in the application re: security of water quality.

A condition under our water licences is that as licensees, 'we shall not allow any tail water/drainage to discharge from our property into or onto, inter alia, any river, creek or watercourse or any groundwater aquifer, nor any native vegetation as described under the Native Vegetation Conservation Act 1997. These are understandable and completely reasonable conditions applying to us as the licensees. Will these same conditions apply to Big lsland? lf not, why not?

Submission No. 014 – Clubb

High risk of water contamination. The EA does not sufficiently demonstrate how it will safeguard the Araluen and Upper Deua water quality and supply.

High risk sediment basins - are based on 100 yr rain events - which does not address the recent impacts on weather associated with climate change in the Southern Tablelands. Parts of the catchment experienced a 100-year flood event twice last year. The impact of this will be catastrophic.

Submission No. 055 – Kowal

The assumptions made in Table 10 Sec 6.2.6, are not based on any factual information. The project is assumed to have a beneficial effect on the creek because of the change of landuse from agriculture (light grazing) to mining. That assumption is not supported with any evidence. Furthermore, the turbidity and TSS parameters are stated as being beneficially effected up to design parameters. I believe the design criteria are insufficient given the catastrophic effects of failure. How do the proponents state a neutral effect on water quality when they do not provide water quality data?

They repeatedly assert that there will be a reduction in pollutants assuming all surface water management options are not only implemented, but function as intended and are maintained. Furthermore, the 1 in 100 year design criteria is insufficient given the effect of failure of the surface water management infrastructure. Current thinking regarding Climate Change is that SE Australia will experience generally less rainfall and more extreme weather events. I therefore suggest that a 1 in 500 year design criteria be adopted to manage the risk to downstream water users and the natural ecology of a High conservation Value Aquatic Ecosystem.

I am particularly concerned about the ecology and health of Majors Creek and Araluen Creek. The Deua River will receive all waters discharged from the proposed mine. The proponents' consultant was apparently confused regarding naming of waterways. The Moruya River ceases to be known as the Moruya R. at its tidal limit and is known as the Deua above that point. Majors Creek has been subject to severe degradation and sedimentation associated with mining and land degradation attributable to agriculture. There is a major "sand slug" choking the Deua R in its lower reaches. The proposed project may well significantly add to this. The EA casually suggests that if they do make it they will remove it. That is ridiculous. Dredging rivers is challenging in tidal areas but in steep inaccessible country it is next to impossible and certainly not possible without causing rnore harm. This would be the case should additional sedimentation occur under this proposal which seems likely.

Submission No. 017 – Dickinson

Response: Respondents raised a number of issues in relation to adverse impacts on downstream users of groundwater and surface water, particularly in the vicinity of the Araluen Creek and Deua River. Perceived direct groundwater-related impacts associated with the Project are specifically addressed in Section 5.2.12. This sub-section principally focuses on perceived adverse surface water-related impacts, particularly reduced quality or quantity of surface water available for downstream water users. Impacts associated with tailings and tailings management are addressed in Sections 5.2.24 and 5.2.25.

In relation to the potential for discharge of sediment or chemical-laden surface water and resulting adverse impacts on water quality downstream of the Project Site, the Proponent notes the following.

- As identified in Section 2.1.3 of the *Environmental Assessment*, the Proponent anticipates that an *Environmental Protection Licence* would be required for the Project. That licence would regulate the quality of all water to be discharged to natural drainage.

- As identified in Commitment 7.10, clean water would be diverted away from all disturbed sections of the Project Site.
- As identified in Commitments7.1 and 7.3 to 7.9, potentially sediment-laden water would be managed in accordance with a *Surface Water, Sediment and Erosion Control Management Plan.* Specifically, surface water within all disturbed sections of the Project Site that are not within the Contaminated Water Management Area would be directed to appropriately designed, constructed and managed sediment basins and water would only be discharged from those basins in accordance with the Project's Environment Protection Licence.
- As identified in Section 4.2.1.3 and Commitment 7.21, the Proponent would ensure all potentially contaminated surface water would be contained within an appropriately bunded Contaminated Water Management Area. That water would not be permitted to flow to natural drainage and would be pumped to the Process Water Tank for use within the processing plant. No water within the Contaminated Water Management Area would be permitted to flow to natural drainage.
- Section 4.5.6 of the *Environmental Assessment* identifies that the Project, through implementation of the identified management and mitigation measures would actually result in improved quality of surface water discharged from the Project Site and that the Project would contribute to the achievement of the Moruya River water quality objectives.

Water that would be released as part of the environmental flows program would be principally sourced from the harvestable rights dams. The catchments for these dams would be undisturbed sections of the Project Site and surrounding lands. As a result, the quality of water that would be discharged during this program would be of the same quality as water that currently flows to natural drainage. As indicated in Section 5.2.34, the Proponent anticipates that it will be required under to the conditions of any project approval that may be issued to comply with the water quality criteria identified by:

- ANZECC (2000) for upland rivers in south-east Australia (as identified in Section 2.10.2.6 of the *Environmental Assessment*); and
- The *Moruya River Water Quality and River Flow Objectives.*
- This issue is discussed further in Section 4.6 of this document.

It is noted, however, that the surface water assessment determined based on 100 years of daily rainfall records, the proposed maximum rate of release of 66.2ML/year and a range of conservative assumptions, that water for the environmental release program would be required to be drawn from alternative sources for a total of 3% of all days modelled (see Section 4.5.5.6 of the *Environmental Assessment*). Further assessment and modelling presented in Section 4.8.5 of this document suggests similar water availability based on 100 years and 40 years of data respectively to 2009. In that instance, when water is not available within the harvestable rights dams, the Proponent proposes to source groundwater from the historic Snobs, United Miners or Stuart and Merton's workings for the compensatory flow program. It is noted that the proposed compensatory flow program is designed to compensate for reduced

groundwater discharge to Majors and Spring Creeks. As a result, the Proponent contends that release of groundwater is an appropriate measure when alternative water sources are not available. This issue is further discussed in Section 4.6 of this document.

In relation to the potential for reduced surface water flows downstream of the Project Site, the Proponent notes the following.

- The groundwater assessment concluded that the Project would result in reduced groundwater discharge to Majors and Spring Creeks of up to 66.2ML/year. As indicated in Section 2.10.2.6 of the *Environmental Assessment*, the Proponent would release an equivalent volume of water to Majors Creek. As a result there would be no net loss of flows within Majors or Araluen Creeks or the Deua River.
- The Proponent proposes to construct eight surface water dams within the Project Site. These dams would be constructed under the Proponent's existing harvestable right under Section 53 of the *Water Management Act 2000*. As a result, there would be no reduction in surface water flows in Spring, Majors or Araluen Creeks or the Deua River, beyond what is currently permitted under existing legislation.

It is noted that the Project is located in the uppermost section of the Moruya Catchment, that the Project Site comprises approximately 0.3% the catchment area and that the Project would represent a single, highly regulated operation in a catchment with numerous agricultural and other operations, all of which have the potential to adversely impact on water users downstream of the Project Site. Finally, it is also noted that the Project would not result in cumulative water quality impacts because there is no other significant industry, with the exception of agriculture, in the vicinity of the Project Site.

As a result, the Proponent contends that the Project would not result in significant adverse surface water quality or quantity impacts for water users downstream of the Project Site.

In relation to specific matters raised by respondents, the Proponent notes the following.

- Sections 4.4.6 and 4.5.7 of the *Environmental Assessment* identify the groundwater and surface water monitoring that would be undertaken during the life of the Project. The Proponent contends that the proposed monitoring program would rapidly identify any water-related pollution or contamination issue that may arise, allowing the Proponent, in consultation with the relevant government agencies, affected water users and the surrounding community to respond to the issue before significant environmental damage is caused.
- Commitment 6.1 has been amended to indicate that the Proponent would monitor springs used by surrounding residents and implement appropriate measures should an independent hydrologist determine that any reduced water supply is Project-related.
- No professional hydrogeological advice has been provided to the Proponent prior to finalising the *Environmental Assessment* indicating that the Project would have adverse impacts on groundwater in the Araluen valley.

- The Proponent anticipates that all potential points of surface water discharge will be required to be licenced under the Environment Protection Licence that would be required for the Project.
- The assessment referred to in Section 6.2.6 of the *Surface Water Assessment* are based on the results of MUSIC modelling detailed in Section 6.2.5 of that document.
- Section 4.5.4 of the *Environmental Assessment* identifies that the surface water management structures would be constructed in accordance with the requirements of the relevant 'Blue Book' standards. Those standards take into account relevant annual recurrence interval rainfall events.

5.2.12 Issue K – Water – Impacts on Groundwater Dependent Ecosystems

The 'groundwater draw-down' slopes of the 'gorge' and Araluen Valley, with its steep sides just outside the area of chosen/select interest appears to have IN NO WAY, shape or form to have been considered in this matter; there is KNOWN TO BE a severe draw-down of rock and regolith water in the sorts of rocks KNOWN to occur to the east and southeast of the proposed mining area (ref: Geoscience Australia, Canberra); it would appear that the likelihood of all the creeks downstream of the mine 'drying-up' or staying dry ('no flow') even in a mild-dry season is very high, as I have experienced similar streams running/falling-east, and drying-up completely (for years) in the recently ended 11 year drought; Climbing Galaxiid fish species used to live in the stream running-out of the proposed mining area; they will need water IF they are to return from where they are now v.restircted in two or three known tributaries of the Deua River.

Submission No. 021 – Friend

I believe this proposed mine presents a massive and unacceptable risk to the general health and water quality of the Deua River ecosystem, upon which much native flora and fauna, as well as riverside residents, rely on. This fauna includes the Australian Grayling (Prototroctes maraena) which is listed as Vulnerable under the Commonwealth Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act) and is listed as a protected fish in New South Wales under the Fisheries Management Act 1994.

The Deua River naturally experiences low flows in summer, and has also suffered severely from the exceptional drought in the south-east NSW for the last 4 years. Fish kills have already occurred in sections of the Deua River due to extreme drought conditions of the last four 4 years. I consider any proposal which leads to reductions in surface flows and groundwater inflows into the Deua River to be unacceptable as it will exacerbate summer low conditions and the extremes of drought.

Submission No. 030 – Kaminskas

Response: Respondents raised a number of issues in relation to adverse impacts on groundwater dependent ecosystems (GDEs). Section 4.4.5.6 of the *Environmental Assessment* identifies that no GDEs exist within the Project Site as a result of historic alluvial mining operations. As a result, the only GDEs with the potential to be impacted by the Project are those downstream of the Project Site.

Potential impacts on downstream GDEs may arise as a result of reduced surface water flows resulting from reduced groundwater discharge to Majors, and Araluen Creeks and the Deua River. That issue has been addressed in Section 5.2.11. Alternatively, GDEs may be adversely impacted either directly by reduced groundwater discharge at springs or by reduced surface water flows in tributaries to Majors or Araluen Creeks or the Deua River due to reduced groundwater discharges.

As identified in Section 5.2.8 and 5.2.9, the groundwater assessment determined that the extent of groundwater related impacts is limited to the area indicated on Figure 4.26 of the *Environmental Assessment.* As the Proponent is not aware of any groundwater dependent ecosystems within the anticipated extent of groundwater impacts, or springs that may support such ecosystems, the likelihood of such impacts in considered to be remote.

It is noted that the majority of the respondents would appear to be principally concerned with potential impacts on GDEs within the Majors Creek Falls Reserve or further downstream. **Figure 7** presents the simulated piezometric drawdown presented on Figure 4.26 of the *Environmental Assessment* in section, together with the topography from the Project Site to the village of Araluen. It is noted that the extent of the anticipated groundwater drawdown does not impact on the Araluen escarpment or potential springs or GDEs on or downstream of that escarpment.

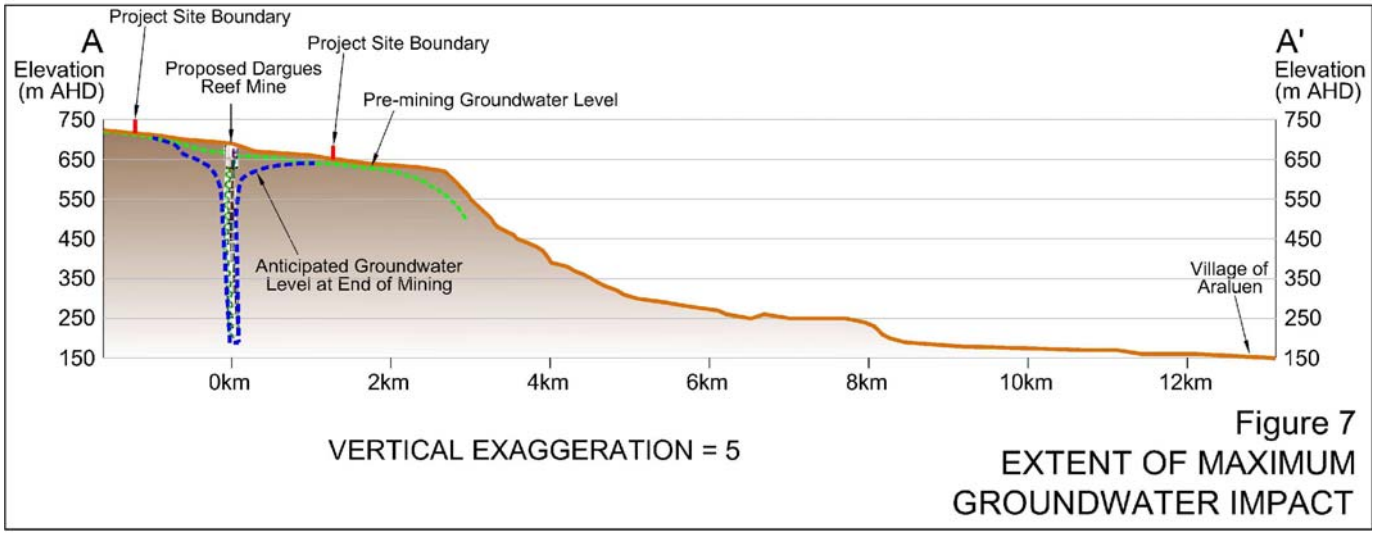

Figure 7
EXTENT OF MAXIMUM GROUNDWATER IMPACT

In relation to specific matters raised by respondents, the Proponent notes the following.

- Section 4.4.5.4 of the *Environmental Assessment* indicates that the modelled existing base flow of or groundwater discharge to Majors Creek is approximately 3.5L/sec. That modelling indicates that at most, the Project would result in a reduction of groundwater discharge of approximately 1.7L/sec, resulting in continued discharge of approximately 1.8L/s. As a result, Majors Creek would not completely dry up. In addition, the proposed compensatory flow program would replace any lost flows downstream of the proposed extent of impacts.
- Issues in relation to the quality of water to be released as part of the compensatory flow program are addressed in Section 5.2.11 and 4.6.

5.2.13 Issue L – Water – Accuracy of the Water Balance and Use of Data

Total water budget calculations

Can the proponent explain why two conflicting amounts have been used in regard to the annual quantity of water required? (EA2.2.5 "the Project would require 870ML per year for mining related purposes" and in 752/04 2-46 "the maximum project related water requirement would be 215ML".)

Though there is much discussion of water recycling (98ML per annum has been estimated as recoverable water and subtracted from the estimates of total water usage) there is no mention of where and how much start up/ original water would be required to initiate the recycling process or indeed where this water would come from. Can this be clarified and explained?

Not only have the impacts of using polluted old mine water for environmental flows been totally ignored in the EA, but also the full magnitude of their use left open ended. The ability of the harvestable right dams to supply environmental flows is one of the critical determinants concerning how much polluted old mine water will be used for environmental flows. The capacity of these HR dams has been overestimated through selective and erroneous use of rainfall data as well as reliance on inherently uncertain theoretical modelling to calculate the actual amount of the reversed groundwater gradient compensatory environmental flows.

Distorted use rainfall data used as basis for calculation of the ability of harvestable right dams to supply environmental flows

The EA uses Braidwood Rainfall Data and states that in 1981 (665mm), the worst year in their 100 year record, that the harvestable right dams would run dry for 182 days (SEEC 4-25). Since 2002 the rainfall data they have ignored included six years out of seven where the rainfall was equal to or considerably lower than the worst year they quote (1981).

2002 434, 2003 647, 2004 539, 2005 666, 2006 474, 2007 806, 2008 602, 2009 438

The average rainfall for the 2002-2009 period is 575mm. The average for the whole period that the weather station has been in operation 1887-2010 is 717mm. This is lower than the 728mm for their selected 100 year period. This means the dams would run dry for longer periods of time and that more polluted water for environmental flows would have to be pumped from the old mines. The additional volume that they pump out will have to be compensated by additional environmental flows because of the reverse groundwater gradient would increase. Their figures also fail to factor in known changes to rainfall attributed to Climate Change (a reduction of 40-50mm in rainfall over the last 4 decades).

Submission No. 011 – Anthony

4.4.5.6 Explains the amount of water collected in harvestable dams has been calculated on the basis of 100 years of rainfall, despite the fact that the last 30 years have been extremely dry, causing drought, reduction of the watertable and significant reduction of dam water throughout the area. Some gullies of tree ferns having flourished for hundreds of years have died in that time.

Submission No. 024 – Harrison

My main concern is the need for a water resource in projected work at the site. The past two decades have resulted in a spiral down of the water table in the district. What was a permanent spring on my property dried up in the late 1980s. This situation is a familiar one in the area. Considering the questionable that recycled water, as claimed by the mining company Cortona will be an adequate resource. Or will the already threatened water table be in further jeopardy? Have the residents who have sunk bores at their own expense been considered.

Submission No. 050 – Tozer

Response: The principal issue raised by respondents is the use of rainfall data from Braidwood for the period 1903 to 2002. That issue has been addressed in Section 4.8.

In relation to specific matters raised by respondents, the Proponent notes the following.

- The volumes of water referred to in Submission 011 relate to the total volume of water that would be required by the Project at the proposed maximum rate of production. However, as indicated in Section 2.10.2.6 of the *Environmental Assessment*, of the proposed total required volume of 885ML/year for processing operations, approximately 755ML/year would be recycled, requiring a further 130ML/year of "new" or makeup water. A further approximately 18.4ML/year of water would be required for dust suppression, with a maximum of approximately 66.2ML required for the compensatory flow program. As a result, the maximum make up water requirement would be approximately 214.6ML/year.

- In relation to start up water, Table 2.3 of the *Environmental Assessment* identifies that the Project would slowly build up to the proposed maximum production rate. As a result, water requirements during the early phase of the Project would be significantly less than those later in the Project. In addition, Section 4.4.5.1 of the *Environmental Assessment* indicates that initial groundwater inflows to the

proposed mine are likely to be significantly higher than the conservative estimate of 4L/sec, resulting in more water being available during the early stages of the Project.

5.2.14 Issue M – Water – Location of Environmental Flow Release Point

"In order to compensate for the anticipated reduction in base flows in Majors and Spring Creeks the proponent would release water to Majors Creek down stream of the anticipated area of groundwater draw down". (Description of Project 752/04 July 2010 p.2-45. The outer boundary of the mapped cone of anticipated draw down is not delineated (somewhere near the escarpment) while the 1m draw down gradient downstream of the site is located well outside the proponents property.

This statement "down stream of the anticipated area of groundwater draw down" has a number of serious implications that have not been discussed or even acknowledged by the proponent. These include:

- *Environmental damage to a large section of Majors and all of Spring creek located over the anticipated area of groundwater draw down that would not receive any environmental flows as well as being subject to as yet accurately quantified groundwater draw down;*
- *There are no arrangements for piping water for environmental flows over properties that are not owned by the proponent;*
- *There are no licensing arrangements for piping and disposing of polluted old mine water into Majors Creek adjacent to the escarpment on property that may adjoin the State Conservation Area. This concern should have been addressed by the proponent given that pollution of waters is an offence against s 120 of the Protection of the Environment Operations Act 1997.;*
- *Given the uncertainty inherent in the highly subjective assumptions underpinning the theoretical modelling used to construct the groundwater draw down gradients combined with the overestimation of the capability of the harvestable rights dam (which mean more old mine water than estimated will have to be extracted for environmental flows) it is reasonable to assume that the proponent has no idea where the environmental flow outlet will be located or the severity of impacts on the environment and surrounding landholders this will cause. This is clearly a major shortcoming of the EA.*

Submission No. 011 – Anthony

Response: In relation to specific matters raised by the respondent, the Proponent notes the following.

- As indicated in Section 4.4.5.3 of the *Environmental Assessment,* the 1m drawdown contour represents the maximum radius of measurable impact on groundwater levels.

- Impacts on Spring and Majors Creeks within the extent of groundwater impacts as a result of reduced groundwater discharge has been assessed and are not considered significant as there are no GDEs within that area.
- Section 4.4.5.5 of the *Environmental Assessment* identifies that the environmental flow would indicatively be released at the confluence of Spring and Majors Creeks at the anticipated limit of groundwater drawdown and within the Project Site.
- The Proponent anticipates that the Environment Protection Licence that would be issued for the Project would permit the proposed environmental flows and identify the release point as a licenced discharge point.
- Issues associated with the validity of the groundwater and surface water modelling have been addressed in Sections 5.2.8 and 5.2.13 respectively.

5.2.15 Issue N – Aboriginal Heritage

I believe that the proposal will have a negative impact upon any indigenous site downstream of the proposed location.

Submission No. 013 – Byrne

I believe that the proposal will have a negative impact upon any indigenous site downstream of the proposed location.

Submission No. 047 – Rossi

Response: No surface disturbing activities are proposed outside of the Project Site. As a result, no adverse impacts on items of Aboriginal Heritage significance are considered likely.

5.2.16 Issue O – Bushfire

Increased Fire hazard – our farm and the Araluen Valley are surrounded by State and national Parks. The increased dry fuel load resulting from less ground water increased the intensity of any major fire in the Araluen Valley.

Submission No. 014 – Clubb

Response: As indicated in 5.2.9, 5.2.11 and 5.2.12, the extent of groundwater impacts is indicated on Figure 4.26 of the *Environmental Assessment*. In addition, Project-related impacts on groundwater are not expected to result in increased fuel load or increased bushfire intensity within or surrounding the Project Site.

5.2.17 Issue P – Traffic – impacts in Braidwood

Crossing the street in Braidwood is already a dangerous concern to many older residents and children. Further truck movements will only add to this danger. The trucks must be made to bypass the town altogether. Perhaps the fill from the mine could go into building the very much needed bypass, which would be only approx. 4km long. It would make an enormous difference to the town.

Submission No. 009 – Anonymous 3

Furthermore, the EA states during operation there will be 18 heavy vehicle movements per day (Table 2.9), presumably from out of the district either, removing concentrate from the mine or delivering supplies to the mine. All of these vehicles will move up and down Wallace Street in Braidwood. This part of Braidwood is heritage listed and the additional truck movements may cause damage to buildings with the resultant effects on tourism and commerce. Why was this not addressed in the EA?

Submission No.017 – Dickinson

Braidwood is already badly in need of a bypass, suffering over 3 million cars passing through the town each year, with 90% having no intent to stop in town. The impact of further regular truck movement through the historic town (the only fully heritage listed town in NSW) will be adverse to the residents, to the architecture and to the business community. While a Kings Highway bypass may not take Cortona's trucks off the main street, it would reduce the other traffic movement substantially.

At present there is no Palerang Council plan for a bypass. As a State road, the NSW Governments should fund a bypass of this increasingly busy road.

Submission No.028 – Anonymous 4

I believe the increased traffic movements associated with the staff working at the mine will have a negative affect upon the communities of Majors Creek and Braidwood.

Submission No.033 – Lee

Impact on Braidwood – the increased number of heavy vehicle movements transporting gold ore to Orange through Braidwood will likely have a destructive impact on the heritage town of Braidwood. Vibration induced damage presents a real threat to the heritage main street buildings, and increased heavy vehicle movements will impact on the visual amenity, pedestrian and local road user safety and the noise pollution within the township.

Submission No.055 – Kowel

Response: Table 4.36 of the *Environmental Assessment* identifies the Project would result in an increase in total weekday traffic movement on Wallace Street, Braidwood from 1 221 to 1259 or approximately 3%. The anticipated weekday increase in heavy vehicle movements on Wallace Street would be from 140 to 158 or approximately 13%. Given that Section 4.9.5 of the *Environmental Assessment* concluded that the increase would not significantly impact on the operation of any road or intersection, the Proponent contends that the anticipated traffic impacts are not significant.

Notwithstanding the above, the Proponent acknowledges that traffic levels in Braidwood, particularly along the Kings Highway, are a concern for residents. As a result, the Proponent would be pleased to consult with Council or other organisations to investigate actions that may reduce traffic-related issues in Braidwood.

In relation to specific matters raised by respondents, the Proponent notes the following.

- The proposed Project-related increase in traffic levels would not result in damage to buildings.
- Construction of a bypass is not a matter for the Proponent. However, the Proponent would be willing to participate in any discussions in relation to any proposed bypass.

5.2.18 Issue Q – Traffic – Impacts on Road Network/Safety

I believe the increased semi trailer movements associated with the mine operations will have a severe impact upon the Majors Creek Road, the Araluen Road and the Kings Highway.

Submission No. 013 – Byrne

Increased traffic, especially heavy vehicles: Majors Creek Road is narrow with a speed limit of 100km/h. There are serious safety issues that must be addressed, including the narrowness of the road, the width of the ore-filled vehicles and the impact on those of us whose driveways lead directly onto Majors Creek Road. The idea of pulling out of a driveway into the path of an ore-filled heavy vehicle hurtling at 100km/h is frightening. We consider that the impact on the traffic movements and safety of Majors Creek Road requires further investigation.

Submission No. 022 – Gow and Davies

Truck traffic will make the narrow and already dangerous roads even more difficult and dangerous to drive on. I consider truck accidents that will liberate processed ore, industrial chemicals or diesel fuel, or a mix of all three, into the Deua River system or its and tributaries to be absolutely inevitable. Such spills would again be catastrophic for the Deua River ecosystem and the Australian grayling.

Submission No. 030 – Kaminskas

That the applicant, in addition to the planning agreement with Palerang Council, be required to fund the building of an overtaking lane at some point on the Majors Creek Road and to upgrade the Back Creek Road leading towards Captain's Flat as an alternative route for local traffic to Braidwood. Also that the applicant not be permitted to have its heavy vehicles on the Majors Creek Road during the hours of operation of the local school bus. Reason: The increased light and heavy vehicle traffic on Majors Creek Road will be significant. I am very concerned that a serious traffic accident will occur, particularly during out regular periods of fog.

Submission No. 037 – Malone

The developers are claiming that they will be responsible for ensuring that there is adequate road infrastructure up-grading to cope with heavy and light vehicle movements. While there have been commitments to upgrades, these commitments appear ad hoc and fail, in my view, to take account of continual damage likely to occur, as mine activity increases. There is no doubt that the present development will be expanded once the ore body yield dictates commercial reality. This will mean further impact on carrying and intersecting roads. I am unclear how these on-going impacts are to be compensated by the developers and/or whether such general infrastructure will be maintained through contributions to Council and, whether Council will inevitably be forced to use other infrastructure funding to boost maintenance of roads in the future.

Submission No. 044 – Robertson

The proponent estimates that during construction there would be 30 light vehicles and 6 heavy vehicles using the roads and when in operation 20 light vehicles and 18 heavy vehicles. As this will also be a major contributor to the local road system we feel Majors Creek Road needs to be widened to a least 8m, and LINE MARKINGS both centre and outer lines, as it is a country road many people tend to veer to the centre.

Submission No. 054 – Wolford

Transport

It is still not known publicly where the partially processed ore will be going by road. Surely this should be part of the planning process and publicly stated.

Submission No. 028 – Anonymous 4

No-where in any submission have I seen mention of the levels of mist that come and go at random in the Creek. Personally, I have three times been lost in the mist here, once in January late at night when I could not find my own house! No line marking can help this.

Submission No. 011 – Ahlquist

I believe the specific climatic circumstances (including the heavy fog patterns) have not been taken into account in the EA, and as such the assessment and its recommendations are incorrect.

Submission No. 026 – ter Huurne

Response: The Proponent acknowledges that the Project may result in adverse impacts on the local road network between Majors Creek and Braidwood. As a result, the Proponent has negotiated an arrangement with Palerang Council in relation to upgrading and maintaining those roads (see Section 4.8.1).

In addition, the Proponent contends that as the site intersection would, in accordance with the requirements of Palerang Council, be constructed to the required standard under the AustRoads or RTA Road Design guidelines and that the Proponent would implement and enforce a Drivers Code of Conduct, the Project would not result in adverse road safety impacts.

In relation to specific matters raised by respondents, the Proponent notes the following.

- With limited exceptions, all heavy vehicles used to transport material to or from the Project Site would be standard sized vehicles. Where oversized vehicles are required to be used for transporting particular items such as large mobile plant or components of the processing plant, the proponent would ensure that all required permits are obtained prior to transportation.
- All heavy vehicles carrying loads with the potential to cause environmental harm such as hydrocarbons, processing reagents and concentrate would be suitably constructed and maintained to the required standard and all relevant management measures and licences would be implemented and obtained.
- The proposed volume of heavy vehicle traffic on local roads between the Project Site and Braidwood would not be significant and would not result in reduced level of service on any of those roads or at any intersection.

5.2.19 Issue R – Air Quality

I would also point out that my 7 year old daughter suffers from occasional asthma. Dust is a known irritant on airways, particularly those of asthma suffers. How will Cortona, its subsidiaries and contractors compensate me, my wife and our daughter for deterioration in her health?

Submission No. 017 – Dickinson

I note from Table 4.42 that my property and home will be the worst affected by dust pollution. Like everybody else in Majors Creek, I rely on collected rainwater for my water supply. Clearly the dust emanating from the mine and any contaminants that dust may carry including presumably, the dust suppressants applied to reduce dust will be deposited on the roof of my dwelling. From the roof, the dust will be carried into my rainwater tanks. How is Cortona, its subsidiaries or contractors going to compensate me for the pollution of my drinking water?

Furthermore, I do not use a tumble drier. Therefore all my clothes are dried in the wind. If this project goes ahead my clothes will be polluted with dust arising from the mine. How will the mining company address this issue beyond some dust suppression measures on the road and processing facilities?

Submission No. 017 – Dickinson

I believe that the amount of dust or airborne matter associated with works at the mine, through plant and machinery, and the increased traffic movements along internal roads will have a negative affect upon the surrounding community.

Submission No. 033 – Lee

I believe that the amount of dust or airborne matter associated with works at the mine, through plant and machinery, and the increased traffic movements along internal roads will have a negative affect upon the surrounding community.

Submission No. 013 – Byrne

Response: Table 4.42 of the *Environmental Assessment* identifies that the Project would result in suspended particulate concentrations and dust deposition levels well below the relevant assessment criteria. In addition, the Project would result in an increase in annual average PM_{10} concentration from 21μg/m^3 to 22μg/m^3 and an increase in deposited dust rates from 2.4g/m^2/month to 2.54g/m^2/month at the most effected residence, namely Residence R27. The Proponent contends that these increases are not significant.

5.2.20 Issue S – Visual Amenity

Visual Pollution

One of the reasons I have enjoyed living at Majors Creek are the attractive rural vistas and rolling hills. This will be marred by an industrial view as I enter and leave my property. I have also been very impressed with the brilliance and number of visible stars in the night sky. The proposed hours of operation of this mine will impact not only by addition of lighting where there is none but also reduce the number and brilliance of stars in the night sky. The EA does not state how many lumens will emanate from the complex and infrastructure of the mine. This should be addressed. How will Cortona, its subsidiaries or contractors compensate me for loss of visible stars in the night sky? Particularly if the lights are visible from the Newell Highway!

Submission No. 017 – Dickinson

Response: Section 4.11 of the *Environmental Assessment* identifies that visual amenity impacts are highly subjective and will vary from person to person and from location to location. As a result, the Proponent would implement the measures identified in Commitments 12.1 to 12.5 to minimise to the greatest extent practicable the general visual amenity impact of the Project. In addition, Commitment 12.6 identifies that the Proponent would work with individual residents to implement further measures to address specific visual amenity-related issues associated with the Project.

5.2.21 Issue T – Environmental Monitoring

Monitoring of potential impact on Araluen water supply.

While the Environmental Assessment appropriately proposes to monitor groundwater quality and quantity in the Majors Creek area following commencement of the mining operation, there is apparently no proposal to monitor any impact on the Araluen water supply. I recommend that the Proponent consult the NSW Office of Water on an appropriate form of monitoring, via the test bores installed by the DLWC in Araluen in 1998. This would enable assessment of the efficacy of the compensatory water proposed to be discharged into Majors Creek. Any legacy impact of the Project on Araluen aquifers should be isolated and appropriately compensated.

Submission No. 008 – Lever

Environmental Monitoring (Table 5.1, section 15) needs to include an assessment of the flora and fauna both locally and in the region prior to operations commencing and again afterwards. Only by doing a baseline survey will one know just how much impact the mining operation is having. If the impact is too great will the NSW Government remove the mine?s authority to operate? Perhaps one assumes all impact will be over and done with within the first few months? of operation. Is the NSW Government? comfortable? with the prospect that native animals in the region will be comprehensively disrupted with unknown consequences.

Submission No. 036 – Machin

A series of test bores be established in the region six kilometres below the mine site, and that before mining takes place assessments are made of the normal groundwater fluctuations over a period of a year. That data from the test bores be collected while all mining operations are in place, and made available to myself and all other interested parties.

That an independent hydrologist be employed to assess the ground water reading. If, in their opinion, mining operations are causing a drop in groundwater below the mine, then those operations will cease and a remediation plan will be put into effect in consultation with the relevant government departments and all landowners affected. Note: as Cortona have indicated that they are confident that there will be no impact beyond two kilometres of the mine site, they can have no objection to a condition asking for remediation if such an effect occurs.

All water returned to the Major's Creek and Araluen aquifers from the Dargues Reef Mine be tested on a daily basis and the levels of pollution made available to all who have made submissions to this enquiry. If these levels are shown to be higher than the levels in the EA then all work should cease until the relevant NSW and Federal Departments can assure the community that the water is safe for residents to drink, wash in, use on the orchards and market gardens, and for the continuation of the animals and plants downstream.

Submission No. 048 – Sullivan

It is claimed that the locations deemed suitable for routine noise compliance monitoring have been chosen because of their proximity to the Project site, so that compliance at these would imply compliance at more distant receivers (Noise and Blasting assessment, p42). It is of concern to us that the four proposed locations for noise compliance monitoring will not reflect accurately noise levels across all receiver locations. In particular, there does not appear to be a noise monitoring location that would be reflective of the unique noise levels at our property (Noise and Blasting Assessment, R10, Figure 5, p21).

We ask for more thorough and inclusive monitoring of noise levels, and that this is listed as a condition of consent.

Submission No. 052 – Waters

Poor monitoring and inspection planning - There is no baseline surface or groundwater monitoring (only point in time data). Proposed monitoring held quarterly is woefully inadequate when dealing with a known high risk of activity. If the proponent was serious about working with the community then water quality testing, piezometer testing, local bore testing, control structure inspections should occur weekly.

Submission No. 055 – Kowal

Response: Sections 4.2.7, 4.3.7, 4.4.6, 4.5.7, 4.10.8 and Commitments 15.1 to 15.14 identify the proposed environmental monitoring that would be undertaken. In addition, the Proponent would prepare the following management plans and monitoring programs in consultation with the relevant government authorities and, where appropriate, the surrounding community.

- Noise Management Plan, incorporating a Noise and Blasting Monitoring Program.
- Groundwater Monitoring Program.
- Surface Water, Sediment and Erosion Control Plan.
- Biodiversity Management Plan.

In relation to specific matters raised by respondents, the Proponent notes the following.

- Commitments 5.4 and 5.6 have been amended to include monitoring of bores and springs surrounding the Project Site as required or requested by landholders. This would be likely to include bores and springs downstream of the Project Site in the Araluen valley. Further details of the proposed groundwater monitoring program would be included in the Groundwater Monitoring Program.
- The *Ecology Assessment* identifies the flora and fauna species and vegetation communities within the Project Site. In addition, the Proponent would undertake regular baseline monitoring of flora and fauna species and vegetation communities within the Project Site to identify any Project-related impacts. Commitment 15.3 has been amended to reflect this commitment.
- The frequency of surface and groundwater monitoring is identified in Table 4.21 and Section 4.5.7 of the *Environmental Assessment*. It is noted that initially, the frequency of monitoring may be increased until sufficient information has been obtained to satisfy the Proponent and relevant government agencies that the Project is not having an adverse impact on the surrounding environment.
- The Proponent anticipates that it will be required to make all environmental monitoring data available on its website.
- Attended noise monitoring locations would be determined in consultation with the relevant government agencies and surrounding landholders. However, Condition 15.2 has been amended to include Residence R10.

5.2.22 Issue U – Use of Cyanide

Can we be assured that the mine will not end up using chemical processing in the future?

Submission No. 009 – Anonymous 3

Response: Cyanide processing does not form a component of this application and the Proponent does not anticipate using cyanide within the Project Site.

5.2.23 Issue V – Tailings – Tailings Storage Facility

The proposed tailings dam will contain heavy metals. A Major rain event as we see now frequently in Australia and overseas could result in the escape of these contaminants into the Deua and onto Moruya river which is the water supply for a population of over 100,000.

Submission No. 004 – Stuzina

Potential leakage from tailings storage. What independent assessment has been done to ensur the lining proposed is adequate for the long term?

Submission No. 014 – Clubb

The dam design is not world's best practice since it is only to have one wall. Should there be a break or a leak then there is nothing to prevent the tailings water and sludge entering the catchment streams and river.

Submission No. 019 – Edwards

I believe the proposed tailings dam is completely unacceptable and poses a severe threat to the individuals, communities, ecosystems and natural habitats of all plants and animals that live (RL below) that of the dam, between Majors Creek and the coast.

Submission No. 029 – Owen

Lastly, if the tailing's dam breaches, what will be the impact downstream?

Submission No. 036 – Machin

I believe the proposed tailings dam is completely unacceptable and poses a severe threat to the individuals, communities, ecosystems and natural habitats of all plants and animals that live (RL below) that of the dam, between Majors Creek and the coast.

Submission No. 047 – Rossi

That a secondary wall be erected below the tailings dam if the mine is given approval.

Submission No. 048 – Sullivan

A second concern is the proposed tailings dam. In past records this district has experienced very heavy rainfalls at 25 year intervals. If a tailings dam containing dangerous life threatening chemicals enters the Majors Creek this overflow from a dam will have far-reaching consequences. Downstream it will mean devastation of the extensive peach orchards at Araluen. These orchards contribute at least 3 million dollars to our economy. Further on are numerous small business enterprises along the Deua River, all the way to Moruya and the Pacific Ocean. Is the livelihood of many a consideration in this proposed project?

Submission No. 050 – Tozer

Response: The Proponent acknowledges that there is significant concern in relation to the tailings storage facility and potential impacts associated with tailings management. This sub-

section addresses matters related specifically to the design, construction and management of the tailings storage facility.

Section 2.7.2.2 of the *Environmental Assessment* identifies that the tailings storage facility would be a prescribed dam under the *Dam Safety Act 1978* and would, as a result, be designed, constructed and operated in accordance with the requirements of the NSW Dams Safety Committee. The Proponent is not aware of any prescribed dam or facility in NSW that has suffered a catastrophic failure.

In addition, the Proponent notes that the facility would be designed and constructed by Knight Piésold Pty. Ltd, a Company with involvement in other 500 mining projects worldwide. No such facilities designed by Knight Piésold Pty. Ltd have suffered catastrophic failure.

The Proponent also notes that during the construction and operation of the facility that it would be required to regularly inspect and test the facility to demonstrate that it is being constructed to the required standards and that there are no issues with the structural integrity of the facility. This would ensure that in the unlikely event that issues do arise, that they would be identified in sufficient time to enable the issue to be managed and rectified.

Finally, Sections 2.7.2.2, 4.4.6 and 4.5.7 of the *Environmental Assessment* identify measures that would be implemented to prevent seepage from the facility, collect any seepage that does occur and monitor groundwater and surface water to ensure that these measures are operating effectively.

As a result, the Proponent contends that risks associated with catastrophic failure of the tailings storage facility or leakage from the facility have been appropriately addressed and that there is no significant risk associated with the facility to residents or the environment downstream of the facility.

In relation to specific matters raised by respondents, the Proponent notes the following.

- The Proponent would ensure through appropriate design and testing during construction that the lining of the tailings storage facility achieves the required permeability of $1x\ 10^{-9}$m/sec.
- The Proponent is not aware of tailings storage facilities with double walls, nor that this represents best practice within the mining industry.
- Section 2.7.2.2 of the *Environmental Assessment* identifies that surface water diversion structures capable of diverting a 1 in 100 year rainfall event as a minimum would be constructed to prevent surface water flows onto the tailings storage facility. The Proponent also notes that the facility has been intentionally located in the upper section of the catchment to minimise the upslope catchment.

5.2.24 Issue W - Reagent Management

There is scant information in the proposal detail about what chemicals and reactants will be stored on site and what effect these might have on the catchment and its waters.

Submission No. 006 – Phillips

The tailings dam is also in the Moruya River Catchment. Reagents are not specified but in other recently opened goldmines the water in the tailings dams is toxic.

Submission No. 017 – Edwards

Response: Section 2.6.6 of the *Environmental Assessment* identifies the reagents that would be used during processing operations. Of these, only two, namely Potassium Amyl Xanthate and Nitric Acid would require specific management measures. The proposed management measures are described in the following locations.

- Section 2.6.6 of the *Environmental Assessment* – identifies reagent-specific management measures.
- Section 2.7.2 of the *Environmental Assessment* – identifies design, construction and operational measures that would be implemented to ensure that there would be no seepage from the tailings storage facility.
- Commitment 7.21 as amended in Section 6 of this document – identifies that all reagents would be stored and used within the Contaminated Water Management Area.
- Sections 4.4.3, 4.4.6, 4.5.4 and 4.5.7 of the *Environmental Assessment* – identify surface water and groundwater-specific management measures and proposed monitoring.

In light of the identified management and mitigation measure and the proposed monitoring programs, the Proponent contends that risks associated with the use of the identified reagents have been reduced to an acceptable level.

5.2.25 Issue X - Waste Rock Balance

How can 445,675m of the total 510,375m of waste rock generated through the whole life of the project be used for site establishment when it has not yet been generated?

Submission No. 011 – Anthony

Response: It is noted that the majority of waste rock material required for site establishment would be required for construction of the tailings storage facility embankment. That structure would be constructed progressively, with only limited volumes of waste rock material required initially. In addition, the Proponent notes that the majority of waste rock generated by the Project would be sourced from the decline and development drives and that these would largely be constructed early in the life of the Project. As a result, the Proponent does not anticipate that scheduling of waste rock production and use will cause an issue for the Project.

5.2.26 Issue Y – Climate Change

The Department of Planning has formally requested that the assessment include due regard for the CSIRO Climate Change predictions- There is no discussion of Climate Change in the whole Environmental Assessment- Why?

Climate change would affect recharge dynamics and HR dam capability, common predictions of heavier summer rainfall is likely to increase the rate of rill, sheet and gully erosion and would be an important consideration meriting a detailed discussion in respect to the proposed tailings dam. – Why is there no discussion of these fundamentally prudent considerations?

Submission No. 011 – Anthony

Large carbon footprint - the EA does not deal with the extra energy requirements. It will increase local carbon emissions. The proponent should offset its energy use through sourcing/or generating renewable energy.

Submission No. 055 – Kowal

Response: A number of respondents questioned why climate change was not explicitly incorporated into the assessment of the Project. The Proponent notes that the Project would result in a 5 year mining operation, followed by a brief period for rehabilitation operations. As climate change is likely to result in a gradual change in climate pattern over decades to centuaries, potential impacts on the Project assessment of such changes are not considered to be significant.

In addition, the Proponent notes that long-term rainfall data has been used to assess the surface water impacts of the Project and that the 100-year data set used is likely to contain significantly more variability than will be produced by climate change. This issue is addressed further in Section 4.8.5.

Finally, the Proponent also notes that while there is some scientific agreement in relation to changes in average climatic conditions, predictions of short-term or short duration climatic conditions in particular areas on NSW as a result of climate change is not certain. As a result, it is more appropriate to assess the Project, as the Proponent has done, in light of the precautionary principle.

5.2.27 Issue Z – Property Values

I believe the 24 hour per day operation of the mining facility will reduce the value of my property and if the mine should operate under the proposal as set forth, I should have legal grounds to claim against the shareholders, directors, managing directors and all others concerned with Big Island Mining Pty Ltd (or as we know them Cortona), the local council (Palerang), the State Government or the Federal Government.

Submission No. 013 - Byrne

I believe the 24 hour per day operation of the mining facility will reduce the value of my property, and if the mine should operate under the proposal as set forth, I should have legal grounds to claim against the shareholders, directors, managing directors and all others concerned with Big Island Mining Pty Ltd (or as we know them Cortona), the local council (Palerang), the State Government or the Federal Government.

I believe the increased semi trailer movements associated with the mine operations will have a severe impact upon the Majors Creek Road, the Araluen Road and the Kings Highway.

Submission No. 029 – Owen

That an adequate bond be required to compensate landowners and all with a commercial interest in the area below the Dargues Reef mine. This will need to cover not just the an estimated $AU3 million per annum income already generated in the Araluen Valley, but other personal and financial loss, including loss of value of properties and businesses. The value of land and businesses in the eight kilometres just below the mine alone amount to more than $AU20 million, and this is without costs of remediation and long term business and personal loss. This compensation should not be limited to those in the catchment below the mine, but to all who have a demonstrated financial and personal interest in the land and water system affected.

Submission No. 048 – Sullivan

Response: Section 2.1.1 of the *Environmental Assessment* identifies that one of the objectives of the Project is "to operate [the Project] in a manner that would minimise surface disturbance and impacts on surrounding residents and the local environment." A detailed description of the design and management measures and safeguards that have been or would be implemented to achieve this objective is presented in Sections 2 and 4 of the *Environmental Assessment.* In summary, however, the Proponent contends that it has minimised the likely impacts on surrounding residents to the greatest extent practicable.

The Proponent acknowledges that some residents surrounding the Project Site perceive that the Project may adversely affected property values in the vicinity of the Project Site. However, the Proponent would highlight the following.

- The Project would result in the creation of up to approximately 80 full-time equivalent positions during the operational phase of the Project and would contribute between approximately $3 million and $7 million to the local economy. This would have the effect of boosting economic activity and supporting or increasing property values. (See Section 2.12 of the *Environmental Assessment).*
- The Proponent has, to the greatest extent practicable, sought to address all community concerns and minimise the impacts of the Project on surrounding residents.
- Property values, and perceptions of property values, are influenced by many factors and it would be unreasonable to attribute any perceived decrease in property values to one factor or to one factor in isolation.

Finally, the Proponent notes that there is anecdotal evidence that there has been an increase in buying of property in the vicinity of Majors Creek, possibly in anticipation of the Project receiving project approval. That may have already resulted in increases in property values in the vicinity of the Project Site.

5.2.28 Issue AA – Application of the EPBC Act

It is my opinion that the proposal does not comply with the Environment Protection and Biodiversity Conservation Act (the EPBC Act) and as such this development should require the Federal Governments approval before proceeding.

Submission No. 013 – Byrne

It is my opinion that the proposal does not comply with the Environment Protection and Biodiversity Conservation Act (the EPBC Act) and as such this development should require the Federal Governments approval before proceeding.

Submission No. 033 – Lee

Response: A referral of the Project under the EPBC Act was made on 1 December 2010.

5.2.29 Issue AB – Life of the Project

I query the stated duration of the mining project, and hence to long term ramifications of this mining venture. Initial project application is stated to be for five years, but in the Key Statistics, nine years. Which ever it is, from an economic viability point of view, it is more likely to have a longer lifespan given capital expenditure required to set up mine, the current price of gold; and further exploration signalled by Cortona in recent announcements and given the forecast amount of gold which may be present. What will be the process for further mining? Will environment assessments be undertaken for each new drill? For example, announcement on 25th October of new shallow high grade discovery located 150 metres north of Dargues Reef application.

Submission No. 014 – Clubb

Response: Section 2.1.2 of the *Environmental Assessment* notes that the Proponent proposes to continue exploration operations within and surrounding the Project Site and that further resources may be identified. However, at this time extraction and processing of any identified resources does not form a component of this application. The Proponent anticipates that should such resources be identified then a subsequent application for project approval or a modification to the current approval would be required.

5.2.30 Issue AC – Economic and Community Contribution

I acknowledge that the mine will bring additional revenue into the village and our main centre of Braidwood for the proposed duration of the mine. However, I am concerned that this will be negated by the fact that we may lose families from Majors Creek who did not move to this progressive little village to be imposed upon by a big mining operation and all that that entails. A lot of us moved here to escape the hustle and bustle of big business and industry, what a loss it would be to lose just one family and the benefits that families bring to a small regional area - they use the pre-school and schools, shop and spend money in local businesses, they are employed in local businesses, all adding to the stimulation of our local economy for years to come.

Submission No. 016 – Cram

The EA summary estimates the mine will contribute $3 to $7m a year to the local and regional economy. It could be that this estimate will change if the conditions and costs of the project are revised in the final approval process. Insofar as economic benefit is a relevant consideration in an environmental assessment, its inclusion perhaps argues for a rigorous cost-benefit analysis. The net benefit for Braidwood and surrounds would take into account the likely reduction in the growth of long-term residential building in the area as a result of mining and/or processing operating 24/7 for 9 years or longer.

Submission No. 045 – Sanderson

Examples of compensatory contributions that we would welcome include, but are not limited to:

- *Noxious weed eradication:*
- *Rehabilitation of land degraded by historical mining operations;*
- *Street tree planting in the village;*
- *Further development of noise controls (in addition to those already proposed in the assessment):*

a) Explore the potential to further reduce the anticipated increase in noise levels in the village by substantial plantings of trees and shrubs on areas of the applicants' land deemed likely to have the most effect. Tree and shrub planting to reduce noise should occur in consultation with expert advice and the community.

b) Explore and adopt new technology to replace existing irritating beeping noise on reversing vehicles.

The Project's presence has already benefited the Majors Creek community to some degree by contributing towards community facilities such as the new tennis court. We argue that the contributions made to date do not sufficiently offset the negative impact of industrial noise.

Majors Creek residents will suffer more negative impacts than Braidwood residents given the Project Site's proximity to the Majors Creek village, in particular with regard to noise levels.

A planning agreement is being negotiated between Palerang Council and the applicant for the upgrading of facilities at the Braidwood Recreation Ground as a compensatory contribution. This will benefit Braidwood residents more so than Majors Creek residents.

Submission No. 052 – Waters

Response: The Proponent acknowledges that economic and community benefits that may flow from the Project and the equitable distribution of those benefits are of crucial importance to the community. To this end, the Proponent has negotiated a deed of arrangement with Palerang Council in relation to provision of community benefits.

In addition, Section 4.13.3 of the *Environmental Assessment* identifies the measures that the Proponent would implement to maximise, to the greatest extent practicable, the equitable distribution of benefits flowing from the Project. This would be facilitated through continued close consultation between the Proponent, its immediate neighbours and the local and wider community.

In relation to specific matters raised by respondents, the Proponent notes the following.

- The relocation of individuals from a particular community is likely to be the result of many factors and is likely to be matched by relocation of individuals into that community. As a result, the Proponent contends that the Project would not result in significant population loss from any community surrounding the Project Site.
- Section 6.2 of the *Environmental Assessment* includes a detailed justification of the Project. That section identifies that, in the Proponent's opinion, the benefits of the Project would significantly outweigh any adverse impacts associated with the Project.
- The Proponent would favourably consider any proposals that would, in the opinion of the community, improve the amenity of the area within and surrounding the Project Site, particularly where such projects are community based and would provide benefits following the life of the Project. Potential Projects include weed management and revegetation projects.
- The Proponent would ensure that frequency-modulated reversing alarms or "quacker" alarms are installed on all machinery where such alarms are required. These alarms are designed to minimise noise transmission and impacts on surrounding residents. Commitment 4.9a has been inserted to reflect this commitment.

5.2.31 Issue AD – Outcome of the Risk Analysis

Risk Analysis: A major pollution event gets rated an H in the risk matrix. How can this be? It should rate an E representing the impact such an event could have on the downstream aquatic ecosystem and human water users. This ranking throws the whole non mitigated risk assessment into question. Furthermore, the risk assessment does not look at the possibility of failure of the tailings dam wall. This has occurred in several other locations in NSW resulting in major pollution. Such an event would be catastrophic to Majors Creek and to my section of the creek and would have a very severe impact on Araluen Creek and its health and that of the downstream users.

Submission No. 017 – Dickinson

The risk assessment (Table 3.6) is not correct. Biodiversity (Flora & Fauna) describes ?Potential Consequences? The ?Potential Environmental Impacts? need to include the destruction of the local native animal habitat and population through actual habitat destruction (e.g. wombat burrows) and likely increase in disturbed wildlife with nowhere to go. The Native Animal Wildlife Group is already aware of disruption to native animal welfare and a consequent increase in death through road kill. The balance of native animal territory has been and will continue to be disrupted. How is this to be managed over the initial years of mining operations? The impact on biodiversity is also included under Noise and Vibration (for some reason ?blast? does not appear). The Potential Environmental Impacts directly affect native flora and fauna, but there is no mention of this. It is suggested the impact of vibration, noise and blast will not be limited to a local effect, but have a much wider impact regionally.

Submission No. 036 – Machin

Response: Section 3.3 of the *Environmental Assessment* presents a detailed analysis of the unmitigated risk associated with the Project while Section 6.1.1 of the *Environmental Assessment* presents an analysis of the mitigated risk associated with the Project. The Proponent acknowledges that the risk analysis is subjective and that others may perceive potential outcomes or likelihood in a different manner, resulting in different classification of particular risk components.

In addition, the Proponent notes that the unmitigated risk analysis was undertaken before the majority of environmental assessments had commenced to inform the Proponent and specialist consultants of those areas with the greatest perceived unmitigated risk and therefore those areas requiring greatest attention when assessing the Project.

As a result, the Proponent contends that the risk analysis undertaken for the Project is fit for the purpose for which it was undertaken.

5.2.32 Issue AE – Sealing of the Site Access Road

The Proponent (Cortona Resources Limited (Big Island Mining Pty Ltd)) are proposing the construction of a site access road and tracks approximately 4 kilometres in length on the property, (part of which is altitude 720m) which will be regularly watered to STOP DUST. WE THINK THAT IS A TOTAL MISS USE OF WATER AND FUEL (energy) and that the road would be better SEALED also eliminating any possibility of dust and catapulting of gravel from the tyres into the traffic on the Majors Creek Road.

It should be a condition of the EA that the site road be sealed this would save the use of water for dust suppression and eliminate dust for traffic to and from site.

Submission No. 054 – Wolford

Response: Table 4.4.2 of the *Environmental Assessment* identifies that air quality-related impacts associated with the Project would be well below the relevant criteria. In addition, chemical dust suppression would be used on the site access road to minimise the volume of water required for dust suppression. As a result, the Proponent contends that the proposal for the site access road to be unsealed is appropriate.

5.2.33 Issue AF – Bush Rock Removal

Bushrock Removal - The disturbance of bushrock is not dealt with in the documentation, and as such is an inadequate response. It must be noted that bushrock removal is a key threatening process under the Threatened Species Act. Several threatened species are recorded in the Wildlife Atlas that utilise bushrock. The removal of bushrock is an impact that cannot be mitigated.

Submission No. 055 – Kowal

Response: There is no bush rock within the Project Site.

5.2.34 Submission 35

A very detailed submission was received from an anonymous respondent in relation to the Project. In light of the nature of the comments made and the issues raised, the submission has been reproduced below and responses to relevant components provided.

I object to the opening of the Dargues Reef Mine.

The environmental assessment of this proposed development is grossly inadequate. The proponent's public claims that 'groundwater modelling covered an area of 7km by 6km' has been done cannot be substantiated.

Response: Section 12.3.3 and Drawing 6 of AGE (2010) identify that the size of the groundwater model is 6km x 7km.

Test bores and other assessments have been made in the area predominantly uphill from the mine, where the impact can be expected to be least. Only two test bores appear to be downhill from the proposed development, both close to that development. No test bore has been placed beyond the Major's Creek Bridge, within 1 Km of the proposed development.

Response: Section 4.4.2.3 and Figure 4.18 of the *Environmental Assessment* identifies that eight monitoring bores were constructed at six locations within the Project Site. Three of these locations were downslope of the proposed Dargues Reef Mine

The proponent also claims that impacts an area of 2 .5 square KM in a radius of the proposed development has been thoroughly tested.

Despite the proponent's claims <u>no</u> study has been done of any impact on water levels, ground water effects, flora fauna or the local economic economy beyond 1.5 kilometres <u>downstream</u> of the proposed mine, and possibly even beyond half a kilometre downstream of the development, despite the likelihood of such an impact downstream, rather than upstream.

Response: The groundwater assessment estimated groundwater impacts within the 6km x 7km area of the groundwater model. As that model included the full extent of the anticipated groundwater impacts, the Proponent contends that there is no requirement to model a larger area as this would merely increase the complexity of the model and potentially reduce its accuracy.

There has been <u>no</u> study of the hydrology, ecology, wildlife or businesses beyond 1.5KM (or less) along the Major's Creek watercourse downstream from the mine. This is the area most likely to be ¡impacted by the mine, not the area up hill from the mine.

Response: In relation to the above, the Proponent notes the following.

- The groundwater assessment concluded that there would be no adverse water related impacts beyond the extent of groundwater drawdown identified in Figure 4.26 of the *Environmental Assessment.*

- The surface water assessment concluded that the Project would result in improved surface water quality.
- The ecology assessment concluded that no groundwater dependent ecosystems would be impacted by the Project and that in the absence of evidence of downstream impacts on surface water or groundwater, there would be no requirement to undertake detailed assessment downstream of the Project Site.

The proponent's claims are grossly misleading. The proponent has also neglected to include vital hydrological information provided by local landowners and the Araluen progress Association in the preparation of the EA.

Response: All hydrological information provided by the Araluen Progress association and surrounding residents is identified in Section 3 of AGE (2010).

I request that additional research is undertaken before any final consideration of the Environmental Assessment prepared by the mining company takes place and before any consideration of whether the Dargues Reef Mine can proceed.

This would include:

- *Placing test bores between various test locations from 1 to six kilometres downstream from the proposed mine, to study the impact of test drilling on the groundwater, and potential dramatic lowering of the watertable, over a one year period, to allow for natural fluctuations in rainfall.*
- *Undertaking a survey of endangered, critically endangered and threatened flora and fauna in the area 1.5-6 km downstream of the Dargues Reef Mine.*
- *Undertaking a study of the heritage sites and Indigenous sites 1.5-six kilometres downstream be carried out before the EA is considered.*

Response: The Proponent has committed to monitoring bores of any landholder who reasonably requests that monitoring. In addition, in the absence that the Project would result in significant impact on ecology or Aboriginal heritage downstream of the Project Site, there is no justification for further assessments of those components.

I also request that as we and others who have been taken by surprise by the contents of the EA which - despite much public relations work by Cortona over an extensive period - has only allowed for a six week comment period - be given at least twelve months to obtain independent hydrological and environmental assessments.

Response: Section 3.2.2.1 of the *Environmental Assessment* identifies that formal community consultation commenced in November 2008. Since that date, Cortona has engaged extensively with the community and there has been abundant opportunity to raise issues associated with potential impacts of the Project.

The preliminary assessments reveal a major risk to the ecology and farming based industries directly below the mine.

They also emphasise that there has been no evaluation of the possible impact on the land, flora, fauna and industries below the mine, and that even hydrological assessments given to Cortona by the Araluen progress Association and other data supplied have been ignored.

Response: This matter has been addressed previously.

I also request that because of the unprecedented numbers of rare and endangered, threatened and critically endangered flora and fauna in the four kilometres downstream from the proposed Dargues Reef Mine, that this matter be referred to the Federal Minister for Environment uner the EPBC Act.

Federally listed animals include:

New Holland mouse (Pseudomys novaehollandiae): vulnerable

Zieria adenophera- Araluen Zieria: endangered

Button Wrinklewort

Rutidosis leptorrhynchoides- endangered

Araluen Gum

Eucalyptus kartzoffiana: vulnerable

Grey Deua Pomaderris

Pomaderris gilmourii var. cana

Spotted-tailed Quoll

Dasyurus maculatus

Status: endangered

Response: A referral under the Environmental Protection and Biodiversity Conservation Act 1999 has been made.

Impact of the mine on downstream environment

The Dargues Reef Mine is directly 1.5 km from the Major's Creek National Park Reserve, created to protect the extraordinary variety of rare, threatened and endangered species and ecosystems it contains.

The proposed mine is also four kilometres to the north of our property, adjacent to Majors Creek National Park Reserve. It is only six kilometres from the Endangered Araluen Grasslands Ecosystem. The vertical mineshaft will descend a total of 500 metres, which will take it to 130 metres below the level our property.

No study has been done on the impacts of the proposal in these areas, despite our repeated requests that test bores be established in the National Park Reserve and our property to test the effect of drilling on the water table. There appears to have been no request from the proponent to put test bores or do other studies in the Major's Creek National Park Reserve along the course of Major's creek, from 1.5-4 km directly downstream from the proposed development.

Response: The Proponent received no request to establish monitoring bores outside the Project Site prior to finalisation of the *Environmental Assessment*. A request was made by Ms Jackie French and Mr Bryan Sullivan on 18 October to establish such a bore and Cortona agreed in principle to that request. In addition, the Proponent notes that as the groundwater assessment concluded that the extent of groundwater impacts would be limited to a radius of approximately 2.5km from the proposed Dargues Reef Mine and that numerous bores exist between the Project Site and the Majors Creek Falls Reserve, that there would be no requirement to establish additional bores within the reserve, assuming that approval could be obtained.

It is noteworthy however than Cortona has made considerable investigation of the two kilometre radius predominantly upstream from the mine, where it is expected that the impact will be far less. Cortona also failed to include any of the professional hydrological assessments provided by the Araluen Progress Association.

The EA has been limited to areas where major impacts are least likely to occur except in the immediate vicinity of the mine.

Response: As identified on Drawing 2 of AGE (2010), the groundwater model is centred on the proposed Dargues Reef Mine and is not focused upstream of the proposed development.

There are many other areas where the proponents have either failed to do the tests they claim in the areas they claim to have tested, or have neglected other highly relevent information publically available or made available to them.

These are detailed below.

I. Inadequacy of the Environmental Assessment

Despite the proponent's claims, no assessment has been made beyond 1.5 kilometres downstream the mine site on the impact of mining operations on the groundwater, endangered, critically endangered and threatened species in the Majors Creek National Park Reserve, the Threatened Araluen Grass Escarpment, the Deua National Park, or our property and any other private nature reserves, nor on the businesses we conduct.

Even though the area downstream of the proposed mine is the most likely to be affected by the development, no test bores have been sunk in, this area apart from two close to the mine site. The Major's Creek National Park Reserve is directly 1.5 km downstream: no test bores have been dug and no testing has been done in this area, nor have any studies been done of threatened flora, fauna, heritage or Indigenous sites.

The properties owned by Jackie French and Bryan Sullivan border the Major's Creek National Park Reserve, and are 4 km directly downstream of the mine. Despite repeated requests, no test bores have been placed on this property, no test bores have been dug and no testing has been done in this area, nor have any studies been done of threatened flora, fauna, heritage or Indigenous sites.

Response: These issues have been addressed previously.

While the proponent has tested areas within 2.5 km of the proposed mine site, apart from one small area directly below the mine these have not been the areas most likely to be affected by loss of ground water, water pollution or an accident to the tailings dam.

The bulk of studies done by the proponent have been in the areas least likely to be affected by loss of ground water.

Response: These issues have been addressed previously.

Note: the proponent would have been able to get permission to test in the Major's Creek National Park Reserve, and has been repeatedly offered access to test the impact of drilling on our property. It is entirely their choice not to test in this critically significant area directly below the proposed mine, along the course of Major's Creek.

Given the value both ecologically and economically of the area below the mine, collection of data in these areas is essential.

Response: The Proponent notes that granting or otherwise of permission to construct a bore within the Majors Creek Falls Reserve is not a matter for the respondent. In addition, the Proponent notes that no approach in relation to establishing of test bores or evaluation of groundwater impacts on the respondent's property was received prior to 18 October 2010. When such a request was made the Proponent agreed in principle to establish a monitoring bore as requested.

2. Effect on the Watertable

This is the most critical of all the objections, and the one with potential for environmental devastation.

Cortona's Environmental Assessment shows plans to remove a total of 66.2 mega litres from Spring Creek and Majors Creek water tables annually, and 14.5 mega litres per annum from the Shoalhaven watertable, with a total of 130 mega litres a year from all local sources.

The natural forest systems and agricultural industries in this area are already suffering from lack of water, with major orchard areas in the Araluen Valley below the proposed mine no longer viable because of diminished creek flow and drop in the water table. Households have been regularly forced to purchase water from outside the region. While 2010 has been a year of unusually high rainfall; this variation can only be expected to last for one to three years.

Removing 130 mega litres of water from this region and the consequent lowering of the water table will have a dramatic impact on local flora, fauna, agriculture. It may also make living in the vicinity of the mine impossible.

Despite the proponent's claims, no study has been done on the impact of removing this water from the area downstream of the proposed mine. No test bores have been sunk in the area 1.5-8 km downstream from the mine; no data of any kind has been collected in the area. Data from this area offered to the proponents has not been included in the EA.

Response: This issue is addressed in Sections 5.2.9, 5.2.11 and 5.2.12 of this document. Sections 8 and 13.7 of AGE (2010) discusses information provided by the Araluen Progress Association in relation to prior groundwater assessments undertaken in the vicinity of Araluen.

No study has been done to test the effect of drilling a vertical shaft 500 metres, with a series of horizontal tunnels up to two kilometres in length, on the ground water of the Araluen valley 300 metres below the mine site. Insufficient detail has been given about the length of these tunnels, if they will extend under private land not owned by Cortona, or under the Major's Creek National Park Reserve.

Response: Sections 12.3.4 and 13.1 of AGE (2010) identify that the groundwater model included a monthly simulation of development of the proposed mine to the maximum proposed depth of approximately 500m below surface. In addition, Figure 2.1 of the *Environmental Assessment* identifies the full extent of decline development for the Project.

Cortona has already expressed its commitment to extending mining operations even further, into areas not covered by the existing EA. (Braidwood Times, 20 October 2010).

Our property and the Majors Creek National Park Reserve are in the same belt of decomposed granite as the proposed Dargues Reef Mine. There is known to be a severe draw-down of rock and regolith water in similar areas of decomposed granite that underlie both our property, the Major's Creek National Park Reserve and the proposed Dargues Reef Mine.

It is inevitable that both our property and the Reserve will be affected by changes to the ground water from mining operations.

Response: These issues have been addressed in Section 5.2.9 of this document.

In March 2010, when test drilling at the mine site was in place, bores in Majors Creek sank by up to seven metres according to the hydrologist employed by Cortona at a meeting with us on 18 October 2010; springs on our property and in the Major's Creek National Park Reserve vanished and Majors Creek stopped flowing. This is despite an above average rainfall in March 2010, when it is likely there would be little water drawn from local bores, and when the water level should have been naturally higher, not lower.

Response: No such comment was made by Cortona's hydrologist at the meeting on 18 October 2010. In addition, the Proponent notes that no complaints in relation to reduced groundwater levels in bores located between the Project Site and the Majors Creek Falls Reserve were received. Finally, it is noted that drilling has been ongoing within the Project Site since 2004, and that since September 2007, there have been at least one, and up to five drilling rigs on site for 30 of the ensuing 36 months. As a result, any fall in water levels in March 2010 is unlikely to be related to the drilling.

All data observed indicate a probability that drilling both 300 metres above and drilling 130 metres below our property and the Reserve will have a major impact on the water table, possibly in excess of the 10.7 metre ground water drop in the area near the mine at Major's Creek.

Response: These issues have been addressed in Section 5.2.9 of this document.

A drop of even 1.5 metres would mean the extinction the majority of flora and fauna in this area, It would also mean that the area would become uninhabitable due to its steepness and fragility without ground cover.

I strongly urge that no assessment of the Dargues Reef mining application be made until these have been surveyed and the risks evaluated.

These are covered in more detail below.

1. Effect on Ground water and the Watertable

The proposed Dargues Reef Mine will reach to 500 metres below ground level, with horizontal tunnels up to two kilometres in length. According to the hydrologist who prepared the Environmental Assessment, all water in the surrounding area will flow down to the lowest spot - the mine.

The mineshaft will reach 400 metres below- the Majors Creek National Park Reserve and 130 metres below our house and property. The mine will therefore be deeper than our property, and deeper than the whole of the Reserve. It is inconceivable that this will not have a major effect on groundwater - far greater than the EA affirms.

Response: This issue has been addressed in Section 5.2.9 of this document.

It is extraordinary that there has been no attempt to put monitoring devices downstream from the mine site, especially given the depth of the mine. There has certainly not been sufficient time or warning for us to undertake any independent hydrological assessment.

Response: The Proponent notes that as the groundwater assessment determined that Project-related groundwater impacts were limited to a radius of approximately 2.5km from the proposed Dargues Reefs Mine, that construction of additional monitoring bores during the assessment phase of the Project was not warranted because the data that would have been collected would not have impacted on the assessment. However, in light of broad community concern in relation to groundwater-related impacts, the Commitment 6.1 has been amended to identify that the Proponent would undertake reasonable monitoring of groundwater in bores or springs downstream of the Project Site in the Araluen valley.

2. The impact of dropping groundwater levels and depletion of the watertable

Cortona have made no study whatsoever of the impact of mining beyond a two kilometre radius.

Response: As previously noted, the groundwater model covered an area of 6km x 7km centred on the proposed Dargues Reef Mine. In addition, the noise and air quality assessments assessed residences up to 3.5km from the proposed processing plant. Finally, all specialist environmental assessments were undertaken in accordance with the relevant guidelines as identified in the Director General's and *Environmental Assessment* Requirements.

Even on Cortona's own figures, the drop in ground water would lead to the death of most flora and fauna in the vicinity. Even deep-rooted eucalypts draw water from only 2-4 metres of subsoil; most of the bushes (like the critically endangered Zieria adenophera - see below) would be killed by a drop of as little as 60 cm.

Response: The anticipated extent of groundwater impacts has been addressed in Section 5.2.9. In addition, the Proponent notes that with the exception of groundwater discharge zones in the vicinity of springs and drainage line, groundwater is typically not directly available to vegetation. Table 4.17 of the *Environmental Assessment* indicates that of the monitoring bores constructed for the groundwater assessment to test the granodiorite aquifer away from drainage lines, namely DRWB01 to DRWB05, groundwater levels are typically 8m to 10m below surface. Of the three monitoring bores constructed to test the alluvial aquifer in the vicinity of Majors Creek, groundwater levels are between 1.2m and 4.2m below surface.

Wildlife in the Majors Creek National Park Reserve, Deua National Park and our property- and other privately owned nature reserves down the valley- relies both on Majors Creek and a number of springs. I have mapped 21 of these on our place alone; places of damp soil where animals can scratch enough moisture for survival. In March 2010 when Cortona was test drilling, 8 of these springs dried up, despite an above average rainfall. I suspect that any further drilling would be even more disastrous.

Response: The Proponent notes that it and its predecessors have been undertaking exploration drilling within and surrounding the Project Site since 2004. There have been no complaints during that time of reduced groundwater levels in surrounding bores. In addition, as drilling operations, particularly diamond drilling operations, do not remove significant volumes of groundwater, there would be no reason for surrounding groundwater levels to drop.

To put it simply: if this amount of groundwater is removed from the watertable of this valley for any extended period of time the Reserve and our property will become a desert.

At a time when governments across Australia are recognising the need to conserve ground water and release more - not less - into ecosystems and to conserve Australia's food bowls, the proposal to proceed with an operation that involves lowering groundwater is extraordinary. It makes neither financial nor economic sense.

I request that at the very least, the effects of the mine on groundwater in the Majors creek National Park Reserve, the endangered Araluen Grasslands Community, the Wisbey Orchards and on our property need to be studied before any approval is given for the mine to go ahead.

Response: The anticipated extent of groundwater impacts has been addressed in Section 5.2.9.

Note: on reading the EA it appears as though Cortona has made adequate provision for the effect of their operations on the flow of Majors Creek and Spring Creek. This appears to have been primarily a public relations exercise - confusing the public with assurances that creek flow will be compensated for, while neglecting to mention the devastating effect of a drop in the ground water. The fact that a drop in groundwater will also impact on creek flow is not mentioned.

The dams from which water to remediate Major's and Spring Creek will be drawn however, will already have removed potential water from these creeks i.e. there will in fact be no extra water returning to these creeks.

The use of water recovered from abandoned workings will definitely reduce the base flow in Major's creek and lower the regional water table.

Response: The Proponent notes that the proposed compensatory flow program was initially developed prior to any community consultation in recognition that the Project would adversely impact on groundwater discharge to Spring and Majors Creeks and the resulting decrease in surface water flows may have potentially adversely impacted downstream water users and the environment.

It is also noted that water for the compensatory flow program will be principally sourced from the Proponents proposed harvestable rights dams which may be constructed under existing rights held by the Proponent.

3. Short-term versus long-term economic effects

It is claimed the Dargues Reef Mine will employ 50-80 people over a ten year period. This is less than the number already employed in the 8 km area directly downstream from the mine.

The Braidwood/ Major's Creek /Araluen district has a labour shortage: it is impossible to find sufficient people to employ in the orchards, in our business, and in many Braidwood businesses, despite over award Wages and conditions being offered. The prosed mine would add to this, offering short-term employment to the detriment of the long-term businesses.

No study has been done by the proponents on the economic climate of the Major's Creek Araluen district.

No study has been done by the proponents of the impact on 50-80 short-term jobs on the community. The housing, school and preschool places, and medical services are already overstretched. The need for short term rather than long term solutions to these will have a negative, not positive, impact on the social and economic life of this community.

The Dargues Reef Mine will produce an income for five years; the books, artwork and peaches produced in this valley bring in a far greater income and with either no or minor environmental impact.

Response: Section 4.13.4 of the *Environmental Assessment* presents an assessment of the socio-economic benefits of the Project. In summary, the Project would generate approximately 100 full-time equivalent positions during site establishment operations and 80 full-time equivalent positions during mining operations. In addition, the Project would contribute $14 million and $46 million per year to the local, regional and national economies through wages, purchase of goods and services and taxes and royalties. This would further stimulate economic activity in the region surrounding the Project Site. Finally, the Project would result in training and education opportunities, as well as the establishment of infrastructure that would provide benefits well beyond the life of the Project.

4. Wider Australian and international reputation

The Araluen valley appears to be only a small regional community. It is, however, dear to tens of thousands, perhaps millions, around the world.

In less than a week copies of nearly 1,000 submissions directed to the Department have been sent to me. I have had emails from many countries offering support and help. There is no doubt that if the time for submissions had been longer, an increasing number of submissions would have come in.

The Araluen Valley is familiar to millions of readers.

Diary of a Wombat has become on one the world's loved children's books. It is based on a real wombat, Mothball, who lives in this valley. In addition there are the thousands who have bought peaches at the Wisbey's or Harrison's sheds, bought vegetables from the Kindrachuks' stalls, camped or simply driven through the valley for it's peace, serenity and beauty.

What would it do to Australia's international reputation to admit that the wombat loved by so many has died because its habitat has been destroyed to benefit a short lived gold mine?

Response: The Proponent contends that the *Environmental Assessment* adequately demonstrates that there would be no significant adverse impact on flora or fauna within the Araluen valley for the reasons identified in Sections 5.2.12 and elsewhere in this document.

5. Effects on the Neverbreak Hills Araluen Arboretum

……Australia's largest Agricultural Arboretum. It has been the work of 34 years to which we have devoted a large part of our lives and resources. With over 800 fruit trees we grow 272 different kinds of fruits, testing the cold tolerance of once presumed tropical trees like avocadoes and custard apples. The Arboretum contains 132 varieties of apple, 13 varieties of quince (Australia's largest collection), 13 varieties of lillypilly, 57 varieties of avocado (Australia's largest collection) one of these, a new variety called wedding Day, promises to the Australia's most cold tolerant avocado, able to be grown as far south as Melbourne, with fruit that bears just after Hass - the only avocado to fruit at this time. The flesh is oil rich; the seed small; it has great commercial potential. Like other varieties bred here however, grafting stock will be made free to the public.

I have been conducting research on natural pest control, weed control and drought tolerance here since 1974. The results are published in books such as natural Control of Common Weeds, Organic Control of Garden Pests; my contributions to organic farming and gardening methods and philosophy are detailed CSIRO's latest publication: A History of Organic Farming and Gardening in Australia by Reebecca Jones.

This property was one of the first in Australia to demonstrate the commercial viability of drip irrigation, minimum tillage, biological control of various agricultural pests and diseases and weeds and other agricultural practices than are now commonplace. It is reasonable to assume that further research will show the value of equally important agricultural practices.

I have also been conducting a 34 year continuous study of local ecology, wombat and macropod ecology.

……..the Arboretum demonstrates new methods of organic farming and gardening; the creation of drought resistant agricultural ecologies and businesses, and methods by which commercial orchard and market gardening can co exist with wildlife, including methods to mitigate bird, possum, wallaby, wombat, grasshopper/plague locust and flying fox depredation of crops.

Any drop in ground water, further depletion of Major's creek, or increase in heavy metal pollution of the water in Major's Creek would make these ongoing studies and demonstrations impossible.

Our arboretum contains irreplaceable agricultural genetic material, as well as being a source of inspiration and knowledge for many thousand of farmers and gardeners who have visited it or studied at workshops here. The trees are watered only for the first 12 months; after that they survive on ground water. Any lowering of the water table will mean the loss of all species. An accident to the tailings dam, four kilometres upstream with an embankment 25 metres above the natural surface, would of course destroy not just the arboretum but our house and any person or animal in its sway.

I request that before an assessment is made of the Dargues Reef proposal a test bore be installed to monitor loss of groundwater in the Arboretum, and that if the ground water does fall, that those operating the Dargues reef Mine remediate that loss within a three month period.

Response: Sections 5.2.9, 5.2.11 and 5.2.12 identifies the anticipated extent and nature of water-related impacts associated with the Project. In addition, Sections 5.2.23 and 5.2.24 address issues associated with construction and management of the tailings storage facility and management of tailings material and processing reagents. The Proponent contends that the Project adequately addresses all risks associated with these aspects of the environment and that there would no adverse impacts on the operation of the Neverbreak Hills Araluen Arboretum located on the Respondent's property approximately 5km from the proposed mining activities as a result of the Project.

6. The Dargues Reef Mine tailings dam

No study has been made on the effect of the tailings dam failing, either from extreme rainfall events or from human agency. No study has been made by Cortona of the extreme fluctuations at Majors Creek- all rainfall data has been taken from Wallace Street Braidwood. While this is only 20 kilometres away, Majors Creek is subject to an unusual 'double dip' effect, where westerly rain-bearing winds are blocked by coastal easterlies.

Cortona has made no attempt to locate any of the rainfall records kept at Majors Creek or Araluen; or if they have, they have preferred to use the largely irrelevant Braidwood figures.

The Dargues Reef tailings dam will be 25 metres above the surrounding ground level; it will hold 800,000 cubic metres of tailings kept in permanent suspension. The Dargues Reef tailings dam will be only four kilometres from our property, and approx. 350 metres above us. If the tailings dam fails, the sediment will wash through a narrow gorge, less than 40 metres wide in places, leading to a venturi effect - the sediment will be forced higher and swifter. Any failure will destroy not just the nature reserve but our house, livelihood, and the arboretum, as well as endanger our lives and destroy the species mentioned above, as well as the other flora and fauna of the area.

Cortona has said that the tailings dam will be world's best practice'. However, according to New Scientist, 18 October 2010, world's best practice involves a secondary wall in case the first fails. No secondary wall if proposed for the tailings dam at Majors Creek.

The potential for a failure of the tailings dam wall is highly likely to reduce the value of our property, as few purchasers would be attracted to a property with such a massive and nearby threat to its existence.

I request that if the Dargues Reef Project is accepted, that - at the very least- a secondary wall be made mandatory.

I also request that the entire tailings area, not just part of the tailings dam, have a plastic lining as well as clay.

Response: In relation to the issues raised, the Proponent notes the following.

- Section 4.6 addresses matters in relation to the use of rainfall data from Braidwood. In addition, the Proponent notes that validated rainfall records from the Bureau of Meteorology for Majors Creek are not available and that use of non-validated data would introduce additional uncertainty into the surface water assessment.
- Section 5.2.23 addresses matters in relation to the design, construction and operation of the proposed tailings storage facility and the risk of catastrophic failure of that facility.
- Tailings within the tailings storage facility would, as is standard practice for most tailings storage facilities worldwide, be discharged as a thick slurry. The solid material in that slurry would settle out to form a "beach" of solid material, while the liquid component of the tailings would be recovered for reuse within the processing plant. The tailings storage facility would not contain, as alleged, a "permanent suspension" of liquid tailings material.
- The Proponent presumes that the respondent is referring to a 237 word article entitled *Lax Laws Led to Mud Flood* published in the *New Scientist* magazine on 16 October 2010. That article focused on the failure of a "concrete dam" at an aluminium plant in Hungary in early October. The article stated that in the opinion of Paul Younger of Newcastle University, UK, that the facility should have had a secondary wall and that lax European Union laws allowed the accident. The Proponent notes that the proposed tailings storage facility embankment would be a clay and earth embankment and that the *Dam Safety Act 1978* and associated regulations require strict controls on the construction and management, including regular inspection, of facilities prescribed under the Act. Finally, as noted in Section 5.2.23, the Proponent is not aware of any tailings storage facilities with double walls, nor that that these represent best practice within the mining industry.

7. The Majors Creek fault line

A major fault line runs along Majors Creek. It has been subject to minor slippage in the past 30 years; the major slippage in the past of this and other nearby fault zones is the major reason for the existence of the Araluen valley.

The proposed Dargues Reef tailings dam and the Dargues Reef Mine itself are only 1.5kM away from the Majors Creek fault line.

[Section deleted from public record]

……..Any slippage on this fault line could result in the failure of the dam; a wall of tailings kept in suspension for decades or longer - down the fragile gorge country, over our house and land.

No assessment seems to have been made of the effect of slippage from the Majors creek fault line. There is no reference to this in the Environmental Assessment.

Response: The Proponent notes that as part of its exploration program it has undertaken an aerial magnetic survey, in part to identify structures and faults that may influence the location of mineral resources. That information has been used to generate plans showing the location of structures and faults within and surrounding the Project Site (see for example Figure 4.5 of the *Environmental Assessment*). The Majors Creek-Araluen Fault has been mapped by the NSW Geology Survey on the Canberra 1:250,000 geological plan approximately 3km to the southwest of the proposed Dargues Reef Mine and the tailings storage facility. The fault strikes to the southeast and, in the vicinity of the Project Site, is coincident with Bains Gully, not Majors Creek.

The Proponent obtained data relating to seismic events within a 250 km radius of the Project Site from the US Geological Survey database from 1973 until the present. That database records 82 earthquakes within 250 km of the Project Site since 1973. Of the recorded seismic events, only one has been recorded to the southeast of the Project Site (**Figure 8**). Of the 82 earthquakes, 46 earthquakes have had a magnitude of 3.0 or above. The most significant event was a magnitude 5.5 event (13 km depth) in March 1973, the epicentre of which was approximately 165 km to the northeast of the Project Site. The closest recorded seismic event to the Project Site was a magnitude 3.0 event (5 km depth), the epicentre of which was 88 km from the Project Site. The single seismic event recorded to the southeast of the Project Site was recoded approximately 171km from the Project Site and had a magnitude of 3.5 or less.

The Proponent notes that the tailings storage facility would be designed for a Maximum Design Earthquake of magnitude 7.5. This would represent common practice for the intra-plate tectonic structure of Australia, and is more onerous than the criteria identified by the NSW Dam Safety Committee earthquake design guidelines.

8. Mine depth and radon exposure

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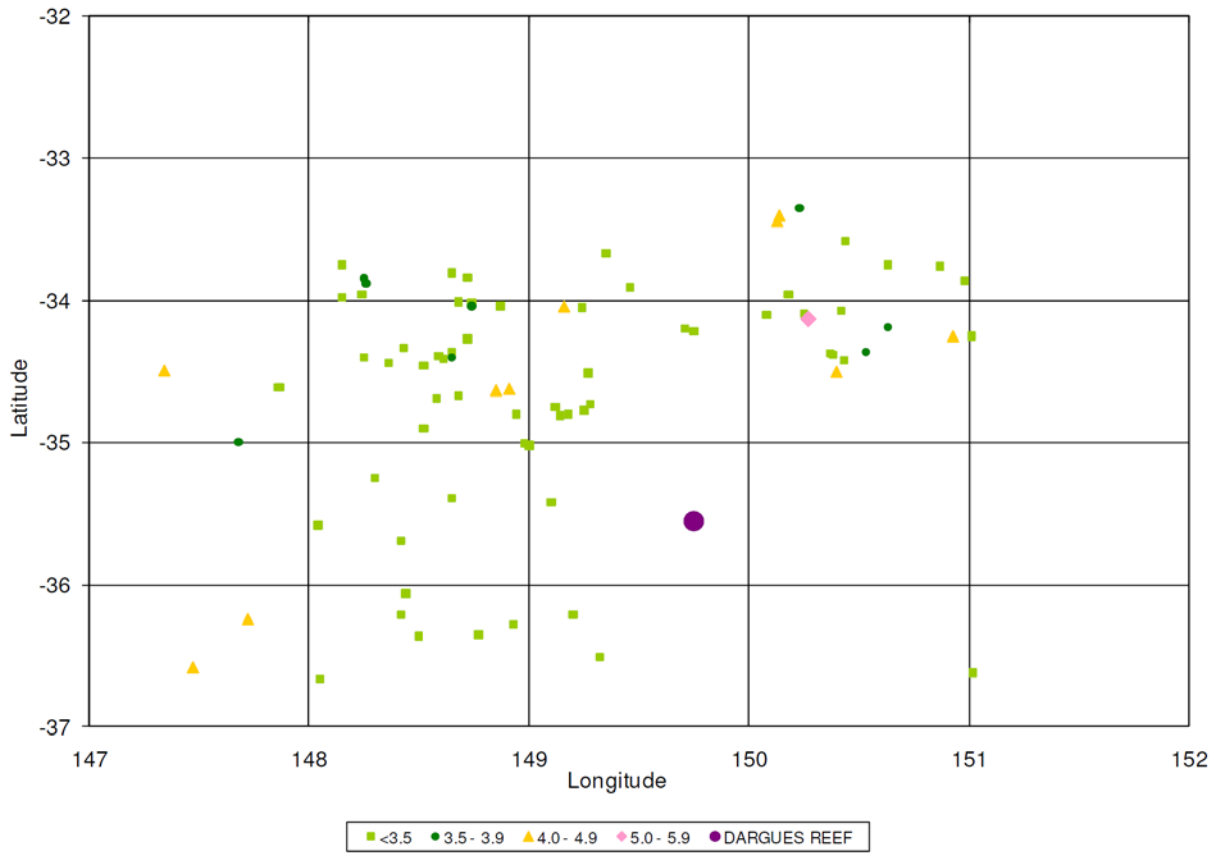
…….....there appears to have been no testing of radon gas levels in the three existing historic mine shafts. There is also no mention in the Environmental Assessment of monitoring radon gas levels, nor of the threat to worker health.

Response: Radon is a radioactive gas that occurs naturally as product of the decay of uranium. Elevated concentrations of radon may be found in confined areas where there are elevated concentrations of uranium-bearing minerals. Examples may include buildings with large areas of high-uranium granitic dimension stone or underground uranium mines.

The Proponent notes that radon concentrations in the proposed Dargues Reef Mine are not expected to be significant as the uranium concentration within the Braidwood Granodiorite is relatively low. Table 2.6 of the *Environmental Assessment* identifies that typical concentration of uranium in the Braidwood Granodiorite is 3.1ppm to 3.7ppm. Notwithstanding this, the Proponent would ensure that adequate ventilation is provided within the mine.

Figure 8 Recorded Seismic Events – 1973 to 2010



Source: Knight Piésold Pty Limited (2010)

No radon-related impacts are anticipated on surface within or surrounding the Project Site.

9. Threat to Endangered species, critically Endangered species and Threatened Species in the four kilometres below the Proposed Mine Site

Cortona has made no attempt to identify any of the critically endangered, endangered or threatened wildlife or fauna in the area below the dam that may be affected either by loss of groundwater or failure of the tailings dam.

Response: Section 4.3.2 of the *Environmental Assessment* identifies the listed species identified as likely to occur within 5km of the Project Site.

The Dargues Reef Mine EA studied only the impact on the flora and fauna of the mine site, and not the gorge nature reserve or private wild lands within the catchment area, and the area likely to be affected by the massive use of groundwater. They have made no attempt to contact us to get access to study the endangered species on our property, or to the National Park Reserve around us.

Response: As the surface water assessment determined that there would be no significant adverse surface water impacts downstream of the Project Site and the groundwater assessment determined that extent of groundwater-related impacts would be approximately 2.5km from the proposed mine, no further ecological surveys were considered warranted under the requirements of the following documents.

- *Threatened Biodiversity Survey and Assessment: Guidelines for Developments and Activities (Working draft),* prepared by the Department of Environment and Conservation (2004); and
- *Draft Guidelines for Threatened Species Assessment* prepared by the (then) Department of Environment and Conservation and Department of Primary Industries (2005).

Finally, it is noted that an assessment of all listed species considered likely to occur within or surrounding the Project Site was undertaken and is presented in Section 4.3.6 of the *Environmental Assessment*.

The Majors Creek National Park Reserve, the Majors Creek gorge, and the Araluen Scarp Grassy Forest are areas of considerable biological richness, in both numbers of species and habitats. The survival of the extraordinary number of species is due to the steepness and roughness of the terrain, which has meant that it has not been logged or affected by earlier mining. It is possibly the only remnant of the original ecology present before the disturbances of farming and gold mining.

The four kilometres directly below the proposed Dargues Reef Mine ranges from rainforest dominated by Backhousia myrtifolia (one of the few such 'dry temperate' rainforest remnants in Australia) to grasslands with rich populations of orchids, to dry sclerophyll and wet sclerophyll forest, each with their own unique but interlocking communities of plants and animals. Several do not exist elsewhere; all are already under threat from climate change and water loss to bores. Any further loss of groundwater would see their extinction.

In 2006 The NSW Scientific Committee, established by the Threatened Species Conservation Act, has made a Final Determination to list the Araluen Scarp Grassy Forest in the South East corner Bioregion as an Endangered Ecological Community in Part 3 of Schedule 1 of the Act. Part 2 of the Act provides for listing of Endangered Ecological Communities.

Note: details of many of the endangered, threatened or critically endangered species have been provided, but will not be made public, as publicly revealing their presence or site might further endanger them. The ones publicly mentioned include:

The following are endangered or critically endangered species that will be threatened, or possibly wiped out by the impacts mentioned above of the Dargues Reef Mine. Due to time constrains - I only received the EA two and half weeks before the close of submissions - it is not complete.

As there has been no assessment of these species in the Dargues Reef Mine Environmental Assessment I ask that before consideration of this assessment is made and before there is any consideration of approval of the mine that an in-depth assessment is made of the risk to these species.

Rare and endangered species within a three-kilometre radius of the mine The Araluen scarp Grassy Forest has been listed as endangered. The entire area is within 2-5 kilometres of the mine and all parts of this bioregion will be affected by the proposed massive depletion of groundwater.

Specific species listed in NSW as rare and endangered species in the area likely to be affected by the mine include:

- *Eucalyptus kartzoffiana- critically endangered and all existing wild specimens are within the area affected by the mine use of groundwater. It grows in proximity to creeks and springs and available groundwater is critical for its survival- far more than for most eucalypts.*
- *Powerful Owl (Ninox strenua): these regularly nest within one to two kilometres of the mine. Status: vulnerable*
- *Barking Owl (Ninox connivens). Status: vulnerable.*
- *Araluen Zieria adenophera: the only wild specimens of these are within five kilometres of the proposed mine. Status: critically endangered.*
- *Majors Creek Leek Orchid: Prasophyllum sp. Majors Creek: status, endangered*
- *New Holland mouse (Pseudomys novaehollandiae): vulnerable*
- *Zieria adenophera- Araluen Zieria: endangered*
- *Button Wrinklewort -Rutidosis leptorrhynchoides- endangered*
- *Grey Deua Pomaderris - Pomaderris gilmourii var. cana*
- *Spotted-tailed Quoll - Dasyurus maculatus Status: endangered*
- *Gang-gang Cockatoo: These are transitory, visiting the area within two kilometres of the mine, usually for four to six weeks each autumn.*
- *Bettong: nesting sites last observed two years ago. Status ??*
- *Red Goshawk: these live and nest within the gorge and cliffs just below the mine site. Status: endangered.*
- *Grey-headed Flying-fox - Pteropus poliocephalus. Status: threatened*
- *Eastern Bentwing-bat (Miniopterus schreibersii oceanensis) : status*
- *Squirrel Glider - Petaurus norfolcensis: status, vulnerable, presence in the area not confirmed but probable*

[Section deleted from public record here]

Many species exist locally only within the gorge below the mine site, These include:

- *The southern most natural occurrence of Bunya Bunya nut trees.*
- *The southern most natural occurrence of Ficus coronata, or sandpaper Fig, not endangered, but present in only two gullies in this region, both affected by the proposed Dargues Reef Mine.*
- *The southern most natural remnant of cabbage Tree palm.*
- *An otherwise unknown pink subspecies of the common brown snake*
- *Backhousia myrtifolia or Neverbreak tree or Grey Myrtle: one of the few remaining remnants of backhousia dry rainforest canopy left.*
- *Notothixos subaureus, parasitic mistletoe.*
- *Dodonaea viscosa -a local subspecies, not yet positively identified.*
- *Adiantum formosum - giant maidenhair- not endangered but this is the only area locally where it appears.*
- *An unnamed stringybark, possibly a hybrid of the red and yellow stringybarks; still to be positively identified.*
- *Macropus rufogriseus: Red-necked wallaby; not threatened, but almost extinct in this district. This appears to be the single surviving local population.*

Other wildlife: Due to the short period of time allowed for comment I have not had time to list all the other animals which currently thrive in the valley below the mine site. These include 127 species of birds, eight species of snake, Common Wombat, Eastern Grey Kangaroo, New Holland Mouse, echidna, Black-tailed Wallaby, Wedge-tailed Eagle Aquila audax, lyrebird, Pretty-faced Wallaby, Brushtail Possum, Ringtail Possum and Sugar Glider to name just a few.

The Wedge-tailed Eagle

Aquila audax is listed as a declining species in this area.

, Crimson Rosella

Platycercus elegans, Eastern Yellow Robin, Grey Fantail,

Response: The respondent identifies a range of listed species and communities, as well as a range of species that are not listed as vulnerable or endangered, and states that they have not been assessed. The Proponent notes that an assessment was undertaken for:

- all species identified on the databases listed in Section 4.3.2 of the *Environmental Assessment* as likely to occur within 5km of the Project Site;
- additional species identified by the authors of Gaia (2010) as potentially impacted by the Project; and
- all species identified by DECCW as likely to occur in the vicinity of the Project Site or potentially impacted by the Project.

Of the species identified by the respondent as not being assessed, impact assessments have been provided in Section 4.3.6 of the *Environmental Assessment* for the following.

- *Eucalyptus kartzoffiana* (Araluen Gum).
- Powerful Owl
- Barking Owl
- Araluen Zieria
- Majors Creek Leek Orchid
- Spotted-tailed Quoll
- Gang-gang Cockatoo
- Grey-headed Flying-fox
- Eastern Bentwing-bat
- Squirrel Glider

The Proponent contends that it has fully assessed all species that may be potentially impacted by the Project. However, in light of the concern shown by the respondent in relation to the identified species, **Table 8**, prepared by Gaia Research Pty Ltd, provides additional information on those identified species not assessed in the *Environmental Assessment*.

Table 9 presents the habitat preference for all listed species and ecological communities identified in **Table 8**. As neither the New Holland Mouse nor the *Backhousia myrtifolia* dry rainforest are listed under the TSC Act or the EPBC Act, they are not addressed in **Table 9.** An assessment of whether suitable habitat occurs within the Subject Site is given and based on habitat preference, suitability of the site (area, degree of fragmentation) and survey results a subset of species are selected for further assessment.

Table 8
Species and Communities not assessed in the *Environmental Assessment*

Threatened Species / Ecological Community	TSC Act Schedule	EPBC Act Classification	Information source as occurring in area
Fauna			
New Holland Mouse	Not listed	Not listed	Submission 35
Bettong? (Tasmanian)	Extinct	Not listed	Submission 35
Bettong? Brush-tailed	Extinct	Extinct	Submission 35
Red Goshawk	Critically endangered	Vulnerable	Submission 35
Flora			
Button Wrinklewort	Endangered	Endangered	Submission 35
Grey Deua Pomaderris	Vulnerable		Submission 35
Endangered Ecological Community			
Araluen Scarp Grassy Forest in the South East corner Bioregion	Endangered	Not listed	Submission 35
Backhousia myrtifolia dry rainforest	Not listed	Not listed	Submission 35

Source: Gaia Research Pty Ltd

Table 9
Preferred Habitat of Listed Species and Ecological Communities

Threatened Species / Ecological Community	Habitat Preference in region	Habitat Assessment Survey results
Tasmanian Bettong	Extinct in NSW	Extinct
Brush-tailed Bettong	Extinct in NSW	Extinct
Red Goshawk	Prefer woodlands and forests but in NSW, Red Goshawks frequent mixed subtropical rainforest, *Melaleuca* swamp forest and open eucalypt forest along coastal rivers (NPWS 2002, Debus 1993).	Not present
Button Wrinklewort	Occurs in Box-Gum Woodland, secondary grassland derived from Box-Gum Woodland or in Natural Temperate Grassland at Goulburn, the Canberra - Queanbeyan area and at Michelago	Not present within the Project Site and not likely to be impacted by the Project.
Grey Deua Pomaderris	Only found in open shrubland on rhyolite outcrops in Deua National Park, south-west of Moruya	Not present within the Project Site and not likely to be impacted by the Project.
Araluen Scarp Grassy Forest in the South East corner Bioregion		Not present within the Project Site and not likely to be impacted by the Project.
Source: Gaia Research Pty Ltd		

It is noted that sections of the respondent's submission have not been made available to the Proponent. As a result, an assessment of potential Project-related impacts on those species cannot be provided.

10. Effect on Households Downstream

Although the EA asserts that no households downstream draw water from household uses downstream from the mine, at least four households within 1 kilometres of the mine do so, and seven within four kilometres of the mine.

Response: This is a factually incorrect statement. The *Environmental Assessment* makes no comments in relation to residents drawing water from Majors Creek.

11. Water quality

Two of the sources of water to remediate Major's Creek come from already polluted sources- dewatering the active water and mine pumped from old abandoned mines. This proposal will reduce the ground water even further.

Response: The Proponent notes that water to be used for the compensatory flow program would principally be sourced from the proposed harvestable rights dams, not groundwater sources. In addition, the Proponent notes that groundwater within the Project Site is not currently polluted and that the Proponent would implement measures to ensure that it does not become polluted as a result of the Proponent's activities. Finally, this issue is further discussed in Section 4.6 of this Document.

The water testing of the old mines was in the seasons 2009-2010, a time of above average rainfall in this area, unlike the drought years 1994-2008. It is likely that the level of contaminants is far fewer in these tests, as the water was diluted by recent rainfall. Tests of the water in the abandoned Dargues Reef mine in 1982 showed extreme heavy metal pollution.

Response: Section 7.3 of AGE (2010) identifies that each of the monitoring bores constructed for the groundwater assessment were tested by a hydrogeologist and that each bore was purged prior to sampling. As a result, the AGE contend that the samples tested from the monitoring bores are representative of groundwater within the Project Site. In addition, AGE contend that groundwater quality would not typically be expected to change as a result of a relatively short term increase in rainfall following an extended period of drought.

[Portion deleted here; not for public release]

Any further pollution of water downstream from the mine may destroy flora, fauna, property values and local businesses, including the orchards and market gardens of Araluen and the oyster farms of the Moruya River. (Major's creek flows into the Deua River, which becomes the Moruya River when it enters the town.)

I request that all water returned to the Major's creek and Araluen aquifers be tested on a daily basis and the levels of pollution made available to all who have made submissions to this enquiry.

Response: Commitment 15.12 states that the quality of water released as part of the compensatory flow program would be tested quarterly. In addition, the Proponent anticipates that the quality of water released under the compensatory flow program would be governed by the Project's Environment Protection Licence. That licence would identify water quality criteria as well as monitoring frequency. However, in light of the level of concern in the community on relation to the compensatory flow program, the Proponent has amended Commitment 15.12 to include daily water quality monitoring of water discharged as part of the compensatory flow program using field monitoring equipment for the initial three months of the program. Following that period and providing that no exceedance of the relevant criteria set by the Environment Protection Licence are identified, then the frequency of monitoring would be reduced, in consultation with the relevant government agency, initially to weekly.

Finally, as previously identified, the Proponent anticipates that any project approval granted for the Project would require the results of all environmental monitoring to be made publicly available on the Proponent's website.

Questions and Recommendations

Before any consideration is given to approving the Dargues Reef Mine, I humbly submit that:

1. That the proponents substantiate their claim that a groundwater modelling covered an area of 7km by 6km' has been done by providing details of bores tests and data collected in the Major's Creek National Park Reserve, 1.5 km directly downstream from the proposed mine, and the property owned by Jackie French and Bryan Sullivan, 4 km directly downstream from the proposed mine.

Without this data the proponents can not justify their claim that and area 6- B square km has been tested; nor can they even justify the claim that an area of 2 square km from the proposed mine has been tested.

Response: This issue is addressed in Section 5.2.8.

2. That the proponents explain how results of the impact of the development on the area beyond 2 kilometres from existing test bores can be confidently extrapolated, given the terrain? Can this extrapolation be substantiated with references to current hydrological theory, and references for this degree of confident extrapolation supplied?

Response: This issue is addressed in Sections 5.2.8 and 5.2.9.

3. That the proponent explain why the bores tested are on land predominantly above the proposed mine, not below it i.e. on the land least likely to be affected by proposed mining, with only two test bores downstream close to the mine site, and no test bores on the land most likely to be affected.

Response: Section 4.4.2.3 and Figure 4.18 of the *Environmental Assessment* identifies that eight monitoring bores were constructed at six locations within the Project Site. Three of these locations were downslope of the proposed Dargues Reef Mine

4. That the proponents explain why despite repeated requests by the landowners no ground water testing has been done from 1.5-20 to kms directly downstream from the mine.

5. That the proponents explain why despite repeated community and landowner requests no ground water testing has been done along the course of Major's Creek, from L- 20 km directly downstream from the mine, at a distance of within half a KM each side of the watercourse.

Response: The Proponent notes that no approach in relation to establishing of test bores or evaluation of groundwater impacts on any non-Project-related property was received prior to 18 October 2010. When such a request was made by the respondent, the Proponent agreed in principle to establish a monitoring bore as requested.

6. That the proponents explain why they have publicly asserted that "The groundwater modelling covered an area of 7km by 6km" (in a letter to the Braidwood times 27 October and to local landowners) when no test bores or accurate modelling had been done from 1- 6Km beyond the proposed mine site along the course of Major's Creek, the area most likely to be affected by groundwater drop.

Response: This issue is addressed in Section 5.2.8.

7. That the proponents substantiate their claim that a 500 metre shaft extending 130 metres below the level of the Araluen valley, with 2KM of tunnels, will have no effect on the water table. Can the proponents produce data that would substantiate this, such as an example of a mine similarly extending under a valley floor with no impact on ground water or the level of the water table?

Response: This issue is addressed in Section 5.2.8.

8. It appears to be expert hydrological consensus that whenever a large amount of water is removed will be a severe drawdown of rock and regolith water in similar areas of decomposed granite. The Major's creek National Park Reserve and the properties of 381 and 402 Major's Creek Road Araluen are part of the same area of decomposed granite as the proposed mine.

If this expert hydrological consensus is correct then it appear that the area 1.5-6 KM below the proposed mine is at severe risk of a lowered water table. Can the proponents give reasons why this hydrological consensus should be ignored in the case of the proposed Dargues Reef mine?

Response: This issue is addressed in Section 5.2.8. In addition, the Proponent is aware of only one technical submission in relation to the groundwater assessment, prepared by an anonymous person. That submission is addressed in Section 5.4.1. In addition, a Peer review of the groundwater assessment did not identify any significant issues in relation to the adequacy of the assessment.

9. That the proponents substantiate their claim that data from tests a restricted and relatively level area can be extrapolated to give valid results about a possible result l.5-8 km downstream, with a sudden 300 metre drop into a valley, especially when no test bores have been sunk nor data collected in this area.

Response: This issue is addressed in Section 5.2.8. In addition, Figure 4.3 of the *Environmental Assessment* identifies that elevation difference between the highest and lowest sections of the Project Site is approximately 110m, namely approximately 735m AHD to approximately 625m AHD. In addition, Section 4.4.2.3 of the *Environmental Assessment* identifies that standing water levels within the Project Site vary from approximately 715m AHD to approximately 617m AHD, or a difference of 88m.

10. That the proponents substantiate their claim that data from tests a restricted and relatively level area can be extrapolated to give valid results in a valley who's hydrology and geology have been so disrupted by a century of gold mining that experts who have studied the area claim that no valid extrapolation can be made of how bores in one part of the Araluen catchment will effect other areas, without direct testing.

Response: The Proponent notes that historic mining operations principally impacted upon alluvial aquifers. As identified in Section 4.4.4.1 of the *Environmental Assessment*, these aquifers are relatively thin and are restricted to the larger drainage lines such as Majors Creek. As a result, disruption of the alluvial aquifer would have very limited impact on the underlying granodiorite aquifer.

11. While in many areas tests done in a limited area can be extrapolated to give reliable data many kilometres away, can the proponents substantiate their claim that tests done 300-400 metres above a valley that begins 1.5 km from their mine will give valid results for the hydrology of that valley? Can they provide independent references to support this claim, with special references to hydrology studies done in the Major's Creek Araluen area from 1980-2002. (Note: local hydrology studies done in this period exist, and are accessible to the proponents with details given by the Araluen progress Association).

Response: This issue is addressed in Section 5.2.8. In addition, the studies identified by the Proponent were considered in the groundwater assessment and are identified in Sections 8 and 13.7 of AGE (2010).

12. That the proponents demonstrate where in their EA they have examined and made use of data provided by the Araluen Progress Association from the varied studies done on the complexities of the water table in the Major's Creek Araluen area, and how that might relate to possible dramatic falls in ground water in the Major's Creek Gorge/Araluen Valley.

Response: The data provided by the Araluen Progress Association is identified in Section 8 of AGE (2010) and is discussed explicitly in Section 3.7 of that document in identifying potential groundwater-related impacts in the vicinity of Araluen

13. That the proponents explain why they have used rainfall figures from Wallace Street Braidwood and not rainfall figures from major's Creek and Araluen.

Response: This issue has been addressed in the separate response to the NOW.

14. That the proponents substantiate any claim that Braidwood rainfall is a sound basis for predicting Major's Creek rainfall. It is further requested that in answering this question, the proponent's provide data on the rainfall differences in Braidwood and Major's Creek on January 1, 1983, May 1988, and in the year 2003.

Response: This issue has been addressed in the separate response to the NOW.

15. That the proponents explain why they have not accepted the offer of relevant local data on the rainfall figures Major's Creek/Araluen catchment, and why they have failed to use those more relevant figures in their EA.

Response: The Proponent notes that rainfall data from private weather stations is typically less complete and has not been the subject of the quality control and verification procedures that the data from Bureau of Meteorology-controlled weather stations have been subjected to.

16. That the proponents provide a valid explanation for the inconsistencies in the figures for the total amount of water required for operational use of the proposed development, and different figures that will be available under harvestable rights in the EA.

Response: The Proponent is not aware of any inconsistencies in the volumes of water proposed to be used for operational purposes. Nor is the Proponent aware of different figures in relation to water that would be available under the Proponent's harvestable rights. No inconsistencies have been highlighted in this or any other submission.

17. That the proponents demonstrate where in their EA they have examined the effects of existing and possible heavy metal pollution in water taken from Major's Creek for household, stock and irrigation uses? This explanation needs to include data from low flow periods, as well as current 2010 high flow periods.

Response: The Proponent notes that the quality of water currently within Majors Creek is not a matter that has been influenced by the Proponent or the Project. In addition, the Proponent contends that the proposed management and mitigation measures, as well as the proposed water monitoring measures, would ensure that the risk of Project-related impacts on water quality downstream of the Project Site is minimised to the greatest extent practicable and that any issues that do develop are rapidly identified and addressed. Finally, Section 4.5.6.5 of the *Environmental Assessment* identifies that the Project would result in improved surface water quality within the Project Site. Sections 4.2.1.1 and 4.6 of this document further discuss the quality of surface water within the Project Site.

18. That the proponents demonstrate knowledge of the effects of possible heavy metal pollution in water taken from Major's creek for household, stock and irrigation uses, and indicate the threshold level at which heavy metal concentrations in the water will affect plants downstream. Note: various species have different thresholds for uptake up heavy metal pollution and tolerance to heavy metal pollution in the water.

The proponents will need to demonstrate a knowledge of the differing thresholds for the major species, both wild and commercial, in the area that might be contaminated from heavy metal pollution downstream.

Response: The Proponent anticipates that it will be required under to the conditions of any project approval that may be issued to comply with the water quality criteria identified by:

- ANZECC (2000) for upland rivers in south-east Australia (as identified in Section 2.102.6 of the *Environmental Assessment*); and
- The *Moruya River Water Quality and River Flow Objectives.*

19. The proponents demonstrate knowledge of the degree of existing heavy metal contamination of water in Major's creek watercourse, and provide figures on how that heavy metal concentration fluctuates in times of heavy and light flow and when flow has ceased and irrigation, stock and bush animal use is dependent on pools subject to high evaporation .levels.

Response: This issue has been addressed in Section 4.6. In addition, as the Project would not result in any disturbance to areas of alleged "heavy metal" or land contamination and would not contribute to additional water or land contamination, the Proponent contends that existing concentrations of "heavy metals" is not a matter relevant to determination of the Project.

20. That the proponents demonstrate knowledge of what level of greater heavy metal pollution is neede to take the existing heavy metal pollution in dry periods of the Major's Creek watercourse to levels that would be toxic for flora, fauna and orchard and household use.

Response: This issue has been addressed the previous response.

21. That the proponents provide data on the heavy metal concentrations in the Dargues Reef and other old mine sites, with reference to the changing concentration rates in the first and subsequent 30cm sections of those mines, and that the proponents also provide studies showing whether such heavy metal pollution might vary at different depths.

Response: The Proponent is not aware of any land contamination by "heavy metals" within the Project Site and has not been provided with any information by the respondent or any other person in relation to alleged land contamination.

22. That the proponents provide further data and expert substantiation, as well as comparison with actual performance in other gold mining operations in similar rainfall areas, for their claim on Page 7 that:

- *'the tailings would be unlikely to oxidize to form an acidic leachate'*

Response: The net acid generation potential of the tailings material is presented in Section 4.2.1.2.

23. The EA states Araluen is 20kms away and will not be or will be only minimally affected based on Araluen Valley water studies. Can the proponents explain why they have made no study of the impact on the first and second commercial properties in the Araluen valley i.e. those belonging to Bryan Sullivan and Jackie Ffrench, and Robyn Clubb of 'Wisbeys'. Can the proponents explain how they can substantiate this claim when no test bores or drilling has been done outside of 1.5 km from the prosed development?

Response: The Proponent notes that the Project is not expected to have an adverse impact on groundwater beyond the identified groundwater drawdown zone, approximately 2.5km from the proposed Dargues Reef Mine. In addition, the Proponent contends that the Project would not have significant adverse impacts on surface water quality or quantity downstream of the Project Site. As a result, explicit assessments of any commercial operations downstream of the Project Site are not considered warranted. Finally, the Proponent notes that despite considerable publicity and community consultation in relation to the Project since 2008, the respondent did not raise any concerns, attend any public meetings or request any additional information in relation to the Project until after the *Environmental Assessment* had been made publicly available. Had they done so, the Proponent would have ensured that any specific concerns were explicitly addressed in the *Environmental Assessment*.

24. Can the proponents explain why they have publicly claimed to have 'groundwater modelling covered an area of 7km by 6km' when no such tests have been done outside of 1.5km downstream of the site? Do the proponents accept that this is an attempt to mislead and deflect scrutiny of the area most as risk from the development?

Response: This issue has been addressed in Section 5.2.8.

25. That the proponents explain why they made no attempt to contact Mr Bryan Sullivan, as the owner of the first commercial property downstream from the proposed development, before the EA was prepared, or during its preparation, and why emails were ignored until three weeks after the EA had been made public?

Response: Section 3.2.2.1 of the *Environmental Assessment* identifies that extensive publicity and community consultation in relation to the Project was undertaken from November 2008 until the Respondent contacted the Proponent on 12 October 2010. That included:

- 9 public meetings/information sessions, including 2 meetings in Araluen;
- establishment of a well-publicised 24-hour community information telephone line and email address;
- door knocking of residents in Majors Creek and businesses in Braidwood;

- information stalls in Wallace Street Braidwood on 4 days in September 2010; and
- at least 10 articles/public notices in the Braidwood Times, Canberra Times and Queanbeyan Age.

The Proponent contends that it provided ample opportunity for the community to become aware of, obtain information and provide feedback in relation to the Project.

In relation to the allegation of ignoring of emails and implication of being unwilling to consult, the Proponent notes that it was first contacted by the respondent on 12 October 2010. The respondent stated that she had been sending emails to the community consultation email address for a number of weeks without a response. The Proponent notes that the email address had been operating as normal during that period, with other emails received and sent. The Proponent also notes that the information telephone line was also operational during that period and that no contact was made using that method prior to 12 October. Finally, the Proponent notes that once contact was established, a meeting was arranged within four business days and that the Proponent arranged for four consultants, including two from Queensland and one from Orange in the central west of NSW to attend the meeting at a total cost of approximately $10,000.

26. That the proponents substantiate their claim that no households within a 4 km area downstream of their mine use the Major's Creek water for household purposes, despite information to the contrary being repeatedly offered to them by residents of Major's Creek and Araluen, and also included in submissions to the Department of Planning?

Response: No such statement is made in the *Environmental Assessment*.

27. That the proponents explain why they do not accept the assertion of Best practice in relation to Surface and Groundwater Balances in the Murray-Darling Basin Commission report of 2004, which stated that 'Disconnected stream-groundwater areas tend to be associated with unregulated stream sections or mid to lower alluvial areas of catchments. The connected re-charge and discharge areas may be distant but should not be ignored in the water management planning.' Can the proponents provide evidence to show that the claims made by the authors of this, report are invalid?

Can the proponents provide evidence why this claim should not be related to the possible effects of a massive use of available water upstream and 300-400 metres above an area of orchards?

Response: The Proponent notes that the full context of the above quote is as follows.

> The cornerstone to the assessments process is the recognition that surface water and groundwater are two inter-related components of the one resource, and changes in one system can have a significant influence on the other. However, one resource should not dominate over the other during the assessment process. Therefore, ideally the sustainability issues of both the surface and groundwater resources of a catchment need to be assessed together. Although this is rarely undertaken at present, it is achievable because the same basic analytical approaches and tools (models) are involved in the assessment of each resource.

> The goal is to conjunctively assess and manage the one resource for sustainability over a specified management timeframe, avoiding allocation of the resource twice (from "separate" pools of surface and groundwater) and minimising impacts from irrigation. The conjunctive assessment and management of water resources involves acknowledging the different attributes of surface and groundwater systems within management approaches to obtain maximum benefit (within a specified timeframe) for economic, environmental and social values.
>
> The integration of knowledge of surface water and groundwater at the assessments stage allows the development and testing of conjunctive use strategies such as aquifer storage and recovery, protection of ecosystems and opportunistic cycling of the use of each resource within wet and dry periods.
>
> It is considered that the framework should be applied not only to water resources management in systems where there are connections between aquifers and streams, but also in systems that are disconnected. It has been shown that even in disconnected surface-groundwater systems; the use of one resource can affect the other. Disconnected stream-groundwater areas tend to be associated with unregulated stream sections or mid to lower alluvial areas of catchments. The connected recharge and discharge areas may be distant but should not be ignored in the water management planning. (*Background Paper - Guiding Principles for Sustainable Groundwater Management* published by IAH Australia)

The Proponent notes that consideration of this document is not a requirement of the Director General's Requirements. However, notwithstanding this, the Proponent contends that the surface water and groundwater assessment were undertaken in a manner consistent with the identified approach, namely that the systems should not be assessed in isolation. The proposed compensatory flow program is evidence of that, namely that the Proponent proposes to ensure that there are no adverse impacts on the surface water environment as a result of unavoidable impacts on the groundwater environment.

28. The Araluen aquifer system is ranked as the third most "at risk" aquifer in the Sydney South Coast Region, based on both the quantity and quality pressures on the groundwater resource'. Can the proponents demonstrate where in their EA they have taken this into account?

Response: The Proponent notes that no source for the above claim is provided. Notwithstanding this, the Proponent contends that the groundwater assessment has been undertaken to the appropriate standard, as identified in Section 5.2.8. In addition, the Proponent is unsure what the Respondent is referring to as the "Araluen Aquifer". As identified in Section 4.4.4.1 of the *Environmental Assessment,* there are three aquifer systems within the Project Site and given the similar geological setting in the Araluen Valley, it is likely that there are also three aquifer systems in the Araluen Valley.

29. The 2000 NSW Water Hydrology Reports report states that....'it appears that less than 40% of the flow in Araluen Creek was from rainfall, with the large component coming from either shallow or deep groundwater, or a source outside the valley'

- *Can the proponents explain why this information was not included in their EA?*

- *Do the proponents dispute that this report and other data was provided to them, but not included in their EA?*
- *Can the proponents substantiate a claim that this report is irrelevant to their EA, with reference to independent assessments, and nit their own extremely limited study?*

Response: The documents referred to are identified in Section 8 of AGE (2010) and have been explicitly taken into consideration in determining the anticipated Project-related impacts in the Araluen valley.

30. The EA states that the project site operation will depend upon the pumping of water from the mine incline to the surface and its use and management around the site for a variety of purposes and then discharge to Majors Creek to fulfil the EA environmental flow determination. Can the proponents explain why there is no mention of management of water quality in this proposal?

Can the proponents substantiate their claim that there is no need to monitor water quality in this scenario?

Response: Section 2.10.2.6 of the *Environmental Assessment* identifies that water removed from the proposed Dargues Reef Mine would be used for operational purposes, principally processing operations. As identified previously, that water would form part of the Contaminated Water Management system and would not be released to the natural environment.

31. Can the proponents provide data on possible subsidence in the four square km around major's Creek, the Major's Creek national park Reserve and that part of the Araluen Valley, which is within 3 km of the proposed development?

Response: Section 2.4.4.2 of the *Environmental Assessment* identifies that underground mining operations would be designed to ensure no surface subsidence.

32. Can the proponents explain why there is no mention in the EA of the impact of such development on the growing accommodation and tourist businesses in the Major's Creek and Araluen areas, with reference to noise, dust, traffic impact and the tourist perception of an area containing major extractive industry?

Response: The Proponent notes that all Project-related noise and air quality impacts associated with the Project would be less than the relevant criteria and that the Project would not result in significant adverse traffic-related impacts. In addition, the Proponent notes that feedback in relation to the Project from businesses surrounding the Project Site and in Braidwood, including tourism and hospitality-related businesses, has typically been positive.

33. That the proponents provide a definitive study, drawing on previous expert studies, of whether the Major's Creek and Araluen aquifer boundaries are the same, interlinked, or separate. If such a study has not been made part of the EA, on what basis and expert opinion has this choice been made? (Note: such studies exist and have been made available to the proponent)

Response: Section 4.4.2.2 of the *Environmental Assessment* identifies that the regional groundwater setting is dominated by three aquifers, namely:

- a fracture-controlled granodiorite-hosted aquifer;
- a regolith aquifer; and
- a shallow alluvial aquifer.

In addition, Section 4.1.4 and Figure 4.5 of the *Environmental Assessment* identify that the Braidwood Granodiorite underlies an area of over 1 000km^2, including the Project Site and the Araluen Valley and that alluvial material is typically associated with drainages such as Majors Creek.

Finally, Section 8 of AGE (2010) identifies previous groundwater studies undertaken in the vicinity of Araluen. No other reports have been identified or provided to the Proponent.

34. That the proponents give an expert asssment of possible reasons why during test drilling in 2010 the level of Major's Creek dropped, so that it ceased to flow from a point 2 km from the proposed development, even though Major's Creek at that time experienced a year and month of above average rainfall?

Response: As the Proponent was not made aware of any alleged decrease in flows in Majors Creek during 2010, no definitive comment can be made. However, the Proponent notes that exploration drilling has been ongoing since 2004, with no other reported adverse impacts on surface water levels. In addition, the Proponent notes that there would be no reason why exploration drilling would adversely impact on surface water flows within Majors Creek

35. Did the proponents measure the flow rate of Major's Creek during the period of test drilling? If so, can they provide measurements of flow rate, and the rate at which flow rate dropped from the mine site to the point where flow ceased? The proponents are requested to compare this flow rate to flow rates in other comparable rainfall years.

If the proponents claim that there was no impact on the flow rate, how can they reconcile this with observations 4 Km downstream that the flow stopped and springs dried up, despite above average rainfall?

Why did the proponents fail to measure flow rate further downstream, given the depth of drilling?

Response: This issue has been addressed in the previous response. In addition, the Proponent notes that it has not constructed a V-notch weir across Majors Creek because of the restriction on undertaking ground disturbing activities within 40m of a creek such as Majors Creek identified in the former *Water Management Act 2000* and its predecessors. In addition, there was no reason to believe that exploration drilling operations may adversely impact on surface water flows in Majors Creek.

36. If the proponents cannot produce figures to compare flow rates in comparable years, can they explain why they did not attempt to procure such data? (Note: such data is available).

Response: (SEEC) This issue has been addressed in the previous response. In addition, the Proponent notes that there is a gauging station on Araluen Creek at Neringla Road, Araluen (station 217006). SEEC examined data from that gauging station for the period 1 January 1997 to 25 November 2010, which represents the full period during which that gauging station has been operational. **Figure 9** presents an overview of that data. During 2010, significant rain events, particularly in February (199mm for the month) and May (142mm for the month) appear to translate to significant discharges and increases in flow at the gauging station. Base flows in Araluen Creek in other months (with a more average rainfall pattern) appear to settle at levels commensurate with historical base flows over the period of gauging.

In addition, rainfall data for 2010 to 25 November for the Braidwood Wallace St station records approximately 730mm of rainfall. This is very similar to the annual rainfall recorded in 1998 and 1999 (795 and 737mm respectively). The flow patterns in 2010 appear similar in nature to those of 1998 and 1999, with significantly wet periods translating to increased flow events.

As a result, there is no evidence that the Proponent's activities have resulted in reduced surface water flows within Araluen Creek.

37. That the proponents explain when the samples were taken from the old Dargues reef Mine for testing for heavy metal contamination, and correlate those with the rainfall in the previous three months before testing.

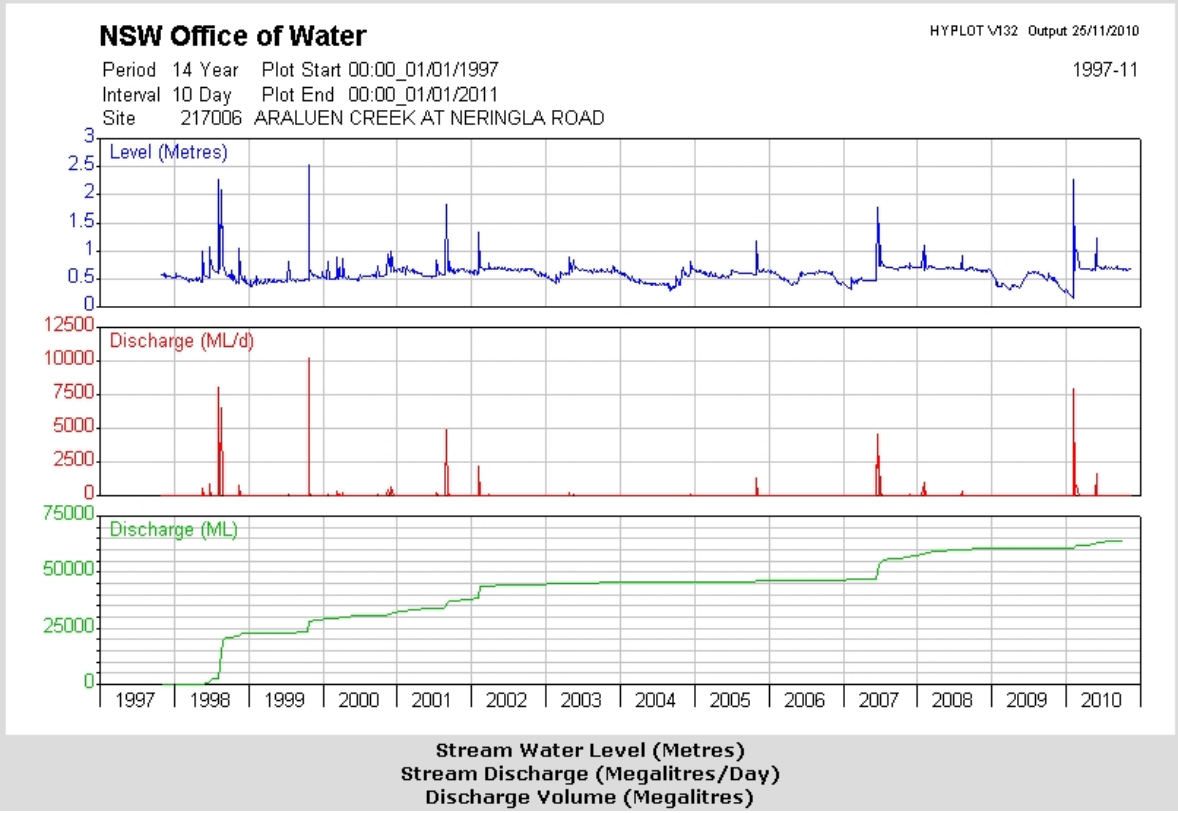
If the samples were taken at a time of above average rainfall (either using Braidwood or Major's Creek or Araluen figures) then the proponents are requested to provide sampling figures from a time of below average rainfall, to show that possible heavy metal contamination would not be present in a more typical year.

Response: The groundwater samples identified in Table 4.19 of the *Environmental Assessment* were collected in April 2010. As identified previously, the Proponent contends that rainfall in the period immediately preceding the sampling program is not relevant to the results of that program due to the disconnect between surface water flows and water within the fractured rock aquifer.

38. If the proponent is not able to provide such figures, could the proponents please explain why have they not considered this matter, nor done such testing?

Response: This issue is addressed in the previous response.

Figure 9 Araluen Creek Flow Data – 1997 to 2010



Source: SEEC

39. That the proponents explain why their EA does not include data on the many threatened, endangered and critically endangered species from 1.5-B km directly below the mine in the Major's Creek- Araluen gorge, and why the proponents have not conducted such a study, given that the Major's Creek National Park Reserve begins 1.5km from their proposed development, downstream, in the area that could logically be considered to be most at risk?

Response: This issue is addressed previously in this sub-section.

40. That the proponents explain why their study of endangered species in their EA is limited only to the area to be developed and not the area from 1.5 km and further down the Major's Creek gorge of the proposed development?

Response: This issue is addressed previously in this sub-section.

41. That the proponents demonstrate their knowledge of the relevant studies of flora and fauna in the area 1.5-20 km directly below the proposed mine, on land adjoining Major's Creek and the Araluen and Deua Rivers, by providing survey details including date and season of the year when they were conducted.

Response: This issue is addressed previously in this sub-section.

42. That the proponents clarify what species of endangered, threatened and other orchids are in the area 1-4 square Km directly downstream from the proposed mine, within half a KM either side of the Major's Creek waterway. Can they substantiate that a survey was done of these species, and give information on the sampling methods used, and the time of year where these orchids in the area, and can so be identified? can they substantiate that the number of species identified is comparable to the number of species identified in other surveys of this area?

Response: This issue is addressed previously in this sub-section.

43. That the proponents demonstrate that they have researched examples of similar gold mine developments within 1.5 km of threatened, endangered and critically endangered species and ecosystems, and give examples of where such developments have co existed with no harmful effect on such species or ecosystems.

Response: The Proponent contends that this is not a matter that is relevant to determination of this application. Notwithstanding this, given that every mining operation occurs in a different environmental setting, with different activities occurring and different potential adverse impacts, any such comparison would be of limited value.

44. Can the proponent elaborate on what studies have been done on the impact of noise, dust and explosions on the nesting habits of wedgetail eagles, and endangered powerful owls, masked owls and little eagles, known to nest in the area 1.5-4 km directly below the mine?

Response: Section 4.3.6.2 of the *Environmental Assessment* includes an impact assessment for Powerful Owl and Little Eagle. An impact assessment for Masked Owl is provided previously in this section. The Wedged-tailed Eagle, not being threatened, does not require an impact assessment.

45. Can the proponent provide details of migratory or mobile species that may be affected by the proposed development, with special reference to the varied species of bat, frog, and reptiles in the 4 square km vicinity of the proposed mine? To substantiate this, can they provide details of local surveys done, the methodology used, and the time of year that calls would indicate the presence of the eight frog species likely to be in the 2 square KM vicinity of the area directly below the proposed mine? Can they also substantiate this with details of the methodology used to sample the bat populations of the area, and the times of year when these surveys are likely to reveal the species present within a 2 km radius of the proposed development?

If such a study has been done, can its results be substantiated with comparison with existing surveys of such wildlife?

Response: Section 4.3 of the *Environmental Assessment* and Gaia (2010) provide a detailed description of the survey methodology used during the ecology assessment and impact assessment on species considered likely to be impacted by the Project.

46. That the proponents give an expert assessment of possible reasons why during test drilling in 2010:

- *the powerful owls that had nested within 2.4 km of the test drilling for the previous eight years failed to nest, and moved their hunting grounds approx. 4 km further down the Major's Creek gorge*

– *a little eagle, white goshawk and red goshawk similarly moved their territory further away from the disruption of noise, blasting and vibration? Did the proponents do any study of the effects of drilling, blasting and vibration on wildlife within a 1.5-4km zone during the test drilling and blasting? If this was not done, can the proponents substantiate a claim that there was no need for such a study to be done?*

Response: As the Proponent was not made aware of this issue at the time, no specific comment can be made. However, the Proponent notes that exploration operations have been occurring within and surrounding the Project Site since 2004 and that Gaia (2010) identified breeding Gang-gang cockatoo within Ribbon Gum Forest in the Project Site in the immediate vicinity of ongoing 24-hour exploration operations.

47. That the proponents substantiate their statement that the tailings dam meets 'world's best practice;' when New Scientist of 18 October 2010 states that world's best practice now includes a secondary wall in case the first wall fails, especially given the sudden and unexpected floods that Major's creek is especially prone to, and given the extraordinary steepness of the terrain immediately below the proposed mine site, leading to such a valuable resource as the Araluen valley.

Response: This issue has been addressed previously in this sub-section. In addition, the Proponent notes that the tailings storage facility has intentionally been located in close proximity to the catchment boundary to limit the potential for surface water run on.

48. Have the proponents done any study of how a lowered water table might affect bushfire risk in the Major's creek and Araluen areas? Can they substantiate a claim that possible ground water effects will have no impact on bushfire risk, with reference to independent expert sources?

Response: This issue is addressed in Section 5.2.16.

49. Can the proponents provide details on how soil types and locations will be assessed, stored and then replaced when the mine project is finished?

Response: This issue is addressed in Sections 2.3.3, 2.14.10 and 4.12 of the *Environmental Assessment*.

50. That the proponents give details on the methods used to maintain organic matter in stockpiles soils so that effective restoration can take place, or how this organic matter will be replaced when the mine is decommissioned.

Response: Proposed soil stockpiling methodology is identified in Sections 2.3.3 and 4.12 of the *Environmental Assessment*.

51. That the proponents provide an assessment of the six largest employers and highest grossing industries within a 10km radius of the mine, and detail the possible impact of the development on those businesses. If the proponents claim that no such assessment is necessary, can they substantiate that claim with reference to the impact on local communities of similar short-term mining ventures?

Response: Section 4.1.6.3 of the *Environmental Assessment* identifies that the principal industries of employment within the Braidwood State Suburb are:

- retail;
- agriculture, forestry and fishing; and
- public administration and safety.

As indicated in Section 4.13 of the *Environmental Assessment*, the Proponent contends that the Project would result in increased economic activity which would be likely to support the retail and associated industries. In addition, the Proponent contends that the Project would not have an adverse impact on surrounding agricultural operations. As a result, the impact of the Project on businesses and employment in the vicinity of the Project Site is likely to be overwhelmingly positive. This is supported by the positive feedback received from businesses and commercial operations during the consultation phase of the Project.

Finally, the Proponent notes that it would be unreasonable to expect it to undertake a detailed assessment of the impact of the Project on specific businesses when a significant number of other issues, including market and climatic conditions, management decisions and the broader economy, will all have a significant impact on individual businesses. In addition, it is unlikely that any such business would agree to provide the information required to undertake the suggested analysis.

52. That the proponents give details of the payments provided to Major's Creek landowners and community groups and Palerang Council, and of share offers to local residents and local councillors, and details of payments promised if the proposal goes ahead unhindered, and that the proponent give details of payment they will guarantee to make to any business, resident or landowner adversely affected by the mine's development?

Response: The Proponent notes that a deed of arrangement has been negotiated with Palerang Council in relation to payment contributions for road maintenance and community infrastructure. In addition, the Section 4.13.2 of the *Environmental Assessment* identifies that the Proponent would continue to support community initiatives, including through financial support. However, the Proponent strongly rejects any suggestion that it has made an improper share offer, monetary offer or any other kind of inducement to any person in return for "unhindered" approval of the Project.

It is anticipated that if Part 3A approval is granted for the Project, it will be granted subject to conditions that will confer on certain landowners the benefit of additional noise mitigation measures if the prescribed noise impact assessment criteria is exceeded, the benefit of an "independent review" regime in the event of any alleged exceedance of prescribed impact assessment criteria and in certain circumstances, the right to oblige the Proponent to acquire their property.

53. That the proponents provide data on similar developments where 800,000 cubic metres or more has been stored near an active fault line, and that the proponents provide seismic data on the movements in the Major's Creek fault line in the previous ten years/ with expert advice on

- *the possible effect of the estimated weight of tailings on a nearby active and inactive fault line.*

- *effect of the rpjceted weight of tailings on the tailings dam wall over the extent of its projected usefulness in the event of a slippage in the Major's Creek fault line.*
- *the effect of blasting in the vicinity of an active or inactive fault line . a half km deep mine shaft in the proximity of an active or inactive fault line.*

Response: The existence or otherwise of a "active fault line" in the vicinity of the tailings storage facility and the potential for adverse impacts on the structural integrity of the facility have been addressed previously in this sub-section and in Section 5.2.23.

54. That the proponents provide data on the effect of possible subsidence on the nearby active Major's Creek fault line. If the proponents allege that the fault line is not active, can they produce data to substantiate their claim?

Response: Section 2.4.4.2 of the *Environmental Assessment* identifies that underground mining operations would be designed to ensure no surface subsidence.

55. That the proponents provide data on the possible effects of slippage along the length of the Major's Creek fault line, and that they provide data on the length of the Major's Creek fault line, and on nearby human activity to the fault line.

Response: The existence or otherwise of the Majors Creek Fault hase been addressed previously in this sub-section and in Section 5.2.23.

56. That the proponents provide data on any other fault lines within 8 square kilometres of the proposed development, and on whether these fault lines are active or may become so in the proposed lifetime of the tailings dam.

Response: Figure 4.5 of the *Environmental Assessment* identifies aeromagnetic or airphoto lineaments that may be related to structural activity in the period since the Braidwood Granodiorite was emplaced approximately 411 million years ago. The absence of recorded seismic events within 88km of the Project Site has been previously identified in this sub-section.

57. That the proponents estimate the current annual income produced within the 4-20 square km directly downstream from the mine in the Araluen valley, with details of each business assessed, and the value of the land on which that business occurs, to enable authorities to estimate a reasonable bond that would be required to compensate residents, landowners and businesses in this area if any loss of water table or loss of quality of water occurred as a direct or indirect action of the proposed development.

Response: The Proponent contends that this request is not justified as the Project is not expected to have a direct adverse impact on any business downstream of the Project Site.

58. That the proponents estimate the costs of remediation to the local ecology and local businesses and residents in the event of:

- *a fracture or leak from the tailings dam.*
- *a lowering of the water table, from 1.5-10.7 metres.*
- *a loss of water quality from heavy metal or other pollution.*

- *an increase in bushfire risk.*
- *a loss of water for household, business or irrigation purposes*

Response: The Proponent notes that determination of the required security for the Project would be a matter for I&I NSW and that that Department would be likely to require an assessment based on the latest version of the rehabilitation cost estimate tool available on the Department's website.

I humbly request that:

- *before any consideration be made of the Dargues Reef proposal that the questions above be answered and the data provided and answers substantiated by independent published report or assessment.*
- *A further Environmental Assessment be provided, by an independent source with a hydrological report and study of eight kilometres downstream from the proposed mine, with particular attention to the region six kilometres downstream along the Major's Creek waterway from the proposed mine site.*
- *That a secondary wall be erected below the tailings dam.*
- *That Cortona pay for independent flora and fauna studies of the Major's Creek National Park Reserve, as well as the 4 square kilometres downstream of the reserve, to document the endangered and critically endangered species at risk; or if not, that local landowners be given a year to commission such studies. (The year is necessary as some of the endangered bird species are migratory, and the powerful owl can only be reliably recorded during late winter when its call can be heard. The grey-headed flying fox is also seen in some local areas only towards the end of summer.)*

Response: Each of these issues have been addressed previously in this sub-section.

If, despite objections, the proposed mine is given permission to proceed, I humbly ask that:

1. A series of no less than 12 test bores be established in the region from 1.5 to 6 kilometres below the mine site, on the Major's Creek National Park Reserve and the land belonging to Bryan Sullivan, Jackie Ffrench and Robin Clubb, at a distance of no more than 50 metres from the course of Major's Creek, and that before mining takes place assessments are made of the normal groundwater fluctuations over a period of a year, so that the mine's effect can be adequately assessed.

Response: The Proponent notes that it has already agreed in principle to establish monitoring bores on the properties of the respondent and Bryan Sullivan. The Proponent is open to further discussions regarding monitoring bores, however, the Proponent notes that numerous bores exist between the Project Site and the respondent's property and that these bores would be expected to be impacted by the Project before any impacts would be expected on the respondent's property. Further, the Proponent contends that following granting of project approval, the Project is expected to require approximately 7 months before underground development commences and that the decline would take another 24 months to reach the full proposed depth of 500m below surface. As a result, there would be ample opportunity to

monitor groundwater levels within the respondent's property prior to any potential groundwater impacts developing. Finally, the Proponent notes that there is no scientific reason why 12 bores should be established.

2. That data from the test bores be collected daily while all mining operations are in place, and made available to all landowners downstream from the mine and all other interested parties.

Response: The Proponent notes that it has agreed in principle to install an automated groundwater logger within any bore constructed within the Proponents property. Indicatively this instrument would measure groundwater levels on a daily basis for downloading every 6 to 12 months.

As indicated previously in this sub-section, the Proponent anticipates that any project approval granted for the Project would require that all environmental monitoring data be made publicly available.

3. That an independent hydrologist be employed to assess the ground water reading. If, in their opinion, mining operations are causing a drop in groundwater below the mine, then those operations will cease and a remediation plan will be put into effect within three months in consultation with the relevant government departments and all landowners affected.

Response: Section 4.4.6 of the *Environmental Assessment* identifies that where a sudden or unexpected change in groundwater levels is observed, that further investigation would be undertaken. Commitment 15.9 has been amended to indicate that this assessment would be undertaken by an independent hydrologist and that should the investigation indicate that the Project has caused the sudden or unexpected change, then the Proponent would negotiate an appropriate arrangement with the owner of the bore.

4. That the proponents agree to compensate all landowners, residents and businesses in full and within a three month period, for any loss of amenity or production directly or indirectly caused by the operation of their proposed development, both during the lifetime of the development and afterwards.

Response: It is anticipated that if Part 3A approval is granted for the Project, it will be granted subject to conditions that will confer on certain landowners the benefit of additional noise mitigation measures if the prescribed noise impact assessment criteria is exceeded, the benefit of an "independent review" regime in the event of any alleged exceedance of prescribed impact assessment criteria and in certain circumstances, the right to oblige the Proponent to acquire their property.

5. That a bond appropriate to allow this be calculated and set as a condition of development.

This will need to cover not just the an estimated $Au 3 million per annum income already generated in the Araluen valley, but other personal and financial loss, including loss of value of properties and businesses. The value of land and businesses in the eight kilometres just below the mine alone amount to more than $AU 20 million, and this is without costs of remediation and long-term business and personal loss. This compensation should not be limited to those in the catchment below the mine, but to all who have a demonstrated financial and personal interest in the land and water system affected.

Note: as the proponents have indicated that they are confident that there will be no impact beyond two kilometres of the mine site, they can have no objection to a condition asking for remediation if such an effect occurs.

Response: This has been addressed previously in this sub-section.

6. That alternate water sources be purchased instead of using water from an already endangered catchment. This could include the trucking in of water from areas of greater water as well as the smaller capacity from the capture of clean storm flow run-off from extensive roof areas that might be constructed over mine facilities such as the tailings stockpile.

Response: The Proponent notes that the principal water source for processing operations would be water that would be required to be removed from the mine to permit underground mining. In addition, the principal source of water for the compensatory flow program would be the proposed harvestable rights dams which may be constructed under existing rights held by the Proponent. Whether these sources should be the subject of water trading is a matter for the Government of NSW, not the Proponent. Also, the Proponent notes that trucking in water would be unrealistic. To provide sufficient water for processing operations alone, namely up to 130ML of water per year, trucking water using 30 000L tankers would require approximately 22 heavy vehicle movements per day. This would impose an additional cost burden on the Proponent, road traffic noise impacts on surrounding residents and additional road maintenance requirements.

7. That the quality of water returned to the Major's Creek and Araluen aquifers from the Dargues Reef Mine be tested on a daily basis for levels of toxicity, heavy metal and other pollution as well as any increases in acidity or alkalinity, and that this data be made available on a daily basis to all who have made submissions to this enquiry.

Response: This issue has been addressed previously in this sub-section.

8. That if these levels of pollution, toxicity, acidity or alkalinity are shown to be higher than the levels measured in the current EA then all work should cease until the relevant NSW and Federal Departments can assure the community that the water is safe for residents to drink, wash in, use on the orchards and market gardens, and for the continuation of the animals and plants downstream.

Response: The Proponent anticipates that the Environment Protection Licence that would be required for the Project would regulate the quality of water that may be discharged.

9. That a secondary tailings dam wall be erected.

Response: This issue has been addressed previously in this sub-section.

10. That if whichever company is currently mining at Dargues Reef goes into liquidation before rehabilitation and compensation can occur, and if the cost of compensation and rehabilitation is more than the bond entered into by the company at the Department of Planning's request, then the NSW Government accept full responsibility for such compensation and rehabilitation necessary for any negative effects of the proposed Dargues Reef Mine included in this and other submissions.

Response: The issue of the security for the Project has been addressed previously in this sub-section.

5.3 OBJECTIONS - PROFORMA SUBMISSIONS

I object to the proposed Dargues Reef mining project on the grounds that no assessment has been made of the impact on the loss of groundwater beyond the two square km radius of the mine, nor on the fragile and threatened ecosystems below the mine. I request more time for these and other questions raised by the Environmental Assessment to be investigated, including test bores 2-6 kilometres downstream from the mine site, to test the impact of drilling on the groundwater over a period of a year, to allow for variation in rainfall.

Response: These issues have been addressed in Sections 5.2.8 to 5.2.12.

I also request that a detailed assessment be made of endangered, critically endangered and threatened flora and fauna in the four kilometres below the mine site. This also needs a year for completion, as some species are migratory, and others, such as the endangered powerful owl, can only be easily identified in late winter when they are calling.

Response: This issue has been addressed in Sections 5.2.6 and 5.2.12.

I also request that a detailed assessment be made of heritage and Indigenous sites 2-6 kilometres downstream from the proposed mine site and the tailings dam.

Response: This issue has been addressed in Section 5.2.15.

5.4 OBJECTIONS - TECHNICAL SUBMISSIONS

5.4.1 Anonymous Senior Hydrologist Submission

More detailed modelling analysis and in particular predictive uncertainty analysis, should be undertaken so that the impact of the scarce dataset (e.g. less than 1 years monitoring data etc.), on the uncertainty of the predictive simulations can be established. The variability of the real world hydraulic properties has not been reflected in the parameters used in the model, and we believe this variability would be greater than was inferred from data collected. No predictive uncertainty analysis has been carried out and as such very little confidence can be put in the findings of the groundwater assessment. To provide more confidence in this work, the predictive simulations should be reported at the 95th confidence level.

Response: (AGE) The hydraulic parameters used in the groundwater model contain significant variability, with a range of over five orders of magnitude, reflecting relatively highly permeable alluvial material to an essentially impermeable granodiorite rock mass. In addition, where assumptions have been made, these have intentionally been conservative. As a result, the groundwater assessment is likely to overestimate the groundwater-related impacts.

Finally, the groundwater model was calibrated using PEST. The Murray Darling Basin Commission modelling guidelines do not refer to reporting to a particular confidence level. AGE is not aware what would provide on 95% confidence level nor similar projects where this was a requirement or has been done.

The modelling undertaken has not accounted for uncertainty related to the correlation between calibrated parameters, e.g. hydraulic conductivity and recharge, nor how this uncertainty will propagate through to the uncertainty of the predictive simulations. No long term data (climatic or groundwater levels, or river levels/weir) has been used for calibration of the model. The modeller has used one set of water level monitoring data, and optimised the recharge to the system without accounting for the correlation between these parameters. The assumption that the groundwater levels are representative of the long term average is nonsense. This will not be the case and is a serious flaw in the modelling undertaken for this consent as it is this data that was used to calibrate the model. The model has not accounted for impacts during a drought or climatic variability, a common occurrence in Southern NSW.

Response: (AGE) The groundwater model was calibrated to provide plausible hydraulic conductivity and recharge rates, that is values that could be expected of the hydrogeological units, the topography and rainfall frequency.

The issue of the use of long-term monitoring data in calibration of the groundwater model is addressed in Section 4.3. In summary, long term groundwater level monitoring data is not available for the Project Site and surrounding area. NOW do not have any bores in the vicinity of the Project Site that provide long term monitoring. In the absence of this data, it is accepted practice to calibrate to steady state rather than transient conditions.

The Senior Hydrogeologist does not provide any evidence to support his/ her statement that "the assumption that the groundwater levels are representative of the long term average is nonsense".

What is the effect of stope porosity being 40% or 30% (as opposed to the assumed 35%)? This has not been addressed in the modelling assessment of potential impacts. This assumption and the potential variability of this porosity need to be included in the predictive uncertainty analysis discussed above, with respect to how this assumption might affect the simulated results.

Response: (AGE) An assumed stope porosity of 35% is considered a conservative upper end of the possible range, particularly considering that sections of some stopes will be cement stabilised.

The effects of reducing the porosity, as is likely to occur, given that cement stabilization will be used, will be that the groundwater levels will recover much faster than predicted as there is less void space to fill. The converse is true if the porosity is greater than 35%. The Senior Hydrogeologist should provide supporting evidence if he/she believes that the bulking factor will result in a porosity of greater than 35%.

This uncertainty would be able to be reduced after more reliable, long term water level and recharge data are obtained as noted above, and after a more comprehensive hydrogeological investigation is undertaken, including pumping tests and additional slug testing.

Response: (AGE) Granodiorite is a very low permeability rock mass with groundwater occurring in the regolith and fractures. Numerous exploration holes have shown that higher groundwater yields that would support a pumping test only where the hole intersects a fracture close to flooded workings. A drill hole located a few metres away that did not intersect such a fracture or a drill hole that intersected a fracture some distance from flooded workings would be unlikely to be able to sustain a pump test. As a result, pump tests would be unlikely to provide useable information on groundwater yield or aquifer properties within the granodiorite aquifer.

Falling head tests were undertaken to assess the permeability range of the regolith and granodiorite rock mass and provided data that is typical of the hydrogeological units encountered.

Once more data has been sourced and used in a new modelling exercise (as this one is significantly flawed and is not suitable to infer potential effects of the development on the environment); drawdown contours at the 95% confidence interval should be presented to at least 0.5 m contour, as this amount of drawdown may affect groundwater users in Majors Creek depending on their available water for drawdown in their well (i.e. some users may only have 0.5 m of water above their pumps especially during times of low rainfall/recharge.

Response: (AGE) The statement that the model is significantly flawed is a broad statement and should be supported by providing more detail rather than a generalization. Section 14.0 of the groundwater report states the uncertainties and limitations of the model which the Senior Hydrogeologist seems to be repeating.

The model development and calibration has been undertaken in accordance with the Australian guidelines. In addition, as indicated in the response to the submission provided by NOW, the groundwater assessment has been peer reviewed by Aquaterra who did not identify any significant deficiencies in the groundwater assessment.

Finally, drawdown contours were presented to the 1m contour as groundwater levels naturally fluctuate by a 1m as is evidenced by the studies undertaken at Araluen. It is considered that 1m of drawdown is the smallest impact of the Project that would be measurable.

It appears that it is highly likely that the operations will result in the cessation of flow in Majors and Spring Creeks, surely this is unacceptable. The embargo may apply to this site as the water taken from deeper aquifers is also being taken out of the shallow aquifers/alluvial aquifers as the assessment indicates they are connected. lt is indicated on 3-9 that embargoed water will be taken but suggested that water be purchased from another user or will be supplied from dams. The modelling undertake in not sufficient to be able to determine with any certainty the volumes of embargoed water that will be taken.

Response: Section 13.5.1 of AGE (2010) identifies that the Project would result in reduced base flow within the 1.5km reach of Majors Creek within the limit of groundwater drawdown of approximately 1.8L/sec. This compares with a steady state base flow of approximately 3.5L/sec. The modelled steady state base flow does not include base flow from upstream of the modelled area, nor does it include surface water flows. As a result, the statement that the Project would result in the 'cessation of flow' in Majors Creek is factually incorrect.

Section 13.5.2 of AGE (2010) indicates that the Project would result in cessation of base flow within the spring in Spring Creek. However, the Project would not result in cessation of surface water flows following rain fall events.

It is noted that Section 4.4.5.4 of the *Environmental Assessment* identifies that the Proponent would discharge of an equivalent volume of water from the harvestable rights dams as part of the compensatory flow program. As a result, there would be no net loss of base flow within Majors Creek. Finally, it is noted that the Proponent has received written advice from NOW that water within the granodiorite and regolith aquifers is not the subject of any embargo and that the compensatory flow program would adequately compensate for any loss of embargoed water from the alluvial aquifer.

To enable a sound assessment of the effects of the groundwater takes on the aquifer and the surrounding environments the following works should be undertaken:

- *Obtain long term groundwater level data and determine effects of drought on water levels under existing conditions, i.e. obtain an understanding of the dynamics of the system.*

Response: (AGE) This issue has been addressed in Section 4.3. In summary, long term groundwater levels and the effects of drought could take years to obtain and is not practical.

- *Obtain recharge data for the catchment or provide recharge modelling scenarios with uncertainty incorporated. Calibrating the model to recharge and hydraulic parameters without accounting for correlation is unacceptable.*

Response: (AGE) Again this requires long term monitoring and is not practical. In the absence of site specific data, the model was calibrated by varying recharge and recharge zones within an acceptable range as determined by data from similar hydrogeological environments eg. Araluen. It should be noted that AGE took a conservative approach in assessing recharge, namely recharge rates of between 2.8% and 6.5%. This compares with recharge estimates used by NOW in the Araluen study based on 10% of rainfall recharging the weathered granodiroite and 15% to 20% recharging the alluvium

- *Obtain more data on the variability of hydraulic parameters. The installation of wells and 6 slug tests at 6 sites, with 2 wells in each aquifer media is not enough to obtain a clear understanding of the variability in hydraulic parameters. ln addition it is not clear from the report if the slug test analysis took partial penetration of the wells and the effect of the sandpack into account.*

Response: (AGE) The slug tests undertaken are considered sufficient to provide an acceptable range to which the model can be calibrated. It is agreed that there will be variability in the hydraulic parameters and the modelling approach provides a rock mass average of these parameters. No matter how many tests are undertaken not every variation will be detected, or can be represented in the model.

With respect to the statement that it is not clear from the report if the slug test analyses took partial penetration of the wells and the effects of the sand pack into account, AGE are professional hydrogeologists and that the slug test analysis was undertaken to industry standard.

- *Long term pumping tests should be undertaken to obtain a clearer understanding of the bulk aquifer hydraulic properties, this will provide a clearer understanding of the potential effects of the groundwater take on the aquifer and the environment. The assessment indicates the possibility of existing groundwater users being impacted by the operations (3-60), and due to the significant*

uncertainty involved and the lack of real data that this modelling exercise has been based on, it is essential for long term pumping tests to be undertaken. Exploration holes with high water inflows could potentially be used for this purpose.

Response: (AGE) As identified previously, the principal "aquifer" is granodiorite which is a poor aquifer which does not provide high yields suitable for long term pumping tests. As stated the only exploration holes that intersected significant yields were in the vicinity of the flooded workings.

- *Undertake predictive uncertainty analysis to get a better idea of the likelihood of various effects of the mining, e.g. calculate contours with uncertainty bounds to at least 0.5 m contours at the 95% confidence level. Undertake a similar analysis for the other predictive simulations included in the report.*

As identified previously, the Senior Hydrogeologist should clarify what he/she requires that in his/her view would provide a 95% confidence level and reference similar studies where this has been done.

5.4.2 Jessica Drake Submission

Mine Operations

2.2.3 Site Access Road and Intersection

Impact of roads on waterways should be addressed, and exact plans as per Why Do Fish Need to Cross the Road? Fish Passage Requirements for Waterways Crossings, erosion and storm water design should be highlighted and addressed fully in the EA.

Response: The Proponent notes that Section 2.2.3 of the *Environmental Assessment* identify that the site access road would be constructed in accordance with the following documents.

- *Why Do Fish Need to Cross the Road? Fish Passage Requirements for Waterways Crossings.*
- *Managing Urban Stormwater – Soils and Construction – Volume 2C Unsealed Roads.*

Finally, it would be unusual to provide detailed engineering drawings or details in the *Environmental Assessment* because until approval is granted, these may not be required.

2.9.3.3 Traffic Types and Levels

Please state plans for dust monitoring and suppression for external roads in and out of the proposed site.

Response: External roads are currently sealed and the site access road would be sealed for a distance of 200m from the intersection with Majors Creek Road. As a result, there is no requirement for dust suppression on external roads.

Water

2.2.4 Surface Water Harvesting Structures

Requires details regarding the percentage of water harvestable that will be used for a) the proposed project and b) released as environmental flows. Dam construction, design and materials used for construction should be further outlined in the EA, including the model and parameters used for the 1 in 100 year event design. Significant erosion and dam failure should be considered in the EA, should an event greater than 1 in 100 years occurring during mine life and rehabilitation.

Response: As indicated in Section 2.10.2.6 of the *Environmental Assessment*, water within the harvestable rights dams would be used for the compensatory release program only. In addition, engineering details in relation to dam construction would not normally be provided in an *Environmental Assessment*. However, the Proponent notes that all surface water management structures within the Project Site would be constructed to withstand the relevant annual recurrence rainfall event depending on their purpose and potential environmental risk.

2.2.5 Groundwater Harvesting Infrastructure

The EA is not explicit about the location and source of the 740ML of water that will be recovered from processing and tailings. The 740ML of water has to come from a source ***before*** *it can be used in the processing of the mineral, and thus before it can be dewatered. The exact location and source of this 740ML needs to be clearly defined in the EA before approval, including source, models and parameters and long term environmental, social and economic impacts addressed.*

Response: As indicated in Section 2.4.6 of the *Environmental Assessment*, the rate of ore material production would increase gradually from nil during site construction to 354 000t/year in Year 4. As a result, maximum water requirements would also increase gradually over that time. As a result, the Proponent does not anticipate that more than 130ML of makeup water will be required for processing-related operations during the life of the Project.

Furthermore, the 130ML of additional or new water is not clearly determined in the EA. This includes the additional 22ML of additional dewatering from the Dargues Reef Project which was not included in the 740ML above, the difference in the 33ML, 55ML and 79ML asked for historic groundwater extraction and the dams differ between 34.5ML and availability of 66.2ML will be available, given events. The modelling for all of the above should be clearly defined, including parameters and models used, environmental concerns (down stream and ground water effects) and include drought events and management, and long term environmental, social and economic impacts addressed. This was also not clearly defined in Section 4.

Response: As identified in Section 2.10.2.6 of the *Environmental Assessment*, the Project would require water for the following purposes and from the following sources.

- Processing – approximately 130ML/year of new or makeup water sourced from the proposed Dargues Reef Mine and the historic workings.

- Dust Suppression - approximately 18.4ML/year of water sourced from the proposed Dargues Reef Mine and the historic workings.
- Compensatory flow program – between approximately 33.1ML/year and 66.1ML/year of water sourced from the proposed harvestable rights dams, with water to be sourced from the historic workings when water from harvestable rights dams is not available.

A detailed water balance, including 100 years of daily rainfall data is provided in Section 4.5.5 of the *Environmental Assessment*. Additional comments in relation to the validity of the groundwater model are presented in Section 5.2.13.

2.10.2.5 Potable Water, and 2.10.2.6 Operational Water

These sections do not match Section 2.4.6. Please explain and expand, as per above.

Response: Section 2.4.6 of the *Environmental Assessment* addresses mining rates, not water usage.

Please identify how base flow was calculated, including model and all parameters. Please demonstrate how base flow will be maintained, both in volumes and flow regimes.

Response: This issue is addressed in Section 4.4.4 and 4.4.5 of the *Environmental Assessment* and Section 5.2.8 of this document.

Please identify impact of change in flows on troglofauna (attention to ground water) and aquatic vertebrates and invertebrates and plants.

Response: Troglofauna are subterranean animals that exist only in caves and cavities and are adapted to life in permanent darkness. Given that the Project Site and surrounding areas are underlain by the Braidwood Granodiorite, the Proponent contends that suitable habitat for such species is highly unlikely to occur in the vicinity of or downstream of the Project Site.

In addition, as identified in Section 4.8 of the *Environmental Assessment* drainage lines within the Project Site have been extensively disturbed by historic alluvial mining operations. In addition, large sections of Spring and Majors Creeks have also been classified in **Figure 4.14** as "Largely disturbed". As a result, Gaia Research state that assessments of aquatic vertebrates, invertebrates and plants is not required.

Please discuss the long term social, environmental and economic effects of changes in ground water and surface water flows and their interactions.

Response: As identified previously, the Proponent does not anticipate significant adverse impacts on groundwater levels or surface water flows in the vicinity or downstream of the Project Site.

4.4.3 Management and Mitigation Measures (Groundwater)

Please provide critical limits and thresholds, including methods and parameters used to determine them.

Response: These would be provided in any Water Management Plan that would be prepared following project approval.

4.4.4.3 Model Development

MODFLOW SURFACT is a United States of America model and does not necessarily reflect the same environmental conditions as Australia. This means that some of the modeling undertaken for groundwater flows, availability and interactions with surface water, may be incorrect. Please specify how specific Australian conditions were added into the model or use an Australian Groundwater Model. Consider contacting the Australian Centre for Groundwater Research and Training and iCAM at the Australian National University for assistance.

Response: As indicated in Section 4.4.4.3, MODFLOW SURFACT modelling code is considered industry standard in Australia and this modelling methodology was supported by the peer review undertaken by Aquaterra.

4.4.5.6 Impact on Groundwater Dependent Ecosystems

There is insufficient information regarding groundwater ecological impacts. Please demonstrate troglofauna and ecosystem survey and assessment, as well as impacts and management strategies.

Response: This issue has been addressed previously in this sub-section and in Section 5.2.12. It is, however, noted that historic alluvia mining operations have significantly disturbed Majors Creek and all other drainage lines within the Project Site.

4.5.6.7 Erosion Management

What are the potential impacts of upstream erosion on the proposed plan? How will these be mitigated?

Response: The Project Site is located at the top of the Moruya catchment. There is no potential for upstream erosion.

General Comments

There are several inconsistencies and lack of information in all Sections (2, 4 and Technical Report) regarding Ground and Surface Water (volumes, management, changes in conditions and impacts, environmental flows etc.). It is suggested that a impartial third-party of groundwater and surface water specialists need to review the aforementioned sections of the proposed plan.

Drought and dry conditions are not suitably acknowledged or identified within the report, including management for both wet and dry periods.

Response: A peer review has been undertaken by Aquaterra of the groundwater assessment. The use of rainfall data has been addressed in Section 5.2.13.

Waste Rock

2.5.3 Waste Rock Emplacement Design

Design needs to consider visual amenity and erosion control.

Response: These aspects are addressed in Sections 4.5.6.2 and 4.11 of the *Environmental Assessment* and have been discussed previously in this document.

Chemicals

2.6.5 Concentrate Management

Will water from this process be part of the 740ML as in Section2.2.5? If so, please state volume and what treatments will be undertaken on the water prior to reuse.

Response: The concentrate produced would be the end product of the processing operations and water consumption to produce it is identified in Section 2.6.5 of the *Environmental Assessment*. As limited volumes of concentrate would be stored within a concrete sealed area and as the material is relatively dense, limited volumes of water may be required for dust suppression. The estimated volume of water required for dust suppression operations within the Project Site is identified in Section 2.6.5 of the *Environmental Assessment*

2.6.6 Reagent Management

Please list details of the Hydrocarbon, Chemical and Reagent Management Plan with all known reagents and chemicals to be used on site, including fuel.

Response: Table 2.5 of the *Environmental Assessment* lists all reagents that would be used within the Project Site. Hydrocarbon storage volumes and management measures are identified in Sections 2.10.5.4, 4.4.3 and 4.5.4 of the *Environmental Assessment*. The specified plan would be prepared following granting of project approval.

Tailings Dam

2.7.2.2 Tailings Dam Design and Construction

Please state the exact permeability of the lining of the Tailings dam and the exact method of ensuring minimal permeability. The entire area of the Tailings Dam should be lined to minimize leakage to ground and surface water.

Response: Section 2.7.2 identifies that the design permeability for the tailings storage facility would be 1×10^{-9}m/sec. The Proponent anticipates that the Dam Safety Committee would require that the Proponent demonstrate that that permeability is achieved during construction of the facility.

Please state erosion control mechanisms for the tailings dam wall e.g. waste rock emplacement on outer wall surface or revegetation, or both etc.

Response: As the outer embankment of the tailings storage facility would be upstream of the proposed seepage collection structure, all surface water flows from the tailings storage facility embankment would be pumped back to the facility and would not enter natural drainage.

Long term and emergency plans should also exist if the Tailings Dam fails or an event occurs which exceeds design specifications (greater than a 1 in 100 year event).

Response: The Proponent anticipates that the Dam Safety Committee will require that a Tailings Storage Facility Management Plan, including contingency and emergency management measures be prepared following the receipt of project approval or approval from the committee to construct the facility.

2.5.4 Waste Rock Emplacement, Processing and Reclamation Procedures

Waste rock use in tailings storage should be identified and clearly discussed. This should include its exact use, its grade (e.g. D50, Dl00 etc.), and if it is to be used to minimise erosion in structural design or part of the structure.

Response: The Proponent is not specifically aware of the grades referred to in the submission. However, an internet search indicates that the terminology used by the Respondent may be applied to drainage control material such as rock mattresses and gabions. As the waste rock that would be used during construction of the tailings facility would be covered on the upslope side by the proposed clay or artificial liner and on the downslope side by topsoil, the drainage properties of the material are not relevant. In addition, the Proponent notes that use of waste rock material in the construction of tailings storage facilities is standard industry practice. Erosion and sediment control issues have been addressed previously in this sub-section.

Rehabilitation

2.14.2 Rehabilitation Objectives

Please list the Overall Aim of the Rehabilitation Objective. For example, aim for an self-sustaining and resilient ecosystem (Drake et al. 2010), which is a) native, b) local endemic native, c) agricultural, d) pastoral etc., as per Section 2.14.3.2. Please be clear about what you intend to achieve as a result of Rehabilitation.

I agree that there should be a degree of flexibility in rehabilitation strategies, should conditions change. However, an overall aim should help guide rehabilitation planning and practices, and this should be clear for the assessment by Planning Authorities and local Community.

Response: Rehabilitation objectives are identified in Section 2.14.2 of the *Environmental Assessment*. In addition, the Proponent notes that a detailed rehabilitation plan will be required as part of the *Mining Operations Plan/Rehabilitation and Environmental Management Plan* (MOP/REMP) requirements of the Mining Lease.

2.14.3 Progressive Rehabilitation, 2.14.5 Decommissioning of Infrastructure and Services, 2.14.7 ROM Pad, 2.14.8 TSF, 2.14.9 Other Areas

This section is unclear, and there is insufficient detail regarding planning and implementation for rehabilitation. Please list the stages that will be undertaken to achieve rehabilitation, and the on-ground implementation/works for rehabilitation for each specific site (TSF, roads etc.). For example, please see Drake et al. 2010.

Please list in detail what plant species you will use to rehabilitate the site, with particular attention to problems with root penetration of the Tailings Storage Facility.

Response: This issue is addressed in the previous comment.

2.12.10 Spreading of Soil and Revegetation

Is there appropriate volume of soil available for respreading? Please identify and clarify. This was also not identified in Section 4.

Seeding and revegetation of the site is unclear. Please clarify Aim of Rehabilitation (as above). This will enable to address what species you will be using as either being pastoral or endemic or both.

Please identify what remediation techniques are likely to be needed to ensure soil is suitable media for vegetation establishment. For example, mulches with low available nutrients.

Please identify erosion control of the site during time that native species and/or sterile cover crop may become established. For example, mulches, rock mulching (from waste rock materials) etc.

Response: The Proponent notes that all areas of proposed disturbance would be stripped of soil materials as identified in Section 2.3.3 of the *Environmental Assessment*. That material would then be available for subsequent rehabilitation operations. As a result, sufficient soil material would be available for rehabilitation operations.

Other issues raised are addressed in previous sub-sections.

2.14.11 Rehabilitation Management and Monitoring

Please list details of the indicators that will be used in monitoring. For example, scales of success or lack of success, how this information will be used for adaptive management of rehabilitation practices on the site. Consider using Landscape Function Analysis and Key Performance Indicators in addition to Drake et al (2010) for rehabilitation planning and monitoring. Both Rehabilitation and Monitoring needs to consider site stability (geotechnics), functions (nutrient and water cycling), structure (complexity of ecosystem, habitat, vegetation structure etc.) and composition (biodiversity of flora and fauna, from microbiology to mammals and lichens to trees).

Please address, with detail, how you will assess the success of rehabilitation.

Response: As identified previously in this sub-section, the Proponent notes that a detailed rehabilitation plan will be required as part of the *Mining Operations Plan /Rehabilitation and Environmental Management Plan* requirements of the Mining Lease. That document will include detailed rehabilitation monitoring procedures.

4.11 Visual Amenity

Should also be considered and identified within the Rehabilitation Strategy.

Response: This issue would be addressed in any MOP/REMP that would be prepared for the Project.

4.8 Bushfire

Please consider risks and management of Bushfire in Rehabilitation Planning and Implementation. For example, designing a resilient system with vegetation traits that can withstand bushfires.

Response: This issue would be addressed in any MOP/REMP that would be prepared for the Project.

Biodiversity

2.15 Biodiversity Offset Strategy

There is insufficient detail regarding the Biodiversity Strategy. Several sections refer to the Strategy (Section 4, 2), however it is not detailed in the EA. It is difficult to assess how the proposed mine intends to deal with this requirement, in which the EPBC and TSC Acts both need to be considered.

Response: The Biodiversity Offset Strategy is identified in Section 2.15 of the *Environmental Assessment* and its adequacy is assessed in Section 4.3.6.8 of the *Environmental Assessment*. The Proponent also notes that DECCW support conditional consent for the Project, provided that a Biodiversity Management Plan outlining the specific management actions that would be implemented be prepared.

Furthermore, is noted that the final Biodiversity Offset Strategy 'would be prepared within l2 months of receipt of project approval'. However, subsequent sections outline the proposed strategy. Please confirm if the strategy outlined in the EA is proposed, or if it will change at l2 months after approval. If it is likely to change, please outline how it will change, the consultation process and under what circumstances, and as per sections 2.15.5 and 4.3.5 and 4.3.6.8.

Response: The Biodiversity Offset Strategy identified in the *Environmental Assessment* is indicative. Further detail would be included in a Biodiversity Offset Plan that the Proponent anticipates would be a requirement of the project approval, should it be granted. That strategy would be prepared in consultation with the surrounding community and relevant government agencies.

The Biodiversity Strategy should be outlined before the proposal is approved to ensure that there is sufficient community, scientific, legislative and other stakeholder consultation and reviewing prior to approval.

Response: It is usual that the biodiversity strategy is prepared following extensive consultation and to delay the Project until that is complete would be unreasonable and would not be consistent with previous Project approvals.

2.15.2 Consultation

This does not match section 2.15 or Rehabilitation Sections, e.g.2.14.2. Please clarify Aim of Rehabilitation and Aim of Biodiversity Offsetting, and ensure they match.

Response: Section 2.15.2 of the *Environmental Assessment* addresses consultation in relation the proposed biodiversity offset strategy only. Section 2.14.2 addresses rehabilitation objectives.

Community

4.1.6 Surrounding Community and 4.13 Socio-Economic Climate

Please detail the community mine closure plan. The mine closure plan should aim to lessen economic and social impact on the community at mine cessation. For example, a Trust Fund for the community, mitigation regarding loss of business, over capacity housing (abandoned buildings), securing of employment and long term prospects of the community. The plan should also consider that cessation, or temporary suspension of work, may occur prior to or after the original intended date of cessation.

Response: The Proponent notes that detailed information in relation to managing mine closure would typically be included in the MOP/REMP that would be prepared for the Project following granting of project approval.

Ecology

4.3.5 Management and Mitigation (Ecology)

Fauna management on the site is not detailed. This includes relocation, management and reintroduction, Biodiversity Offsetting and Rehabilitation.

Fauna deaths should be monitored and sent away for third-party assessment. Reporting on all faunal deaths should be required.

Please consider incorporating the Ecology and Biodiversity Management with Rehabilitation.

Response: Management and mitigation measures in relation to fauna within the Project Site are identified in Section 4.3.5 of the *Environmental Assessment*. Further detailed management measures would be included in the MOP/REMP that would be prepared for the Project following receipt of project approval. These measures would complement and be consistent with the proposed rehabilitation and biodiversity offset activities that would be undertaken within the Project Site.

4.3.6.4 TSC Act Detailed Impact Assessment and 4.3.6.5 EPBC Act

Please clarify the method undertaken to determine that there are no impacts as per the TSC and EPBC Act. For example, "Vegetation within the Project Site is not critically important to the long-term survival of threatened species". Please explain how this was determined and why.

With unknown risks on species, for example the impact of noise and illumination on the Little Eagle, what risk management strategies will be undertaken to ensure minimal impact and further understanding of these species? Will monitoring be undertaken?

Please identify risks and management of troglofauna.

Response: Section 4.3.6 of the *Environmental Assessment* and Section 6 of Gaia (2010) provide a description of the methodology used to assess impacts to listed species and communities as a result of the Project.

In relation to the comment specifically referred to, the sentence should have read "Vegetation to be disturbed within the Project Site is not critically important to the long-term survival of threatened species". In summary, of the approximately 27.2ha of vegetation to be disturbed, approximately 23.9ha would be highly disturbed native-dominated pasture and 2.2ha would be previously disturbed land. As a result, Gaia (2010) determined that that vegetation was not critical to the long-term survival of and threatened species that may occur within the Project Site.

The Proponent is not aware of specific noise and illumination-related risks to fauna within the Project Site, particularly in light of the amendments to the Project identified in Section 2.2. This issue is discussed further in Section 4.2.6 of this document.

The Proponent anticipates that the Biodiversity Management Plan that would be prepared for the Project would include detailed monitoring procedures.

Issues associated with troglofauna are addressed previously in this sub-section.

4.3.7 Monitoring (Ecology)

Please outline intended ongoing fauna monitoring, impact and assessment surveys, as well as adaptive management.

Response: As indicated previously, the Proponent anticipates that the MOP/REMP and/or Biodiversity Management Plan that would be prepared for the Project would include detailed monitoring procedures.

Soils

4.12.4 Management and Mitigation (Soils) and 2.3.3 Soil Stripping

Stripping should ensure minimal mixing of soil types and horizons, and plans regarding this should be outlined. This could include identification of areas and stockpile locations for each soil type and horizon; staff/contractors undertaking the soil stripping and stockpiling should be trained and shown each soil type and location before operation commencement to avoid accidental mixing.

Please consider strategies to deal with potentially dispersive soils, including organic matter maintenance and other amelioration strategies. Please consider structure and drainage that will reduce impacts of erosion (rill, gullies and tunneling) such as concave slopes. Slope lengths also need to consider grade, for example a steep 80m slope will be more prone to erosion than a concave low-grade 80m slope.

Response: Section 4.1.4 of the *Environmental Assessment* and Sections 8.1 and 8.2 of SEEC (2010b) identify that soils across the Project Site are relatively uniform and may be mixed.

The Proponent notes that detailed locations of soil stockpiles, where not a major component of the Project, would typically be identified in the MOP/REMP that would be prepared following the receipt of Project approval.

Section 4.12 of the *Environmental Assessment* and Sections 8.1, 8.2 and 8.3 of SEEC (2010b) identify the heights and slopes of the proposed soil stockpiles, the slopes of the land on which they should be placed and the level of vegetative cover that should be achieved to minimise erosion or sedimentation from the stockpiles. In addition, Section 4.5.4 of the *Environmental Assessment* identifies that erosion and sediment control measures, including those associated with soil stockpiles, would be implement in accordance with the relevant "Blue Book" requirements. Those requirements identify slope lengths and other factors that would minimise the potential for erosion and sedimentation associated with the Project.

Primary Recommendations

- *Consider an independent, not-for-profit third party to assess all aspects of water. This includes changes to drainage, dams and impacts on towns/stakeholders, modeling, flows, use and balances. There are several inconsistencies within the plan that need to be rectified before approval.*

Response: The Proponent notes that the surface water and groundwater assessments were undertaken by independent specialist consultants. In addition an independent peer review of the groundwater assessment was undertaken. Finally, the Proponent does not agree that an assessment undertaken by a not-for-profit organisation is likely to be any more valid than one undertaken by recognised experts in a particular field.

- *Consider further development of a Biodiversity Strategy. These sections are not clearly defined and confusing, and should be rectified before approval.*

Response: As indicated previously, the Proponent anticipates that the project approval, should it be granted, would require preparation of a detailed Biodiversity Offset Plan in consultation with the surrounding community and relevant government agencies. The Proponent also notes that DECCW support conditional consent for the Project, provided that a Biodiversity Management Plan outlining the specific management actions that would be implemented be prepared.

- *Need to develop and better identify Rehabilitation Aims, Planning and Implementation prior to approval.*

Response: As indicated previously, this information would be included in any MOP/REMP that would be prepared for the Project.

- *Further develop a community based socio-economic mining cessation plan.*

Response: As indicated previously, this information would be included in any MOP/REMP that would be prepared for the Project.

- *Need to consider Troglofauna and associated habitat and ecosystems in groundwater assessments.*

Response: As indicated previously, the Proponent does not believe any suitable habitat for troglofauna exists within or in the vicinity of the Project Site.

- *Consider broader Monitoring Plans for Rehabilitation and Fauna, as well as associated adaptive management.*

Response: As indicated previously, this information would be included in any MOP/REMP and/or any Biodiversity Management Plan that would be prepared for the Project.

5.5 SPECIAL INTEREST GROUP SUBMISSIONS

5.5.1 Introduction

This sub-section provides a response to those issues raised by the special interest groups that provided a submission.

5.5.2 Majors Creek Community Liaison Committee

Water

The concern is what will happen to all aspects of the environment while the water table is lowered. This is not just about some bores dropping in level: there is a wide concern about the survival of plants whose roots might dry out and native animals whose water supply will dry up. We understand that water levels in Majors Creek will be maintained by augmentation from other water supplies but the community is most concerned about the lack of ground water no longer passing through the environment. There is a substantial concern that the EA has not thoroughly investigated this issue in a large enough area.

Response: This issue has been addressed in part in Sections 5.2.8 and 5.2.9. In addition, the Proponent notes that with the exception of groundwater discharge zones in the vicinity of springs and drainage line, groundwater is typically not directly available to vegetation. Table 4.17 of the *Environmental Assessment* indicates that of the monitoring bores constructed for the groundwater assessment to test the granodiorite aquifer away from drainage lines, namely DRWB01 to DRWB05, groundwater levels are typically 8m to 10m below surface. Of the three monitoring bores constructed to test the alluvial aquifer in the vicinity of Majors Creek, groundwater levels are between 1.2m and 4.2m below surface.

There is concern about the stated heavy reliance on water harvesting rights to fill a series of yet to be built dams to replace the water in Majors Creek and the inconsistency of rain. The general belief is that Cortona can "build as many dams as if likes but they won't fill if it don't rain! Then what will they do?"

Response: The Proponent notes that the surface water balance included 100 years of daily rainfall data and that modelling indicated that water would be available within the harvestable rights dams for compensatory flows on 97% of all days modelled. This issue is discussed further in Section 4.8.5 of this document.

We believe what is needed is a much larger study over a much larger area over a longer time, including downstream into the Araluen Valley to include the habitats of two endangered species and a much larger radius around the mine site. This should be done by an independent body.

Response: This issue is addressed in Section 5.2.34.

We request that the appropriate Federal Authorities be contacted about these rare species- the Newholland Mouse and the plant, the Araluen Zieria and the possible threat to their habitat.

Response: This issue is addressed in Sections 5.2.28 and 5.2.34.

We request more thorough and widespread monitoring of water impact and stronger powers for appropriate agencies to shut the operation if there is a measurable negative impact on the environment such as dieback of trees and grasses and observable migration of animals.

\Efficient independent monitoring processes must be put in place and if there is any evidence of dieback, the company must take immediate remediation measures to save the trees, shrubs and grasses. It is noted that Cortona, wisely, chose to relocate the planned mine entrance to not knock down trees. What if the habitat trees die through lack of water?

Response: The Proponent anticipates that the project approval, should it be granted, would include a requirement to prepare a *Water Management Plan*, including detailed monitoring requirements, trigger levels and contingency plans, in consultation with relevant government agencies. In addition, the Proponent notes that numerous government agencies already have regulatory powers, including the power to shutdown the Project in the event of significant environmental impacts.

Noise

There seems to be general acceptance that during daylight hours, noise is inevitable and that there is already noise in the village and that industrial sounds coming from the mine would have little impact on that. The issue arises with industrial type noise between 6pm and 6am. Because of the unknown (and poorly explored in the EA) factor of how much noise will be generated at night the overriding attitude from the community is that the mine should not operate over 24 hours as is proposed. The EA explores the issue of noise but only deals with "acceptable' maximum levels at certain distances but the community concern is not an issue of how much noise is "legally allowed". Many nights are absolutely silent in this village. Any noise at all is anathema to the ambience of the night experience. So in that sense no (ongoing industrial) noise is acceptable at night. The committee is aware of the absolute necessity for the mine to operate over the 24 hour period for "technical reasons". But it is not really the 24 hour operation that is the issue, only the noise emanating from the mine site into the village. If the operation can go ahead with no noise, the 24 hours / 7 days a week idea is not a problem on the grounds of noise at least.

There is general concern for the interests of the closest neighbours to the mine and the impact the noise will have on their lives, and the value of their properties.

There is a general concern about the substantial noise that will be generated during the set up stage- major earthwork machinery as well as (community anticipated) surface and near surface explosions.

Activities will need to be restricted at night so NO industrial noise emanates from the mine site. Included in the final licence should be a process of monitoring and community reporting to be in place so if noise is heard by the community those activities will need to stop forthwith.

No one is allowed to create noise which disturbs other- that should include a mine next door to a village.

Response: This issue is addressed in Sections 2.2, 4.2.2, 4.8.4, 5.2.2 and 5.2.3.

Traffic Generation

There are ongoing issues of concern not yet resolved by either the EA, statements from Cortona or the agreement recently made between Cortona and Palerang Council. Cortona has stated there are only a "few" truck movements per day from and to the mine and that hours of departure and arrival will be timed to not coincide with work and school journey times for the community. The MCCLC notes and appreciates this however the community is concerned that this may well be a serious underestimation of vehicle movements. They believe there will a great many light vehicle movements to and from the mine as well as a plethora of small and medium service vehicles. This will be particularly noticeable during the mine development stage over the next year or two as large machinery comes and goes and then at changes of shift and times of deliveries. Company policies need to be in place that somehow control the movement of transport servicing the mine but not owned or operated by Cortona.

Response: This issue is addressed in part in Section 5.2.18. In addition, the Proponent notes that Table 2.9 of the *Environmental Assessment* identifies to the best of the Proponent's knowledge, the anticipated vehicle movements.

The last meeting of the group which followed the joint announcement between Cortona and Palerang about the road reiterated their concern about the proposed intersection. Everyone agrees that an acceleration lane is required from the mine entrance to the north not just a simple T- intersection. Several times people mentioned the need to establish passing places. They are also suspicious that the amount of money agreed to will not be sufficient to make theroad safe and that more ideas need to be explored about road sharing and safety, particularly at dawn and dusk and in fog.

Response: These issues have been previously addressed in Sections 4.8.1 and 5.2.18.

Ground Movement

There are a number of home owners in the village who own quite old homes with brick or stone walls and foundations. Everyone who attended our meetings agreed that explosions at the mine should not be allowed to cause damage to these lovely old homes. lf vibrations do occur and cause damage as a result of mine activities some system of compensation and/ or repair needs to be established before the explosions start. Insufficient study seems to have been made about the fault lines in the area and the likelihood of these events occurring. No system of monitoring is yet in place to record or measure if these events occur. This committee has, on several occasions, warned those residents with concerns they should contact Cortona and photograph their properties in case they need "proof" of movement damage. The committee believes the licence could mandate this.

Response: This issue has been previously addressed in Section 5.2.5. In addition, the Proponent notes that as the Project is expected to comply with the human comfort criteria for all blasting operations at the closest residences, that the higher criteria for structural damage would be easily achieved. In addition, the Proponent notes that the project approval, should it be granted, is likely to include a requirement that all residents within a specified distance of the proposed Dargues Reef Mine be offered a structural inspection of their property prior to blasting operations commencing.

Preparation of EA

There is a concern that while the EA is a very substantial series of documents it is still lacking in important detail and fails to explore ideas of transparent and public monitoring and reporting systems for the issues of water, dust, native species issues, noise and traffic. The EA contractors, for instance, failed to identify a number of properties closely affected by the proposal- they did not ask the council about buildings approved but not yet built with straight line views to the mine site, they failed to note a property 4000 metres to the east that's been there thirty or forty years. What other unknown things were not done by the EA scientists? How do people complain about matters? What does happen if the mine makes too much noise, or dust, or if the trees die? What mechanisms are in place for the community to make a real difference? There is a very real concern that once the approvals are granted it will be "too late"- the community won't be able to do anything about anything. Consequently, we believe a process for community concerns to be addressed needs to be established for this to occur.

Response: The Proponent acknowledges that a number of minor omissions were made in the *Environmental Assessment* and, where that information has been identified, clarification has been provided in Section 3. In addition, the Proponent notes that it has previously committed to maintain an open and honest dialogue with the community to resolve issues of concern. To that end, the Environment Protection Licence that will be required for the Project will require a complaints telephone line be maintained. Finally, in the event that a resident feels that their complaint has not been adequately addressed by the Proponent, issues may be raised with the relevant government agencies.

There is also an underlying concern that a development such as this and the EA which tries to explore its impact is also dealing with undefinable and unmeasurable concepts- beauty, ambiance, history, silence, the night sky, sharing the planet with other species, the spirit of community. This committee thinks Cortona management is trying to deal with these ideas but the lip service paid to them by the "specialists" who wrote the EA does not do them justice.

Response: The Proponent acknowledges the concerns of community regarding the 'undefinable and unmeasurable concepts' and that these concepts have been taken into account during the design and development of the Project. However, the Proponent also notes that these concepts vary from person to person and that it is impossible to meet the views of all persons affected by the Project. The Proponent contends that they will continue to consult widely with the community during the life of the Project and that any concerns raised would be dealt with in an appropriate and open manner.

Property Values

There continues to be a concern about the values of properties in the area. Most people came here to live the quiet life in a quaint, little former gold mining village- they did not come to live in a mining town. Some ratepayers are already planning to sell. Buyers may be difficult to find. Again this is one of those "unknowns". For all we know, if there is an influx of people this may increase prices by putting pressure on existing dwellings. The limited availability of rented accommodation has been noted at several meetings. There may even be a building boom. These are also issues not necessarily welcomed by the whole community. There is no doubt that the mine proposal has divided the community and that the ongoing existence of the mine will probably extend those ill feelings.

Response: This issue has been previously addressed in Section 5.2.27.

General

In summary, while there is no adamant anti- mine feeling generally in the community, there are some people who simply want it to go away. In the main there is a general sense of inevitability and guarded acceptance. However, even those who express very strong support for the mine still articulate some misgivings. This committee is hopeful that the planning authorities do set in place very strict guidelines to keep all the activities associated with the Dargues Reef venture, and any subsequent development nearby, from negatively affecting the village and surrounding environment of Majors Creek on the issues outlined above as well as the other strongly felt issues raised in other submissions.

Response: The Proponent acknowledges the sentiments raised by the Respondent and contends that the Proponent will continue to be open and consult widely with the community to address any concerns or issues as they are raised.

5.5.3 Araluen Progress Association

Background

The Araluen Valley is a very productive Valley and is situated downstream of the proposed mine, approximately 10kms as the crow flies. It is also approximately 500 metres below the proposed mine activities. The Valley extends for some 10kms leading to the Deua River and thence into the Moruya River.

The EA provides no clarity for the downstream impact of the proposal. The project site and surrounds (approximately only 2kms in terms of ground and surface water assessments) fails to recognise the connectivity of the surface and ground water systems, ecosystems and biodiversity issues that are all obviously interdependent.

Response: These issues are addressed in Sections 5.2.8 to 5.2.13.

Dependent upon the health of the area's ecology is the sustainable socio-economic wellbeing of the downstream region. The absence of any critical assessment particularly of the water issues is worrying for this community and will require addressing prior to any licence approval.

The Valley has niche market stone fruit orchards which are the backbone of the rural enterprises along with cattle production. These orchards start at the base of the Valley within 8kms of the mine and extend throughout the Valley. Throughout the Valley in all the rural enterprises full time and seasonal workers are directly employed with indirect flow on effects throughout the Valley and the Braidwood area in the supply of rural equipment and services. Additionally the Valley supports a sustainable "experiential" style tourist industry with easy access to National Parks, (Monga and Deua) NSW Forestry and the Araluen Creek and Deua River.

The impact of any disturbance to water quantity and quality on the maintenance of the population, maintenance of employment and small businesses, including the accommodation businesses, permanent and seasonal labour for orchards and cattle and of course the possible very negative environmental impacts are of extreme concern. We are also concerned about the potential for a reduction in water to adversely impact the local environment, including threatened and endangered species.

Such was the APA's concern that we maintained regular contact with the Mine proponents and provided them with detailed bore readings from NSW Water Valley readings over many years. The Association also considered the D-G requirements provided to the proponents in respect of their EA and we sought amplification of those requirements. It was our understanding that our concerns were provided to the proponents for addressing in their EA statement.

It is with regret and some frustration that the APA views much of the EA report, in relation to water issues for the valley, as inadequate. It is also noted that the EA at times presents statements with no obvious detail as to how such conclusions were reached. E.g. The EA finds that no groundwater dependent ecosystems will be affected by the mine, but provides no detail on how this conclusion was drawn.

Reproduced are the DG requirements and the amplified issues raised by the APA prior to the completion of the EA report.

*The **DG Requirements***

*1 **Soil and Water** – including:*

- a detailed site water balance;

- a detailed groundwater model;

- potential water quality impacts on the environment and other land

users; and

- a description of the final landform water management

Araluen Progress Association amplification request:

- *The three aquifer systems and the long term bore monitoring of these by NSW Department of Water be reviewed in light of the rural industries and domestic users currently and potentially in the Valley. This to include possible impacts of upstream interruption to the ground water, surface water and suggested drainage of upstream ground water aquifers,*

- *The water quality and quantity impact to include consideration of the Araluen Valley water rights and the water sharing proposals in the pipeline, (see NSW Dept Water)*
- *The assessment to include due regard to the CISRIO climate change predictions and to include consideration of possible no pumping indicators.*

This submission will address the inadequacies in the proponent's EA report in light of the D-G requirements and the amplification requested by the APA.

Response: The Proponent notes the following:

- Appendix 2 provides an indication of where each issue identified in the Director-General's Requirements has been addressed.
- Long term monitoring and remodelling of the groundwater impacts is identified in commitment 6.5. Undertaking Project-related monitoring is not the responsibility of NOW.
- Consideration of water rights and the water sharing proposals is a matter for the relevant government agencies.
- Issues associated with climate change are addressed in Section 5.2.26.

All of the EA is predicated upon a five year mining operation with a mention of a nine year operation. Cortona Resources itself says:

- *The company strategy is to fast track the development of a high quality gold operation at Dargues which will provide the cash flow to fund mine development and ongoing exploration.*
- *Regional exploration continues with the objective of discovering a pipeline of satellite production opportunities in the immediate Dargues area and beyond.*
- *The extensive tenement holding (659 km sq) is viewed as highly prospective and several new exploration targets have been discovered in highly altered rocks of the northern tenements.*

Importantly given this statement it is even more critical that such a large scale mining operation which could alter for ever the ecosystems in the area, be most comprehensively assessed and all risks and mitigation strategies developed in detail with independent and transparent monitoring arrangements a condition of any licence.

Expansion of the mine by stealth in five year increments based on existing operations and capital inputs is dismissive of the value of maintaining the sustainability of the area's ecosystems.

Response: This issue is addressed in Section 5.2.29

There is no doubt from the EA that groundwater in the Araluen aquifer will drop. Without the necessary research beyond the limited scope of the current EA surface and groundwater study, the effects in the Valley on ecosystems will be inevitable and cumulative and umremediated. Possible reduction in ground cover, reduction in flora and fauna, including vulnerable and endangered species will be devastating for this fertile Valley. It will forever change the Valley terrain and potentially denude the escarpment and Valley walls to the north and western sides.

The Majors, Bell and Araluen Creeks provide a habitat for the endangered Araluen Gum (eucalyptus kartzoffiana) listed as vulnerable under the EPBC Act. This gum's habitat is listed as damp. The Araluen Scarp Grassy Forest is listed as an endangered ecological community under the EPBC Act and in 2003-4 evidence of dieback was observed and related to the drought years. Clearly any reduction in ground water which in turn will also reduce the creek flows has not been researched, quantified or mitigated in the proponent's EA.

Response: These issues have been addressed previously in Sections 4.2.1, 4.8.5, 5.2.8 to 5.2.14 and 5.2.35. Furthermore, the Proponent contends that the statement that groundwater in the "Araluen aquifer" will drop is not supported by AGE (2010).

Climate Change predictions. (APA raised issue)

The EA report is based on 100year weather data but does not take into account extended drought periods or extended wet weather periods. This report uses Braidwood weather data which, given the micro-climates in Majors Creek and the Araluen Valley, is of little relevance. Both centres experience distinct weather patterns and again the APA provided such data (NSW Water studies) to the proponents.

Response: This issue is addressed in Section 5.2.13.

Additionally, it would seem most unusual that the EA did not cite the NSW Climate Change Impacts Study produced by NSW Water in conjunction with CSIRO Land and Water and CSIRO Marine and Atmospheric Research in their 2008 Report "Future Climate and Runoff Projections (2030) for NSW and ACT".

This report provides the first detailed understanding of the impacts of climate change on run off and water availability across NSW. The report is used to look at impacts of future flow sequences and river health, aquatic ecosystems and water availability for towns, rural enterprises and industry.

Response: This issue is addressed in Section 5.2.26.

The Harvestable Rights issue alone seems inadequately addressed. It would appear that NSW Water should be assessing the number and type of dams to be constructed and issuing a licence in respect of the use of this water, given it is noted to be used to "make up" for using embargoed water usage. These proposed dams should be further detailed in terms of their construction and future management prior to being approved.

The EA assessment contends that 97% of the time environmental flows can be maintained as outlined by the use of Harvestable Rights water. We are concerned that this statement is not based on reliable information or fully supported by the modelling. However Harvestable Rights water will also be used operationally???

In the scientific paper the Harvestable Rights water will be used to "make up" the short fall in the operational water requirements which will not be fully gleaned from the tailings dam.

The driest year on record (100 year data) would indicate by the EAs own assessment that the harvestable water would not be available for 182 days of that or similar years. Given the weather data does not include run off predictions projected in light of climate change issues this is also not an adequate response. Several drought years would indicate a significant impact on environmental flows.

APA request *a review and re-submission of an improved approach to the Harvestable Rights issue, evidence that the climate change projections have been considered and contingency plans for reduction of water use within the operation if environmental flows are not available. We would also like to see some evidence that NSW Water has been consulted on this issue prior to a decision being made. This would appear to be best practice.*

Response: This issue has been previously addressed in Sections 4.8.5 and 5.2.26 and in the response provided to the submission from NOW.

Groundwater Management (APA raised issue)

The obvious need to manage groundwater and surface water sustainably within the Valley has led residents of the Valley through both the APA and the Local Landcare Group to pro-actively participate with the Southern Rivers Catchment Management Authority (SRCMA) to repair sections of the Araluen Creek.

The formation of the Upper Deua catchment Landcare Group in 1996 (UDCLG) has resulted in a range of activities being undertaken to improve the water quality, environmental health and biodiversity of the stream. The NSW Department of Water and Energy, Department of Water (water sharing officers) and SRCMA have all worked with UDCLG to improve the stability of the creek bed, and management of vegetation. The monitoring of flows and ground water levels (improved) has enabled the work to prove its worth. The Araluen stream is now a chain of ponds that even in severe dry periods maintains groundwater-fed waterholes. The water quality is highly improved with some erosion and sedimentation issues reduced significantly.

The 10 km stretch of creek is now a vastly different stream and the funding provided ($150, 000) and the thousands of hours of volunteer work are testament to the Valley's commitment to sustainable ground and surface water management. The UDCLG has a Water Sharing Committee which has been in negotiations with NSW Water concerning a plan for the Valley.

While 90% of NSW is now managed by Statuary Water Sharing Plan, the UDCLG has not yet completed the plan with NSW Water due to the workload of NSW Water. However, data from monitoring bores across the Valley is available and was provided to the proponents.

Water Sharing Plans set out how water is to be shared between people and the environment through extraction licences and allocations for environmental flows.

In the absence of such a plan, the APA is concerned that the EA does not address further groundwater impacts "downstream". The prediction that Majors Creek and Spring Creek will be impaired for five years plus post mine years, and the environmental flow proposed shows little consideration of any cumulative impacts on ground and surface water users remains very concerning. Indeed the proponent suggests supplementary flows for only 2 years post mining completion.

Response: This issue is addressed in Sections 5.2.8, 5.2.9 and 5.2.11.

The possibility of extending the life of the mine raised in the consultation processes is also an ever present concern given the EA focuses on a 5 year project only. There is no evidence in the modelling that the environment will cope and if the water system is permanently altered, then the ecosystem might be deprived of sufficient water permanently, which will fundamentally alter it.

Response: This issue is addressed in Section 5.2.29.

The water for the supplementary environmental flows is proposed to come, in the first instance from harvestable rights, and then from old mine workings. The groundwater issues raised by the estimated extraction of 126ML from the new mine incline are to be mitigated by the 34ML of available harvested water. This approach means an increase from 9 ML (existing capture) to add a further 25.5 ML of water runoff will be captured on the site. This represents water that will no longer be available to re-charge the ground water. The proponent also contemplates the extraction of 78 ML from old mines in respect of any short fall in harvestable rights from dams. This would indicate that the ground water systems, including the Araluen Valley, will be under potential stress due to a potential reduction of 103.5ML annually.

Response: This issue is addressed in Section 5.2.9.

There are also inconsistencies in the figures for the total amount of water required for operational use, and different figures that will be available under harvestable rights.

The 885Ml/y required for operational pursuits e.g. processing, dust suppression etc will have 755ML/y drawn from the tailings dam. The scientific paper indicates that the "new or make up" water required for operational water requirements is estimated at 130Ml/y and will be drawn from the harvestable rights dams, dewatering of proposed mine and old workings. Also the harvestable rights water is to be used for environmental flows.

- *Where does the 755ML/y to be drawn from the tailings dam come from in the first instance??*
- *The double-up use of the harvestable dams water for environmental flow return and operational requirements does not add up???*

Additionally there is no attempt to consider cumulative impacts on groundwater hydrology from existing and proposed uses in the area.

Response: The Proponent acknowledges that SEEC (2010a) erroneously identifies that water within the harvestable rights dams would be used for processing operations. That water would be used only for the compensatory flow program. Issues in relation to "start up water" are addressed in Section 5.2.13. Finally, the Proponent notes that surrounding groundwater users within the vicinity of the Project Site are unlikely to use significant quantities of groundwater. As a result, a cumulative assessment is not required.

The NSW Groundwater Policy states that the degree of stress or potential threat a particular system is under will indicate the prioritisation for the development of a Groundwater Management Plan. The APA would submit that there is now a potential threat which requires prioritisation.

Clearly integrated management will mean groundwater will be considered in relation to surface water management and land use decisions. Additionally, aquifer boundaries do not always follow water catchment boundaries thus a Ground Water Management Plan involving NSW Water, the CMA, the UDCLG, Moruya Catchment, Majors Creek LG and others would be advisable.

The critical factor for the APA is that Spring Creek will be dry, thus that flow will not enhance Majors Creek which will also be compromised. Majors Creek flows over the escarpment into the Araluen Creek thence to the Deua River thus the potential effects could be devastating for many rural producers all the way down the river.

Response: This issue is addressed in Sections 5.2.11 and 5.2.12.

The state of the scientific knowledge and understanding of aquifer characteristics and behaviour and ground water quality is an emerging field. Currently NSW Water has monitoring bores in the Valley which could be used to assist in gaining further knowledge. Certainly the re-charge characteristics are poorly defined both seasonally and long term. Given our knowledge is ever expanding it would seem preposterous to set in place a water arrangement with the proponents that did not allow for adaptations or close monitoring by independent agencies and that did not have a clear principle that adjustments to water access and use rights will and can be made in response to evidence indicating stress.

It is the Association's understanding that the precautionary principle is a key component of ecologically sustainable development and is a matter that the Minister MUST take into account when arriving at a decision.

"This principle states that a lack of full scientific certainty about the effect of a proposed development on the environment should not be used to argue that the development should go ahead. Rather, a precautionary approach should be taken."

The ground water report (Department of Land and Water Conservation 1999) provided to the proponents states that the Araluen aquifers were judged to be "high risk". However the proponent did not extend the surface and ground water study to include the Valley. The EA states Araluen is 20kms away and will not be or will be only minimally affected based on Araluen Valley water studies.

However given the study's findings and the erroneous nature of the proponent's linkage of the Valley to Majors Creek (20kms) with residents in the Araluen Valley being 5kms downstream of the mine site, this assessment should have included the greater area.

Response: The validity of the groundwater modelling is addressed in Sections 5.2.8 to 5.2.12.

Best practice in relation to Surface and Groundwater Balances was described in the Murray-Darling Basin Commission report of 2004. It states:

"It is considered best practice that the framework should be applied not only to water resource management in systems where there are connections between aquifers and streams, but also in systems that are disconnected. It has been shown even in disconnected stream-groundwater systems: the use of one resource can affect the other. Disconnected stream-groundwater areas tend to be associated with unregulated stream sections or mid to lower alluvial areas of catchments. The connected re-charge and discharge areas may be distant but should not be ignored in the water management planning.

"All assessments must be underpinned by an analysis of the entire aquifer system of interest, not just the lowest salinity resource areas or an administrative region where the ground water users are located."

It is of most concern that the mine will extend 130metres below the Valley floor, and there is no apparent assessment, research or modelling that has even acknowledged the potential hazard this poses for the Valley.

The Araluen studies describe the type and function of the aquifers and the water quality. The EA notes those studies however does not address the very real pertinent findings in the report in March 2000 namely:

- *The Araluen Valley groundwater resource is deemed of high beneficial use, as it provides drinking water, water for large scale crop irrigation, plus stock and domestic supplies. Unfortunately, this aquifer system is also ranked as the third most "at risk" aquifer in the Sydney South Coast Region, based on both the quantity and quality pressures on the groundwater resource'.*
- *As part of the water quality sampling, the source of the base flow in Araluen Creek was also investigated. …'it appears that less than 40% of the flow in Araluen Creek was from rainfall, with the large component coming from either shallow or deep groundwater, or a source outside the valley'.*

The proponent's commitment to a second year review of groundwater drawdown (Majors Creek aquifers) is neither comprehensive nor transparently independent. It is also based upon a flawed assessment that does not adequately map the ground and surface water systems and calculate future and cumulative impacts, inclusive of the Araluen Valley.

The EA brief that excluded a study of the greater area inclusive of Araluen systems, in spite of representations from the APA, is patently inadequate.

APA request that a further independent comprehensive study be undertaken that reviews the work to date and extends the work to cover the surface and groundwater systems inclusive of downstream, the Araluen Valley. This study should follow "best practice" guidelines.

APA request (assuming an extended study has been completed) the Minister attaches a condition to any consent that mine's impact on water is regularly independently reviewed and consent remains conditional on adequate water being available for other users and the environment. Such monitoring to include Araluen Valley bore data.

APA request the proponent submits a willingness to join with the appropriate NSW Government agencies and local authorities and communities in the development of a Ground Water Management Plan (including monitoring and adjustment arrangements) prior to any development determination. Further, that any development determination be delayed until such a Plan is drafted, agreed and approved by NSW Water in accordance with their Groundwater Policy Framework document.

APA will concurrently make strong representations to NSW Water to prioritise the development of A Ground Water Management Plan for the Moruya Catchment Area as a priority under its Groundwater Policy citing the development application as a potential threat.

Response: The Proponent contends that the groundwater and surface water studies undertaken for the Project are comprehensive and detailed enough to assess the impact of the Project on water resources and additional study into this issue is not required. This issue has been extensively addressed in both this and previous Sections, as well as the response the submission provided by NOW. The Proponent also notes that extensive consultation has been undertaken with NOW and that a *Water Management Plan* will be prepared for the Project subject to Project approval.

Water Quality (APA raised issue)

The NSW Groundwater Policy Framework includes the component policy related to groundwater quality. The Quality Protection Policy (within the framework) aims to ensure that potential source contaminants from activities such as land filling, mining, waste-water, manufacturing, underground storage or accidental spills are avoided. Under this Policy such high risk activities are either avoided or risk mitigated which may include the use of regulatory tools to ensure compliance and safety standards are upheld.

The quality of the groundwater in the Araluen Valley is excellent. It is used for all domestic (including accommodation businesses) activities, irrigation of over 200 000 fruit trees, irrigation of vegetable and pasture crops and stock watering.

Clearly the quality of the groundwater is crucial to all these activities as contaminants either from direct mining activities, accidental spills and/or sedimentation will have a negative effect upon all activities. Resultant economic effects could be far reaching, immediate and cumulative in the Valley.

The EA describes the mitigation strategies for implementation concerning the monitoring of the ground water, which will include analysis for contaminants including metals and metalloids. The EA further indicates that by not using hazardous chemicals during processing "the tailings dam is not expected to generate leachate". However the placement of the tailings dam in a tributary of Spring Creek, even with surface water from above the dam to be diverted around it, remains an unmitigated risk in terms of the possibility of leakage and contamination.

Response: This issue is addressed in Section 5.2.23.

There is no apparent treatment in the EA of the possibility of sedimentation contamination or of the water quality management of the proposed supplementary environmental flow to be directed to the confluence of Majors Creek and Spring Creek. Any water drawn from old mine workings to supplement the surface harvestable rights water ought to be quality monitored prior to discharge.

Response: This issue is addressed in Section 5.2.34

The project site operation will depend upon the pumping of water from the mine incline to the surface and its use and management around the site for a variety of purposes and then discharge to Majors Creek to fulfil the EA environmental flow determination. There is no mention of management of water quality in this scenario.

Response: No water used within the processing plant would be permitted to be discharged into natural drainage.

It is also noted that the surface water flow into Majors Creek will pass across the project site. Thus the management of possible site surface contaminants, including sedimentation, has not been addressed. There are some notes concerning the site management of hydrocarbons and chemicals and a commitment to the refuelling of all equipment and maintenance processes, involving hydrocarbons, "where practical " to be undertaken within designated sealed sites. This is of concern.

APA request the proponent review the water quality management measures suggested in the EA and adjust those measures to ensure both the proposed returned environmental flows and surface water (including possible tailings dam leakage) are monitored for contamination including sediment.

There also needs to be some sort of plan for what will happen if contaminants above a certain level are detected. The mine should be responsible not only for mitigating the risk of contamination, but for cleaning any contamination that does occur. Systems need to be put in place to ensure the water quality of the affected streams and groundwater is not reduced.

Response: Commitment 701 identified that a detailed Surface Water, Sediment and Erosion Control Plan would be prepared in consultation with the relevant government agencies.

Surface Water (APA issue)

The surface water to be captured under the proponent's Harvestable Rights will be used to replace the reduction in base flows anticipated from the drying of Spring creek and the reduction in the Majors Creek aquifer re-charge due to the generated water in-flow to the new mine from ground water.

In several places within the document the rate of the replacement is cited as 2.1MLs combined. This is of course assuming the original calculations are correct. The EA also indicates the harvested surface water may need supplementing from old mine workings.

There are two places within the document where a mention is made that monitoring will determine whether the full 2.1MLs are returned. However it appears that 2.1ML is the anticipated limit. Given that the harvested right water is primarily to supplement the environmental flow that is being reduced by the use of embargoed ground-water (mine incline inflow) and that is also a calculation which may or may not be accurate, the safeguards of independent monitoring and management of this water balance appear insufficient.

Additionally, given the calculations around possible deficiency in volume of the available harvested water and the need to supplement with old mine workings water extraction, there appears no safeguard against the possibility of contaminated ground water impacting on surface water or eco systems.

The extraction of water from old mine workings appears to have received no consideration in respect of subsidence. The 1800 gold workings within Majors Creek and the Araluen Valley were undertaken with none of the current understandings associated with water management and environmental issues and have resulted in disturbed water-ways and environments. This would indicate that the proponent's modelling may not accurately reflect a fractured environment that over 100 years has stabilised, albeit in a unique and singular manner.

APA request *that the proponents be required to have independent monitoring of the water balance issues associated with the level and quality of the proposed supplementary environmental flow.*

Response: The Proponent notes that environmental monitoring data associated with the Project would be made publicly available. The Proponent does not believe that independent monitoring of the water balance for the Project is warranted. Also, all other issues raised above have been addressed previously in this Section.

Summary

Prior to any approval to this project the ground and surface water assessment and modelling requires an independent review and additional research to address the APA's concerns, as raised in this submission. We believe the EA is not adequate and includes erroneous information. We therefore request that the EA is reviewed by an independent third party, particularly with regards to the water modelling. We also request that the EA be expanded in scope to include the full environment that is likely to be affected, and this includes the Araluen Valley.

A surface and ground watering monitoring and management regime needs to be implemented for the future.

Additional research should also be carried out into the bores extending from the boundary of the current study to the existing Araluen NSW Water monitoring bores to evaluate the interdependencies of the surface and groundwater systems. This to include attention to the previously noted EPBC Act listed flora and escarpment and Valley hillsides.

Ministerial consent to remain conditional:- on adequate water being demonstrably available for other water users and the environment.

Response: These issues have been addressed previously in this Section. In addition, it is noted that a peer review of the groundwater assessment has been undertaken and that it is the role of the relevant government agencies to assess the adequacy or otherwise of documents provided in support of applications for project approval.

5.5.4 Friends of the Mongarlowe River Inc

Water

Can the proponent explain why two conflicting amounts have been used in regard to the annual quantity of water required? (EA 2.2.5 "the Project would require 870ML per year for mining related purposes" and in document 752/04 section 2.10.2.6, on p,2-46 "The maximum project related water requirement would be 215ML".)

Though there is much discussion of water recycling (9BML per annum has been estimated as recoverable water and subtracted from the estimates of total water usage) there is no mention of where and how much start up / original water would be required to initiate the recycling process or indeed where this water would come from. Can this be clarified and explained?

Response: This issue has been previously addressed in Section 5.2.13.

Environmental Flows

The environmental flow regime proposed the mining operation would result in the major pollution of Majors Creek and the Araluen, Deua and Moruya River Systems. Section 2 Description of Project 2-45 "The Proponent would ensure, "where practicable" that the water released conforms to water quality criteria. This statement reflects the fact that the harvestable right dams do not have the capacity to adequately supply environmental flow requirements and that polluted old mine water would have to be used (Harvestable Right 38ML stated environmental flows 66.2ML). The quality of the old mine water fails both the conservative ANZECC, 2000 water quality standard for aquatic ecosystems and the Moruya River Water Quality Objectives. Some of the allowable parameters for particular indicators are exceeded by more than 300%.

The Deua river system has been identified by the Commonwealth Government as a High Conservation Value Aquatic Ecosystem (why was this not mentioned in report).

Not only have the impacts of using polluted old mine water for environmental flows been totally ignored in the EA, but also the full magnitude of their use has been left open ended. The ability of the harvestable right dams to supply environmental flows is one of the critical determinants concerning how much polluted old mine water will be used for environmental flows. The capacity of these HR dams has been overestimated through selective and erroneous use of rainfall data (see section on harvestable rights in this submission) as well as reliance on inherently uncertain theoretical modelling to calculate the actual amount of these compensatory environmental flows.

Response: This issue has been previously addressed in Section 5.2.11.

Location of Environmental flow release

According to the documentation "In order to compensate for the anticipated reduction in base flows in Majors and Spring Creeks the proponent would release water to Majors Creek down stream of the anticipated area of groundwater draw down". (Description of Project 752/04 July 2010 p.2-45). The outer boundary of the mapped cone of anticipated draw down is not delineated (somewhere near the escarpment) while the 1m draw down gradient downstream of the site is located well outside the proponents property.

This statement "downstream of the anticipated area of groundwater draw down" has a number of serious implications that have not been discussed or even acknowledged by the proponent. These include:

- *Environmental damage to a large section of Majors and all of Spring Creek located over the anticipated area of groundwater draw down that would not receive any environmental flows as well as being subject to as yet accurately quantified groundwater draw down;*
- *There are no arrangements for piping water for environmental flows over properties that are not owned by the proponent;*
- *There are no licensing arrangements for piping and disposing of polluted old mine water into Majors Creek adjacent to the escarpment on property that may adjoin the State Conservation Area this concern should have been addressed by the proponent given that pollution of waters is an offence against s12O of the Protection of the Environment Operations Act 1997;*
- *Given the uncertainty inherent in the highly subjective assumptions underpinning the theoretical modelling used to construct the groundwater draw down gradients combined with the overestimation of the capability of the harvestable rights dam (which mean more old mine water than estimated will have to be extracted for environmental flows) it is reasonable to assume that the proponent has no idea where the environmental flow outlet will be located or the severity of impacts on the environment and surrounding landholders this will cause.*

Response: This issue has been partially addressed in Section 5.2.14. In addition, the Proponent notes the following.

- Spring Creek and Majors Creek within the Project Site have been extensively disturbed by historic alluvial gold mining operations.
- As identified previously, water within the historic workings is not polluted and the Proponent would implement measures to ensure that it does not become so.

Groundwater

- *Applying the precautionary principle requires that the dual impacts of mining and climate change need to be considered and managed.*
- *Leakage from the Alluvial Aquifers i.e. "seepage from the alluvium to the mine or shafts where the groundwater flow gradient has been reversed... is embargoed water" (3-54 Report 752/O5 of Majors Creek due to mining activities is an*

unlicensed extraction of embargoed water . This leakage has been grossly understated as more water will be required from the dewatering of old mine workings to supply for operational and environmental flows) (as described above)

- *The cone of groundwater drawdown is currently estimated at 1m within 500m of the escarpment - where is the drawdown zero in relation to the escarpment? . Will the cone of drawdown and extent of depressurisation of the granodiorite and regolith aquifers extend to the Araluen Escarpment and the town ship of Majors Creek if more operational and environmental flow water is obtained from mine dewatering?*
- *When do the drawdown impacts on Spring Creek finally recover after the five years post mining?*
- *Given that the groundwater modelling used contains "numerous qualitative and subjective interpretations" what degree of confidence can be had in the outputs generated by the model especially considering the high degree of uncertainty associated with the modelling and the potential implications and impacts of the modelled results?*
- *This degree of uncertainty could easily be reduced through collection of real data this should be done in a way that produces a statistically robust time series of observations and the model recalibrated accordingly.*
- *No long term monitoring has been undertaken only a one off steady state calibration with the assumption that the water levels in the bores selected for steady state calibration were representative of the long term average (steady state) groundwater levels.*

There is too much uncertainty about the modelling for it to be suitable for formulating accurate risk assessments and parameters for the groundwater impacts of this development.

If only 64,700m of waste rock, a small proportion of the estimated total of 510,375m that is expected to be generated by the project, is to be used for stope backfilling there will be a huge underground void that will have major impacts on groundwater behaviour in the area for many years after the mining operations have ceased. Can these impacts be fully explained and clarified and with what certainty?

Response: These have been previously addressed in Sections 4.6 and 5.2.8 to 5.2.12 as well as the response to NOW.

Chemical Management

- *We are unconvinced that the precautionary principle has been applied to chemical and tailings dam management. The use of material that is toxic to aquatic species is of great concern. Pollution prevention systems should be designed with regard to potential extreme and unprecedented flooding events due to climate change. Best practice would require triple bunding of any hazardous chemical store.*

- *In particular, the tailings dam is clearly insufficient to prevent possible pollution from tailings in the event of large floods. It is also clear that the two proposed harvestable rights dams for water collection are too small to provide an effective back-up in case of flooding. Additional backup storages are required.*

Response: These issues have been previously addressed in Sections 5.2.11 and 5.2.23.

Other Water Questions

- *What is the chemical composition of the flotation reagent and does it pose a pollution risk?*
- *Cyanide is known to have been used in some of the old mines whose dewatering is to be used for environmental flows. What are the risks associated with this practice?*

Response: The flotation reagents and their management have been previously addressed in Section 4.2.12. The Proponent is, unaware despite extensive knowledge of historic mining activities, of any previous use of cyanide within the Project Site.

Hours of Operation

- *No justification is given (in the summary) for the 24 hour operation. The benefits would appear to be maximised, without additional cost to the company if it runs normal working hours. Why is this not proposed?*
- *If there are inherent reasons for 24 hour operation, then at the least, could the night-time operation be minimised.*

Response: This issue has been previously addressed in Sections 2.2 and 4.8.4. **Noise**

- *To prevent community stress, we suggest that blasting be undertaken at regular times, so that local people know when to expect them. Otherwise that ongoing community liaison be used to minimise the stress associated with high noise events.*

Response: Underground blasting will typically be undertaken at shift change, namely, 6:00am and 6:00pm.

- *Truck movements have been identified but what about additional traffic from workers?*

Response: Table 2.9 of the *Environmental Assessment* identifies light and heavy vehicle movements.

- *We strongly agree with the condition that there be no noise at the boundary at night time. Limiting bulk earthworks to 7:00am to 6:00pm is a start, but any other noisy activities should be similarly controlled.*
- *What about sirens? They are not listed among noise issues, but are common at mine sites.*

- *What are the noise generation characteristics of the hydraulic rock breaker to be used to process oversize ore?*
- *What noise attenuation measures are proposed to reduce the residential amenity impacts of this operation?*

Response: These issues have been previously addressed in Sections 4.2.2, 5.2.2 and 5.2.3. Sirens are not expected to be used within the Project Site except in the event of an emergency.

Waste Rock Management

- *The documentation suggests that nearly 446,000t of waste rock generated through the life of the project be used for site establishment. How will this be done if it has not yet been generated?*

Response: This issue has been previously addressed in Section 5.2.25.

Business Risk Management

- *The potential for greater than anticipated environmental damage, together with external risks such as fluctuating share market prices for gold, and the approach of peak oil all suggest that there is no certainty that the mine will last for its anticipated life-span. We seek assurance that the Department of Primary Industries - Mineral Resources is ensuring that a security bond will be in place sufficient to meet the costs of outstanding rehabilitation?*

Response: The Proponent acknowledges that rehabilitation security will be required. The amount of that security would be calculated in conjunction with Industry and Investment NSW following receipt of project approval.

Ongoing Research

- *Other environmental and community impacts could continue to emerge. There needs to be processes in place to be able to discover and take these on as the mine is developing and operating.*
- *These could include assessment of foundations of old buildings, and vibrations through rock in and beyond Majors Creek affecting communities further away.*
- *We strongly suggest that local input, including local experts be employed in this ongoing research.*

Response: The Proponent has undertaken extensive community consultation during the development of the EA. The Proponent contends that this consultation will continue during the life of the Project and that any community concerns can be identified and suitably addressed.

Communicating Issues

- *The omission of water resource and noise issues from the 'Key Statistics' section in the summary is disturbing. It suggests that some important issues could be overlooked or downplayed in communication documents.*

- *There is no clarity on how community views will be incorporated in the long-term.*
- *As one solution, we request that results from monitoring to be made public - eg published on-line in real time.*

Response: The Proponent anticipates that the project approval, should it be granted, will require that environmental monitoring data be made publicly available on the Proponent's website. In addition, as identified previously, extensive public consultation will continue throughout the life of the Project.

Climate Change

The Department of Planning has formally requested that the assessment include due regard for the CSIRO Climate Change predictions- There is no discussion of Climate Change in the whole Environmental Assessment- Why?

Response: This issue has been previously addressed in Section 5.2.26.

5.5.5 South East Region Conservation Alliance

The mine is being planned in an area that is only four kilometres directly upstream from residents. These people have only been able to access the Environmental Assessment two weeks ago and submissions must be received by 1 November, 2010.

Response: This issue is addressed in Section 5.2.34.

Studies for the Environmental Assessment do not adequately consider the mine's effect on terrestrial and aquatic environments beyond the actual mine site. The proposed mine is extremely close to a Nature Reserve and a National Park. Endangered, critically endangered and threatened species in the gorge below the proposed mine site, including the Powerful Owl to the critically endangered Araluen Gum Eucalyptus kartzoffiana, have only been surveyed within the property held by the proponent. However, potential effects on the environment outside these properties of a regional reduction in the water table and the escape of contaminated tailings, either by wind or the activities of birds, have not been adequately considered.

Response: This issue is addressed in Section 5.2.34.

It is not clear that the water modelling has been based on an adequate understanding of how catchments work. There seems to be an un-stated assumption that the surface dams will fill by hortonian overland flow, unaffected by the draw-down in the regional water table due to dewatering the mine. In fact, most run-off in these catchments will be due to baseflow, subsurface stormflow or overland flow which is the result of exfiltration of interflow in saturated zones (see, for example, the review by Bonnell 1993, or original studies by Hewlett and Hibbert, 1967, O'Loughlin, Cheney and Burns, 1982, Topalidis and Curtis 1982).

Response: The Proponent notes that the harvestable rights dams policy prevents construction of harvestable rights dams on third order (or higher) or spring fed streams. As a result, the Proponent notes that no inflow to those dams will be the result of base flow and all inflow will therefore be via overland flow.

Borefield studies undertaken by the proponents show that the regolith and granodiorite aquifers are tightly connected. Any surface dams constructed in the zone surrounding the mine which may be even slightly affected by the draw-down in the water table are unlikely to yield significant volumes of water.

While the decision to attempt to replace lost baseflow in Major's Creek with releases from the "harvestable rights" dams is welcomed, this strategy is unlikely to succeed due to the poor yield from these dams. A failure to secure the baseflow in Major's Creek will have adverse impacts on the valuable peach orchard production at Araluen and ultimately the urban water supply scheme for the Eurobodalla Shire due to the recent upgrade in extraction capability from the Deua River.

Alternate water sources are required if the mine is to proceed. These might include the purchase of entitlement from other water users or the capture of clean stormflow run-off from extensive roof areas that might be constructed over mine facilities such as the tailings stock-pile.

The use of water recovered from abandoned workings will definitely reduce the baseflow in Major's creek and lower the regional water table.

The water table currently supplies underground springs that provide drinking water for the local native animals and also keep the native flora watered. The dramatic drop in the water table would be a disaster for these native animals and their habitat.

Response: These issues have been previously addressed in Section 4.3 and 5.2.8 to 5.2.12.

There is no proposed secondary wall to be constructed in case the first wall of the tailings storage facility fails. The clean water diversion structure around the tailings storage facility appears to be a mainly a surface drain/bund. This will intercept hortonian overland flow but not intercept the interflow of subsurface water. In prolonged wet conditions, such interflow, concentrated in natural fissures, might threaten the integrity of the low permeability layer of the tailings storage facility.

Response: This issue has been previously addressed in Section 5.2.23.

The chemical composition of the tailings has been assessed by analysis of just 3 samples of local granodiorite. There is likely to be considerable heterogeneity of the material actually mined (after all, gold is not uniformly distributed throughout the granidiorite so why should other elements, such as heavy metals, not be located in some of the ore to be mined?)

Response: This issue has been previously addressed in Section 5.2.34.

Mining of hard rock and processing the ore and transporting the concentrate will all use considerable fossil energy. The greenhouse gas emissions of the project have not been off-set in any way.

Response: Offsetting of greenhouse gas emissions is not a matter for consideration by the DoP.

5.5.6 Braidwood Greens

1. The Dargues Reef Goldmine poses a series of threats that cannot be ameliorated. These are:

- *Further degradation of the fragile Upper Deua Catchment - the Upper Deua catchment has undergone severe stress from human disturbance, historical and ongoing land management practises, historical gold mining, weed invasion and commercial water extraction (Araluen Valley). The community is working together to restore this important part of the catchment yet the Dargues Reef Gold Project is mostly likely to damage it beyond rehabilitation.*

Response: This issue is addressed in Section 4.2.5, 4.2.6 and 5.2.6.

- *Decreased Water quality - water quality will decrease and the effects on the health of the people and stock from the long-term use of the local water sources (bores and surface water) have not been addressed. Water modelling has used default and one off figures, and is not providing an accurate assessment of the hydro-geological picture at the mine site.*

Response: This issue is addressed in Sections 5.2.8, 5.2.10 and 5.2.11.

- *Decreased surface and groundwater in the catchment - Use of full harvestable right, bore water and dewatering of mines will lead to overall losses in water flow throughout the catchment. The impact on the ecology, domestic and agricultural use is far too great to accept.*
- *High risk of contamination. The EA does not adequately address how it will safeguard the Upper Deua water quality and supply.*
- *Poor water quality for environmental flows - there is no indication of the water quality of the historic mine workings that will be released into the water supply. This is potentially fraught and can cause serious water quality and ecological impacts to the catchment.*

Response: These issues are addressed in Sections 4.2.1 and 5.2.8 to 5.2.12.

- *Local noise increase - all the figures provided are modelled and not based on real data. Increase in noise will adversely affect neighbours and surrounding ecology. The noise impacts will decrease the tourism values and liveability of the township of Majors Creek. The proposal will result in sleep disturbance (EA-4-35) under noise enhancing inversion conditions which are a common feature of the local night-time environment. A real time acoustic assessment (winter night) using real data is required to accurately assess and subsequently ameliorate noise impacts on the surrounding local residents, Processing and construction 24 hours a day in a small community is unacceptable.*

Response: This issues is addressed in Sections 2.2, 5.2.2 and 5.2.3

- *High risk tailings management - How does the proponent know that residual sulphides in the tailings will not oxidise? Permeability into groundwater is highly probable. This cannot be ameliorated.*

Response: This issue is addressed in Section 4.2.1.2 and 5.2.24.

- *Clearing of Native Vegetation - including Endangered Ecological Communities (EECs). The Tableland Basalt EEC exists in the area and will be impacted on and has not been addressed in the EA. Impacts are noted within the Natural Temperate Grasslands EEC and the preliminary listing of Tablelands Frost Hollow Grassy Woodlands EEC. Downstream the Araluen Grassy Scarp Forest EEC and the Majors Creek State Conservation Area will be affected by decreased water tables. This cannot be undone.*

Response: This issue is addressed in Section 5.2.34.

- *Consultation with Aboriginal Communities - the recommendation from the Buru Nqunawal Aboriginal Cooperation that site officers be present during ground disturbance is standard practise and would represent good faith between Cortona and aboriginal communities (4-120). The consultation process was also lacklustre - effort was not made to make sure each interested party fully understood the project. This is not good enough.*

Response: Section 4.6.2 of the *Environmental Assessment* identifies the consultation undertaken with the aboriginal community. That consultation was undertaken in accordance with the relevant guidelines. In addition, given the general absence of significant items of cultural heritage significance, the Proponent contends that the presence of site officers is not warranted.

- *Bushrock Removal- disturbance of bushrock is noted as a Key Threatening Process under the Threatened Species Act. Several threatened species are recorded in the Wildlife Atlas that utilise bushrock. This is not addressed, nor can it be mitigated.*

Response: This issue is addressed in Section 5.2.33.

- *High risk sediment basins - are based on 100 yr rain events - which does not address the recent impacts on weather associated with climate change in the Southern Tablelands. Parts of the catchment experienced a 100-year flood event twice last year. The impact of this will be catastrophic.*

Response: The Proponent notes that all surface water control structures would be constructed in accordance with the requirements of Landcom (2004) and DECC (2008).

- *Risk of contamination from chemical storage - overfilling is a serious risk and contamination is likely. This is too high a risk.*

Response: This issue is addressed in Section 5.2.24

- *Poor monitoring and inspection planning - There is no baseline surface or groundwater monitoring (only point in time data). Proposed monitoring held quarterly is not good enough when dealing with a high risk of contamination. lf the proponent was serious about working with the community then water quality testing, piezometer testing, local bore testing, control structure inspections should occur weekly.*

Response: This issue has also been previously addressed in Section 5.2.21.

- *Perception of conflicts of interest - various donations, any Councillor shareholdings and Section 94 Planning Agreement processes have raised questions in the community about the conduct of various stakeholders and the transparency of pre-approval discussions and decisions.*

Response: The Proponent contends that they have operated openly and honestly with all stakeholders during the assessment process. The intimation by the Respondent that any dealings with stakeholders were less than transparent is strongly rejected by the Proponent. This issue has also been previously raised and is addressed in Section 5.2.34.

- *Large carbon footprint - the EA does not address the extra energy requirements. It will increase our local carbon emissions. The proponent should also be proposing to offset its energy use through sourcing renewable energy and/or investing in solar and wind generation in the Majors Creek area.*

Response: This issue is addressed in Section 5.5.5.

- *Transportation of ore - The EA does not address the high carbon footprint ore transportation by road for processing. Road maintenance costs will have to be met by a range of Local Government Areas, as well as pollution from increase in fuel use, and increased safety issues for other road users. This is unacceptable.*

Response: This issue is addressed in Section 5.5.5. Section 4.9 of the *Environmental Assessment* presents the traffic assessment.

- *Impact on Braidwood - The heavy vehicles transporting gold ore to Orange will take a route through Braidwood, NSW. Braidwood and its setting, which are of state significance as an excellent surviving example of a Georgian period town plan, dating from the late 1830s is listed under the NSW Heritage Act. Vibration induced damage is a real threat for the main street buildings, and increased heavy vehicle movements impact on the visual amenity and the noise pollution within the township.*

Response: This issue has been addressed in Section 5.2.17.

5.5.7 The Coastwatchers Association Inc

Impact on Humans That Live in the Catchment

The Executive Summary of the Environmental Assessment for the project states that all surface disturbing activities are planned to be undertaken within the Moruya Catchment with a predicted reduction in base flow into Majors Creek of 66 ML per year. We are not convinced that the plans to "return" water to Majors Creek from the eight new "harvestable rights" dams will be able to replace this reduction in base flow.

The EA does not adequately address how the Upper Deua water quality will be protected. Release of low quality water from these dams into the water supply could lead to serious impacts on this important catchment. There is no indication of the quality of the water that would be released from these dams.

Response: This issue has been addressed in Section 5.2.34.

A reduction of base flow and water quality in Majors Creek will have adverse impacts on the valuable peach growing area of Araluen.

Response: This issue has been addressed in Section 5.2.11.

The recent impacts on weather in the Southern Tablelands associated with climate change have not been addressed. Parts of the catchment experienced a 100 year flood event twice lost year. The impact of such events on sediment movement on the site could be catastrophic.

Response: This issue has been addressed in Section 5.2.26.

Ecological Impacts

The effect of the mine on terrestrial and aquatic environments beyond the actual mine site have not been given adequate consideration in the studies for the EA.

The Dargues Reef Mine proposes to remove 66.2 megalitres of groundwater per year from the area. This will lower the regional water table and greatly reduce the water available to native plants and to the native animals that drink from the springs currently supplied by this groundwater.

The proposed mine is extremely close to a Nature Reserve and a National Park yet there has been no study of the impact of the loss of groundwaler on ecosystems beyond the two square kilometre radius of the mine. Survival of the fragile ecosystems in the gorge below the mine, which include endangered and threatened species such as the Powerful Owl and the native Araluen gum Eucalyptus kartzoffiana, is of special importance.

The impact on the Tableland Basalt EEC which exists in the area has not been addressed in the EA. Also planned bushrock disturbance, which is noted as a Key Threatening Process in the Threatened Species Act, has not been addressed.

Response: The issues raised have been previously addressed in Section 5.2.34 and 4.2.6.

Management of Tailings

The tailings storage facility, which covers nine hectares, has on embankment which will be approximately 25 metres above the natural surface. There is no proposal to construct a secondary wall in case this embankment fails.

Prolonged wet conditions may threaten the integrity of the low-permeability layer of the tailings storage facility due to interflow concentrated in natural fissures.

The reported chemical composition of the tailings is based on analysis of only three samples of the local granidiorite. This very small sample will not reflect the likely heterogeneous make up of the large volume of materiol that will actually be mined over the lifetime of the project.

There is no proof to back up the claim that residual sulphides in the tailings will not oxidise.

Response: These issues have been previously addressed in Sections 4.2.1.2 and 5.2.23.

Coastwatchers Association Formally Requests That:

Test bores be drilled between two and six kilometres downstream from the mine site, to test the impact of drilling on the groundwater over a period of a year, to allow for variation in rainfall.

Response: This issue has been addressed in Section 5.2.34.

Greater scrutiny be made of the design of the tailings storage facility and the composition of the tailings that would be generated throughout the life of the mine.

Response: This issue has been addressed in Section 4.2.1.2.

A more detailed assessment be made of endangered and threatened flora and fauna in the four kilometres below the mine site. This should be carried out over o period of one year to allow for inclusion of migratory species and those that con only be identified in late winter when they call.

Response: This issue has been addressed in Sections 4.2.6 and 5.2.34.

Detailed assessments be mode of the heritage and indigenous sites, two to six kilometres downstream from the proposed mine site and tailings dam.

Response: This issue has been addressed in Section 5.2.15.

If this mine proceeds a secondary wall be built as back up for the tailings dam.

Response: This issue has been addressed in Section 5.2.23.

5.5.8 Conondale Range Committee

Impacts on endangered species like the powerful Owl Ninox strenua, a high order predator, reliant on a healthy complex food chain, are not adequately addressed. Although not listed under federal EPBC legislation, the precarious situation of Ninox strenua is recognised in different state legislation. In NSW, I understand it is declared as "Vulnerable", precisely the classification which should urge caution with approving a proposal such as this. It is also my understanding that the area that would affected by this proposal is home to all existing wild specimens of Eucalyptus kartzoffiana and further that the availability of groundwater is critical for its survival.

The on site treatment and tailings dam provide other threats to both surface and ground water.

Response: The issues raised by the Respondent have been previously addressed, the powerful Owl is discussed in Section 5.2.6, tailings management in Section 4.2.12 and *Eucalyptus kartzoffiana* (Araluen Gum) in Section 5.2.34.

5.5.9 South East Forest Rescue

There is no proposed secondary wall to be constructed on the tailings dam if the first wall fails. The tailings storage facility seems to have potential to impact Spring Creek and further the tailings facility should have a liner throughout, not just clay in some parts as implied.

Response: This issue has been addressed in Section 5.2.23.

No studies have been done for the Environmental Assessment on the mine's effect on the land beyond the actual mine site. The proposed mine is situated close to Majors Creek Araluen National Parks Reserve, Monga and Deua National Parks. Threatened, endangered and critically endangered species in the gorge below the proposed mine site, ranging from the Powerful Owl to the critically endangered Eucalyptus kartzoffina are not mentioned. This is contrary to current case law on definitions of significant impact.

Response: This issue has been addressed in Section 5.2.34.

The Dargues Reef Mine proposes to remove 130 mega litres of water per year from the local water table. This would cause a drop in ground water levels of between 1.5 and 10.5 metres. The water table currently supplies underground springs that provide drinking water for the local native animals and also keep the native flora watered. The dramatic drop in the water table could impact these native animals and their habitat.

Response: This issue has been addressed in Section 5.2.12.

Chemicals

The proponent makes scant mention of the chemicals to be used and no mention of their effects on biota. The Assessment Report states the company will transport 'sulphide concentrate'. We would state that this is a cynical understatement and an attempt to hide the real facts.

The EA must provide details of the project that are essential for predicting and assessing impacts to waters: including the quantity and physio-chemical properties of all potential water pollutants and the risks they pose to the environment and human health, including the risks they pose to Water Quality Objectives in the ambient waters (as defined on www.environment.nsw.gov.au/ieo, using technical criteria derived from the Australian and New Zealand Guidelines for Fresh and Marine Water Quality, ANZECC 2000).

- *Copper Sulphate Pentahydrate*
- *Potassium Amyl Xanthate*
- *Carbon disulphide*
- *IF6500*
- *Nitric Acid*
- *Other Chemicals*

Response: This issue has been previously addressed in Section 5.2.24.

Overburden/Waste Rock

Given the extent of sulphides likely to be present in much of the tailings and waste rock, this could lead to significant risks such as acid mine drainage in the future, especially given the recalcitrant environmental problems caused by smaller scales at numerous abandoned and/or rehabilitated mining projects around Australia.

The two components include both the waste rock:ore ratio as well as the total quantity of waste rock. If the ratio continues to increase over time as is apparent for many minerals, this will lead to ever increasing volumes of waste rock to be managed. At present there is not sufficient data on the public record to examine this quantity of waste rock with respect to the potential for acid mine drainage or other environmental problems, leaving major uncertainty with respect to the long-term sustainability of waste rock production and management authorities.

The scale and nature of waste rock often presents significant environmental risks if not identified and managed accordingly. Historically this has not been achieved, with numerous former abandoned mine sites leaving major pollution legacies following closure.

Response: The Proponent notes that the waste rock balance for the Project is included in the *Environmental Assessment* in Section 2.5.5. It is also noted that an assessment of the acid generating potential of the waste rock was made and is detailed in Section 2.5.2 of the *Environmental Assessment*. This issue is also discussed further in the response below.

Acid Mine Drainage

Acid mine drainage ("AMD") occurs when surface or groundwater flows from or over abandoned mine features containing sulphide mineralisation. Discharge from adits or open pits, as well as surface flow over and seepage through sulphide rich waste rock and tailings can produce acid drainage. Acid drainage begins with the exposure of iron sulphide materials to air and water.

In conclusion there is no guarantee that even with testing the community and the environment will be protected. Acid generation testing (waste rock and tailings) is often inadequate and ends up being incorrect because of the distribution of acid generating material.

Response: The Proponent rejects the assertion that acid generation testing 'is often inadequate and ends up being incorrect because of the distribution of acid generating material'. The Proponent contends that the testing undertaken in regards to acid generation potential, as detailed in Sections 2.5.2 and 2.7.4 of the *Environmental Assessment*, provides adequate definition of waste rock and tailings material. In addition the Proponent has included Commitment 7.20 to identify any acid generating material through the life of the Project and ensure that this material is appropriately managed.

Rehabilitation

On evidence mining companies seem to collapse before remediation is undertaken leaving the environment as 'an unfortunate victim.'

Finally, and perhaps most critically, there are not yet uniform standards or criteria for determining 'acceptable' rehabilitation.

Response: The Proponent will be required to provide a rehabilitation security for the Project. This security would be determined in consultation with I&I NSW and would be required to be provided prior to commencement of mining operations.

Noise and Blasting

Earthworks and drilling associated with the establishment of the box cut, ROM Pad and Tailings Storage Facility at the ROM area, access portal and tailings storage dam, have been predicted to exceed the noise criterion under inversion (night-time) conditions at several receivers.

Response: This is a factually incorrect statement. No exceedances of the noise assessment criteria are predicted.

Vibration

It is known that vibration effects are cumulative and with 5 years of blasting it will not be surprising if cracks in neighbouring residents appear.

Response: This is a factually incorrect statement. No exceedances of the blasting assessment criteria are predicted and no structural damage to buildings is anticipated.

Ecology

The notion that the CAR Reserve System is genuinely based on the principles of Comprehensiveness, Adequacy and Representativeness, is false as the declining populations of forest-dependent threatened species does not support the Assessment Report's argument. The output of the CAR was deeply biased towards logging industry objectives and as such is a flawed document.

> *…serious flaws in the information and scientific process underpinning the RFAs undertaken to date have been identified.*

To base a value judgment on whether an EEC is viable or not on CAR is therefore based on flawed data.

Of note is that a Preliminary Determination has been made to list the Ribbon Gum - Snow Gum grassy open forest as an Endangered Ecological Community by the New South Wales Scientific Committee.

Clearing of native vegetation is not ecologically sustainable.

The Assessment Report repeatedly states that, as the area to be cleared is small, there will be no negligible effects. We would contend that this statement is erroneous and only serves the proponent.

While much is made of the undertaking not to destroy any hollow bearing trees the undertaking to not destroy any feed trees or habitat trees is missing from the Assessment Report. This is not acceptable.

Response: The issues raised have been previously addressed in Section 4.2.5, 4.2.6 and 5.2.34. In addition, as indicated in Section 4.2.5, the Proponent would not disturb any vegetation more than 3m high.

Listed Endangered Ecological Communities

The Assessment Report states:

> *A small strip of Native Grassland was also identified. However, due to the narrowness of the strip (<5m) and location adjacent to an eroding stream bank, the community was determined not to be viable.*

The Natural Temperate Grasslands of the Southern Tablelands (NSW and ACT) is listed as an endangered ecological community. If the point of listing an EEC community is that it is endangered then to allow it to be destroyed seems in complete conflict with everything known about biodiversity and the point of its listing. It is also in tension with other legislative instruments. The Department of Environment Climate Change and Water has developed 18 Priority Actions to enable recovery of this EEC. Destroying an EEC is not one of the Priority Actions.

Response: This issue has been previously addressed in Section 4.2.5.

Fauna Survey Methods

Studies have been undertaken which suggest that spotlight surveying methods are ineffective for detecting arboreal mammals. Detectability of arboreal marsupials by spotlighting depends on weather conditions. Spotlight transects may substantially under-estimate the actual abundance of animals in a given area.

We would state that this proposal triggers the Environment Protection and Biodiversity Conservation Act 1999 (Cth) and requires the Commonwealth's approval before proceeding. Federally listed animals within four kilometres of the project include:

- *New Holland mouse (Pseudomys novaehollandiae): listed as vulnerable;*
- *Araluen Zieria (Zieria adenophera): listed as endangered;*
- *Button Wrinklewort (Rutidosis leptorrhynchoides): listed as endangered;*
- *Araluen Gum (Eucalyptus kartzoffiana): listed as vulnerable*
- *Grey Deua Pomaderris (Pomaderris gilmourii var. cana): listed as vulnerable;*
- *Spotted-tailed Quoll (Dasyurus maculatus): listed as endangered.*

Response: The Proponent notes that fauna surveys for the *Environmental Assessment* were conducted by Gaia Research Pty Ltd who conducted the surveys using the methodology provided in Section 4.3.3 of the *Environmental Assessment*. The Proponent notes that this methodology complies with the requirements of:

- *Threatened Biodiversity Survey and Assessment: Guidelines for Developments and Activities (Working draft),* prepared by the Department of Environment and Conservation (2004); and
- *Draft Guidelines for Threatened Species Assessment* prepared by the (then) Department of Environment and Conservation and Department of Primary Industries (2005).

In addition, issues related to the EPBC Act are addressed in Sections5.2.28 and 5.2.34.

Ecosystem Maintenance

Fragmentation of the landscape and the consequent habitat loss is the major threat to biodiversity. It has been suggested that fragmentation within a forest will force the inhabitants of the logged forest patch into the surrounding forest, thereby causing dysfunctional behaviour due to higher than normal densities. This phenomenon is reduced when the remaining forest is left intact.

Roads result in fragmentation of the landscape, but they also have much broader and wide ranging effects. At the landscape scale, roads disrupt ecosystem processes and, at both a fine and coarse scale, cause a loss of biodiversity. In this proposal's case the transportation of hazardous chemicals elevates the risk of environmental damage.

As stated in the Assessment Report the trees in the Ribbon Gum forest are between 120 -200 years old. To destroy these trees for the sake of a project that has a five year life span verges on the corrupt. Further much of the Assessment Reports Ecology Section recommends that further more comprehensive surveys be undertaken.

We would remind the Department of Planning that Alteration to the natural flow regimes of rivers, streams, floodplains and wetlands, Clearing of native vegetation and Human-caused Climate Change have all been listed as Key Threatening Processes under the Threatened Species Conservation Act 1995 (NSW).

Response: Figure 4.17 of the *Environmental Assessment* identifies that with the exception of 0.2ha of Ribbon Gum Forest, all Project-related ground disturbance would be in areas that have been previously disturbed and would not result in further fragmentation of habitat or removal of native vegetation.

Groundwater

The water table currently supplies underground springs that provide drinking water for the local native animals and also keep the native flora watered. The dramatic drop in the water table would be a disaster for these native animals and their habitat. Spring Creek feeds into Majors Creek which passes through the Majors Creek Araluen National Parks Reserve and then feeds into the Deua River which turns into the Moruya River which passes through National Park and then out to the Pacific Ocean.

Seemingly the water modelling has been based on an inadequate understanding of how water catchments work. There seems to be an assumption that the surface dams will not be affected by the draw-down in the regional water table and will somehow be filled by hortonian overland flow.

However most run off in these catchments will be due to baseflow, sub-surface stormflow or overland flow which is the result of exfiltration of interflow in saturated zones.

Borefield studies undertaken by the proponents show that the regolith and granodiorite aquifers are tightly connected. Any surface dams constructed in the zone surrounding the mine which may be even slightly affected by the draw-down in the water table are unlikely to yield significant volumes of water.

The strategy to attempt to replace lost baseflow in Major's Creek with releases from the 'harvestable rights' dams is unlikely to succeed due to the poor yield from those dams.

Response: This issue is addressed in Section 5.5.5.

The use of water recovered from abandoned workings will definitely reduce the baseflow in Majors creek and lower the regional water table. The Project would result in lowering of groundwater levels within the Shoalhaven Catchment.

Response: This issue is addressed in Section 5.2.9.

A failure to secure the baseflow in Majors Creek will have adverse impacts on the valuable peach orchard production at Araluen and ultimately the urban water supply scheme for the Eurobodalla Shire due to the recent upgrade in extraction capability from the Deua River.

Response: This issue is addressed in Section 5.2.11.

There is no proposed secondary wall to be constructed in case the first wall of the tailings storage facility fails. The clean water diversion structure around the tailings storage facility appears to be a mainly a surface drain/bund. This will intercept hortonian overland flow but not intercept the interflow of subsurface water. In prolonged wet conditions, such interflow, concentrated in natural fissures, might threaten the integrity of the low-permeability layer of the tailings storage facility.

The failure of the tailings storage dam at Captains Flat, which contaminated vast reaches of the Molonglo River with heavy metals, resulting in Lake Burley Griffin being rendered biologically poor is one such example.

Response: This issue is addressed in Section 5.2.23**.**

Energy Use

Mining of hard rock and processing the ore and transporting the concentrate will all use considerable fossil fuel energy. The electricity usage is predicted to be between 36 444 885 kWh to 46 662 513 kWh per year for a total of 209 735 707 kWh for the 5 years of the project.

With climate change mitigation being listed as a priority by both the State and Federal Governments to approve a project that has such considerable usage of fossil fuels seems hypocritical, particularly as anthropogenic climate change has been listed as a Key Threatening Process.

Response: The Proponent notes that the Project has been optimised to reduce energy consumption where ever possible and that the Proponent intends to use efficient mining techniques. The Proponent also notes that the energy reduction measures included in Section 4.10.6.2 of the *Environmental Assessment* will be implemented during Project development.

Air Quality

Low dust levels are difficult to maintain. This is of great concern in view of the toxicity of many of the chemicals used in this project. Research has shown that current standards for dust protection are not being met in some mines.

The inhalation of dust particles less than 10 microns (PM10) is known to increase death and asthma attacks. With the pit close to residents and schools this dust is a major concern. Further issues such as sulphur dioxide emissions and silicosis have not been addressed in the Assessment Report.

Response: Section 4.10 of the *Environmental Assessment* provides an air quality assessment. That assessment indicates that the Project would not result in dust emissions at surrounding residences that would exceed the relevant assessment criteria.

Other Issues of Consideration

The Majors Creek Fault Line

A major fault line runs along Majors Creek. It has been subject to minor slippage in the past 30 years and major slippage in the past. No assessment seems to have been made of the effect of slippage from the Majors Creek fault line. There is no reference to this in the Environmental Assessment.

The proposed Dargues Reef tailings dam and the Dargues Reef Mine itself is only 1.5kM away from the Majors Creek fault line. Any slippage on this fault line would result in the failure of the dam impacting on residents and the environment.

Radon Gas Exposure

This is not mentioned in the Assessment Report, nor have the community been informed, of the depth and extent of mine tunnels. The vertical mine shaft is proposed to be 500 metres deep. The horizontal tunnels will extend out for possibly more than two kilometres. This is of particular relevance as, in most areas of decomposed granite, radon gas is a particular hazard at depth.

Response: These issues have been previously addressed in Section 5.2.34.

Aboriginal Heritage

There are known Aboriginal women's sites within ten kilometres of the proposal. Further cultural objects were found within the area of the proposal indicating that if a more thorough survey were to be conducted there is a likelihood of more objects being discovered.

Response: Section 4.6 of the *Environmental Assessment* identifies that five sites of Aboriginal heritage significance comprising 10 individual flakes or cores were identified within the Project Site. In addition, Section 4.6.2.2 of the *Environmental Assessment* identifies that consultation with the Aboriginal community was undertaken in accordance with the relevant guidelines and that information in relation to women's sites or reference to the existence of such sites was not made at that time. Finally, the Proponent notes that all registered Aboriginal groups were provided with a draft of the Aboriginal Heritage Assessment and those that responded did not contest the findings of the assessment. The Proponent contends therefore that no further assessment is required and none has been requested by the Aboriginal community.

Inconsistency in the Survey Results

The archaeologist expresses surprise at the results of the field survey where a significant number of Aboriginal Objects, as defined under the National Parks and Wildlife Act 1974 (NSW) 'archaeological sites', were found in the immediate proximity to the study area's Spring Creek and that prior to more recent European land management activities it was likely that there would have been a lot more evidence of past Aboriginal occupation present along the banks of Spring Creek (see Section 7, Discussion).

He then states, in contradiction, that the Spring Creek environment was unlikely to have been a location favoured by past Aboriginal inhabitants as an occupation area but would have been merely part of an Aboriginal movement corridor between more suitable and habitable areas.

Surely then the archaeologist should have been questioning the results of the field survey if he was surprised by the results of the field survey. The presence of a relatively large number of geographically separate Aboriginal site locations should have been a trigger to create some concern in the consultant's mind as to question what had in fact caused the unexpected presence of Aboriginal stone artefact scatter sites along the banks of a creek which he defined in his report as 'ephemeral' in nature.

Response: Firstly, the Proponent contends that ASR, in Section 7 of ASR (2010a) was surprised that five sites had survived historic alluvial mining activities. This is not contradictory with the predictive model suggesting limited potential for a high density of sites because, as indicated in **Appendix 3** of this document, Aboriginal occupation may have been occurring for 50 000 years and some form of background scatter of artefacts would be expected

in most environments. Finally, the Proponent notes that limited sites were identified within the Project Site despite an extensive survey effort and reasonable ground visibility. As a result, the Project is unlikely to result adverse impacts to items of Aboriginal heritage significance.

Survey Area Coverage

None of the material talks about survey area coverage. DECCW should have required a map of field survey coverage of the survey area and a description of the coverage strategy and a justification for such a strategy.

Field survey coverage details should include, for example the percentage of survey area covered, patterns of on-foot or vehicle coverage, surface visibility, other impediments to effective coverage of the study area.

Furthermore, whilst there is no map provided which identifies survey area coverage, it would appear that the survey focused primarily upon archaeologically sensitive alluvial/colluvial stream banks only.

In comments from one of the Aboriginal community participants (Bell, pers coms 2010, Appendix) the participant stated that he was concerned that they were not afforded an opportunity to visually inspect the entire study area.

Response: Section 4.6.4 of the *Environmental Assessment* identifies the survey methodology. That includes a description of roster that was used during the Aboriginal heritage survey and the methods employed to ensure that each participant was made aware of the previous survey findings. The Proponent notes that the survey area was the entire Project Site and that **Table 1** of ASR (2010) identifies the survey coverage within the survey area.

Landform Based Archaeological Sensitivity Assessment

The report makes no attempt to provide to the reader, and most importantly to a DECCW reviewer, a description of survey area landform and /or Study Area landforms.

No attempt is made to formally classify and differentiate between the various survey area landforms such as alluvial creek banks, alluvial and colluvial creek bank terraces, adjacent low hillslopes and hillslope terrace, spurlines and spurline crests, for example.

All of the above mentioned landform units, many of which occur within the Dargues Reef study area, may be considered to have high levels of archaeological potential, depending upon levels of past disturbance, along with varying levels of assessed archaeological sensitivity, based upon existing Aboriginal site distribution patterns and predictive models.

From the copies of topographic maps and aerial photos provided in the report the alluvial stream banks, of which the report author refers to in his report as containing numerous Aboriginal 'sites' (Aboriginal Objects as defined under the Act) are not the only archaeologically sensitive landforms contained within the study area. However, they appear to have been the focus of the field survey.

Response: Section 4.6.4 of the *Environmental Assessment* notes that an assessment of the potential for a range of landform types to host sites of Aboriginal heritage significance is provided in Section 5.2 of ASR (2010). In addition, **Table 1** of ASR (2010) identifies a range of landforms and the survey coverage and a description of each.

Aboriginal Community Consultation

The copy of the Letter to Registered Aboriginal Stakeholders is evidence that there is no attempt to obtain from any of the registered stakeholders / Aboriginal community groups, known information on the cultural significance of the Dargues Reef study area.

This information should have been critical to the integrity of the field survey and should have been obtained prior to commencement of the field survey.

Given the devised and non culturally sensitive strategy by the consultant for the involvement of such a large number of Aboriginal community representatives as participants in the field survey it is difficult to understand how any one group who had rostered representatives present during the course of the field survey could have obtained an understanding of the development proposal and its potential impact upon Aboriginal cultural heritage.

The strategy for community consultation and involvement would have been better served whereby a small number of representatives, considered to be the most relevant to the study area, were given the opportunity to participate in the entire survey. This could then have been followed by a post field survey inspection of the other identified stake holders. Priority in choosing the most relevant group reps to attend the field survey would have been more appropriately established using community reps who identified specific cultural and physical knowledge of the study area and or the attended by reps of the statutory Aboriginal land council. The strategy employed by the consultant was clumsy and inappropriate for the above reasons. DECCW should not accept this below standard methodology.

Response: As indicated in Section 2.2.1 of ASR (2010),

> "It was clear from some of the communications between ASR and various stakeholders that there were "some differences of opinion" between some of the stakeholders and that holding a meeting to discuss the Project would only lead to even greater animosity."

As a result, it is unlikely that any of the registered stakeholders would have been willing to agree to allow the other stakeholders to undertake the assessment on their behalf. As a result, the suggested methodology would not have been acceptable to the registered stakeholders. In addition, the Proponent notes that the consultation was undertaken in accordance with the relevant guidelines.

Significance Assessment

The consultant seems to be confusing Social Significance with the all encompassing term Cultural Significance. The consultant, whilst attempting rather clumsily and grossly inaccurately to define what cultural significance is for the purpose of his report, certainly appears to be totally unfamiliar with international cultural significance assessment criteria and protocols, that is ICOMOS or the Australian ICOMOS (the Burra Charter) standards, criteria and definitions in his section of the report on Significance Assessment.

The consultant attributes interest in Aboriginal cultural heritage only to the Aboriginal community. His extremely poor grasp and confusion of the Burra Charter provisions for assessing Cultural Significance is clearly displayed when he excludes the remainder of the broader non-indigenous community from attributing cultural significance to aspects of Aboriginal archaeological heritage.

Nevertheless the significance assessment for the artefacts was not conducted due to an unsubstantiated claim that 'no Aboriginal Objects would be impacted as a result of the development proposal'.

It seems the consulting archaeologist did not enter into any discussion of the overall significance of the Dargues Reef study area to the Aboriginal community with the relevant Aboriginal community groups, or even attempt to put the discovery of the recorded 'sites' in any Aboriginal cultural context.

Response: The Proponent notes that each of the registered Aboriginal stakeholders was given the opportunity to provide feedback both informally during the field survey and formally during the consultation following circulation of the draft report and that no groups identified the Project Site as an area of significance to the Aboriginal community.

Aboriginal Site Management

Whilst it would appear that there is no proposal to impact 'known' Aboriginal sites (objects) there are no formal protective measures described within the report such as fencing, flagging and protective buffer zones around recorded Aboriginal sites within the study area.

How does the proponent intend to ensure that 'accidental' impact does not occur ?

Whilst there is mention in the assessment of areas of PAD in the survey area there was no material relating to this matter in the Assessment Report. The existence of PADs is a major issue in such a large area survey and especially where surface visibility might impede effective surface coverage.

The comment that PADs are not recorded as sites on the DECCW AHIMS register is erroneous. DECCW accepts PAD recordings on the database.

Response: Section 4.6.6 of the *Environmental Assessment* identifies management and mitigation measures that would be implemented, including fencing and buffer zones around the identified sites. In addition, a range of measures are proposed to protect objects that may be identified during the life of the Project. Finally the potential for PADs to occur within the Project Site is considered to be limited as the convex nature of the valleys indicates that with limited exceptions, the Project Site is an eroding landform, not an accumulating landform, and the likelihood of objects of Aboriginal heritage significance being buried and preserved is considered slim.

Conclusion

The greenhouse gas emissions of the project have not been off-set in any way.

The Assessment Report does not usefully contribute to the debate as it fails to adequately address a wide range of public health problems. Additional to the dust concern is the health risk associated with exposure to arsenic in mine tailings, especially for children. To allow the proposal to proceed under these health concerns with the proponent self-regulating and monitoring would be negligent.

Other voiced concerns have focussed on an increase in stress due to noise, vibration, loss of property values, harassment and disruption of general lifestyle and amenity. The proposal has already caused anxiety and depression in Majors Creek's close-knit rural community.

In addition, the Assessment Report states the company will clear valuable forest on which fauna and flora rely.

The gold mining industry is a powerful lobby group. The industry justifies its assault on communities and the destruction of the environment with the promises of jobs and economic benefit, but at the conclusion invests its profits elsewhere and leaves the community with a dangerous mess. When the mine closes a further risk is the large and dangerous void, which will have to be made secure for hundreds of years.

Furthermore, with what is current scientific knowledge on the effects of climate change nothing about this proposal can be seen to have any mitigating factors and in fact will help exacerbate the effects of climate change.

Response: Each of these issues has been addressed previously in this sub-section.

5.5.10 Permaculture Sydney North

Our primary concern is that the impact of the mine on ground water and in turn flora and fauna have not been adequately assessed. It is considered that:

- *The impact on groundwater levels need to be extended further from the proposed mine site*
- *The evaluation of likely recharge scenarios is inadequate in that measurements need to be taken over a longer period to allow for variations in rainfall. The Environmental Assessment presented by the proponent provides an optimistic view of likely recharge rates which may not be justified when NSW re-enters a period of drought.*
- *Even if recharge will restore groundwater levels within 5 years of the mine ceasing operations as predicted (after a 9 year project life) groundwater levels will have been suppressed for 14years. This extended period of changed water regime may lead to serious adverse consequences for local flora and fauna. These impacts need to be thoroughly assessed before any consideration could be given to approving the Dargues Reef Mine.*

- *It is considered that a detailed assessment should be made of endangered, critically endangered and threatened flora and fauna in the four kilometres below the mine site. This will require a study period of 12 months for completion, as some species are migratory, and others, such as the endangered powerful owl, can. only be easily identified in late winter when they are calling.*
- *It is considered that a detailed assessment should be made of heritage and indigenous sites 2-6 kilometres downstream from the proposed mine site and tailings dam.*

Response: The issues raised by the Respondent have been addressed in previous Sections. Specifically, ground water related impacts are dealt with in Section 5.2.8 to 5.2.12, endangered species in Section 5.2.6 and 5.2.12, and heritage and indigenous sites in Section 5.2.15.

5.6 FACTUALLY INCORRECT STATEMENTS IN SUBMISSIONS

This sub-section presents a range of factually incorrect statements that have been made in submissions received and presents the relevant facts.

And to register my outrage at the proposal's stated intentions to truck effluent from other mines across the district and process materials at Majors Creek in future years.

However, the most frightening aspect of the 24 hour mine proposal is the part of the submission by Big Island Mining Pty Ltd (Known here as Cortona) which fields their intention to process material extracted from other mines in the region at Majors Creek! This reinvents Majors Creek as a 24 hour noisy dump for the rest of the lives of those presently living here and remakes Braidwood and the Majors Creek Road as a truck highway.

Submission No. 010 – Ahlquist

I believe that if Big Island Mining Pty Ltd (or as we know them Cortona) were to propose to mine in neighbouring regions and process any of this material at the Majors Creek site that they should be prevented from doing this as it will only further the negative affects upon the local community at Majors Creek.

Submission No. 026 – Huurne

Response: The Project would not accept material from outside the Project Site for processing. All ore material would be sourced from the Proposed Dargues Reef Mine. Should further resources be identified, subsequent applications for project approval would be prepared.

There is a stated intention of the proponent to use polluted old mine water for environmental flows.

Submission No. 011 – Anthony

Response: Water within the historic workings is not polluted. Table 4.19 of the *Environmental Assessment* presents an overview of the quality of water within the workings.

Furthermore, the EA states that the noise parameters will be frequently exceeded and yet the unmitigated risk analysis states it will be unlikely. This is confusing. Either way regular exceedance of the noise criteria is not acceptable.

Submission No. 017 – Dickenson

Response: No exceedances of the noise assessment criteria are anticipated.

An influx of some 80 miners would dramatically change the village forever. We simply do not have the amenities to cope with such sudden growth. Water, septic pollution, traffic and waste disposal would all present major problems for the community.

Submission No. 025 – Harrison

Response: It is anticipated that the majority of the Project workforce would be based in Braidwood or other centres. In addition, the Proponent proposes, as far as practicable, to recruit local workers who already have accommodation.

6. FINAL STATEMENTS OF COMMITMENTS

Table 10
Statement of Commitments for the Dargues Reef Gold Project

Page 1 of 21

Desired Outcome	Commitment	Timing
6.1 ENVIRONMENTAL MANAGEMENT		
Compliance with all conditional requirements in all approvals, licences and leases.	1.1 Comply with all commitments recorded in **Table 5.1**. 1.2 Comply with all conditional requirements included in the: • Project Approval; • Environment Protection Licence; • Mining Lease(s); and • any other approvals.	Continuous and as required.
All operations conducted in accordance with all relevant documentation.	1.3 Undertake all activities in accordance with the accepted Mining Operations Plan, environmental procedures, safety management plan and/or site-specific documentation.	Continuous and as required.
6.2 AREA OF ACTIVITIES		
All approved activities are undertaken generally in the location(s) nominated on the figures shown in Sections 2 and 4.	2.1 Mark, and where appropriate, survey the boundaries of the areas of proposed disturbance.	Prior to the commencement of the relevant activity.

Table 10 (Cont'd)
Statement of Commitments for the Dargues Reef Gold Project

<table>
<tr><th>Desired Outcome</th><th>Commitment</th><th>Timing</th></tr>
<tr><td colspan="3">6.3 OPERATING HOURS</td></tr>
<tr><td>All operations are undertaken within the approved operating hours.</td><td>3.1 Undertake all activities, where practicable, in accordance with the following operating hours.
<table>
<tr><th>Activity</th><th>Proposed Hours of Operation</th></tr>
<tr><td>Vegetation clearing and topsoil stripping</td><td rowspan="2">7:00am to 6:00pm, 7 days per week</td></tr>
<tr><td>Construction operations – Box cut</td></tr>
<tr><td>Blasting Operations – Box cut</td><td>9:00am to 3:00pm, Monday to Saturday</td></tr>
<tr><td>Construction operations – Remainder</td><td rowspan="4">24 hours per day, 7 days per week</td></tr>
<tr><td>Underground mining operations, including underground blasting</td></tr>
<tr><td>Maintenance operations</td></tr>
<tr><td>Processing operations – except crushing and screening</td></tr>
<tr><td>Crushing and screening operations</td><td>7:00am to 7.00pm, 7 days per week (24 hour operations on no more than 20 days per year)</td></tr>
<tr><td>Transportation operations – Proponent-controlled vehicles</td><td>7:00am to 10.00pm, 7 days per week (except 7:00am to 8:30am and 3:00pm to 5:00pm school days)</td></tr>
<tr><td>Rehabilitation operations</td><td>7:00am to 6:00pm, 7 days per week</td></tr>
</table></td><td>Continuous and as required.</td></tr>
<tr><td colspan="3">6.4 NOISE AND BLASTING</td></tr>
<tr><td rowspan="3">Noise generated by operational activities does not exceed DECCW nominated criteria nor significantly impacts on neighbouring landowners and/or residents.</td><td>Site Establishment Noise Controls
4.1 Ensure all bulk earthworks strictly adhere to standard construction hours of operation, namely 7:00am to 6:00pm.</td><td>Continuous during site establishment operations.</td></tr>
<tr><td>4.2 Maintain the on-site road network to limit body noise from empty trucks travelling on internal roads.</td><td rowspan="2">Continuous during site establishment operations.</td></tr>
<tr><td>4.3 Maintain an open dialogue with the surrounding community and neighbours to ensure any concerns over noise or vibration are addressed.</td></tr>
</table>

Table 10 (Cont'd)
Statement of Commitments for the Dargues Reef Gold Project

Desired Outcome	Commitment	Timing
6.4 NOISE AND BLASTING (Cont'd)		
Noise generated by operational activities does not exceed DECCW nominated criteria nor significantly impacts on neighbouring landowners and/or residents. (Cont'd)	**Operational Noise Controls** 4.4 Place and operate the crusher within an enclosure engineered to achieve a noise reduction of at least 12dB.	Prior to and continuous during mining operations.
	4.5 Ensure that the grinding circuit is rubber lined.	
	4.6 Place and operate the ventilation fan at least 10m below ground level rather than at the surface. The interim ventilation fan would be placed within the deepest section of the box cut until the final fan is commissioned. The interim fan may be retained as a backup ventilation system in the event of failure of the final fan.	
	4.7 Construct a noise bund of at least 5m high along the southern and western edges of the ROM pad.	
	4.8 Undertake attended noise monitoring at the residences most likely to be affected by noise generated by the Project.	Continuous during mining operations.
	4.9 Prepare a Noise Management Plan prior to the commencement of mining activities which would incorporate the specific details of all noise controls and provide measures to address noise criteria exceedances and/or complaints should they occur.	Prior to commencement of mining operations.
	4.9a Ensure that Frequency Modulated Reversing Alarms are fitted to all mobile equipment that require such alarms	Continuous during the life of the Project
All activities are undertaken in such a manner as to reduce the noise level generated and minimise impacts on surrounding landholders and/or residents.	**Transport Noise Controls and Operational Procedures** 4.10 Ensure strict adherence to hours of operation, identified in **Table 2.11** of the *Environmental Assessment.*	Continuous during transportation operations.
	4.11 Ensure, where practicable, that all Project employees and contractors enter and exit the Project Site in a courteous manner and without causing undue traffic noise.	
	4.12 Prepare and implement a Drivers Code of Conduct and ensure that all drivers of heavy vehicles that regularly access the Project Site sign and comply with the code.	Prior to commencement of transportation operations.
Achieve compliance with all ANZECC Blasting Guidelines.	**Blasting Controls** 4.13 Ensure that all blasts are designed by a suitably qualified and experienced blasting engineer or shotfirer and that each blast has an MIC of no greater than 105kg (until such time that a site law is developed which will allow for more precise predictions of blast emissions).	Continuous during mining operations.

Table 10 (Cont'd)
Statement of Commitments for the Dargues Reef Gold Project

Desired Outcome	Commitment	Timing
6.4 NOISE AND BLASTING (Cont'd)		
All activities are undertaken in such a manner as to reduce the noise level generated and minimise impacts on surrounding landholders and/or residents.	**Other Noise and Vibration Controls** 4.14 Ensure that equipment with lower sound power levels is used in preference to more noisy equipment and that frequency modulated reversing alarms are installed on all mobile equipment operating on the surface. 4.15 Maintain an open dialogue with the surrounding community and neighbours to ensure any concerns over noise or vibration are addressed.	Continuous during mining operations.
6.5 ECOLOGY		
Management of disturbance within the Project Site to minimise impact on fauna of conservation value.	5.1 Ensure that, no ground disturbing activities are undertaken within areas of identified. Ribbon Gum Forest and Fragmented Ribbon Gum Forest.	Continuous during site establishment operations.
Maintenance and improvement of the biodiversity value of the Project Site and surrounding areas.	5.2 Avoid the use of phosphate-based fertiliser in pasture areas to encourage the regeneration of native grasses. 5.3 Manage grazing operations, including stocking rates and fencing, in a manner to sustain and facilitate the spread of native grass species. 5.4 Fence all areas of Ribbon Gum Forest and Fragmented Ribbon Gum Forest and exclude stock from those areas. Those areas are to be managed to maintain to improve biodiversity values. 5.5 Ensure that areas of habitat suitable for the Majors Creek Leek Orchid are appropriately identified and fenced with a 20m buffer and access restricted. Ensure no disturbance occurs within the fenced areas. 5.6 Prepare a management plan to ensure that Common Wombat are not harmed during establishment of the tailings storage facility. This plan may include the following. – Mark all wombat burrows prior to the commencement of ground disturbing activities. – Commence ground disturbing activities on the upper slopes of creek banks a few days before disturbing the identified hollows to allow individual wombats time to vacate their burrows at night when equipment is not operating. – Inspect all burrows to ensure that common wombats have vacated the proposed area of disturbance. Any remaining wombats would be relocated in consultation with local wombat experts.	Continuous during the life of the Biodiversity Strategy.

Table 10 (Cont'd)
Statement of Commitments for the Dargues Reef Gold Project

Desired Outcome	Commitment		Timing
6.5 ECOLOGY (Cont'd)			
Maintenance and improvement of the biodiversity value of the Project Site and surrounding areas.	5.7	Continue the existing weed and pest control program, with particular focus on managing Broom and Blackberry within the southern section of the Project Site.	
	5.8	Ensure that dead fallen and standing timber are not removed or disturbed to preserve fauna habitat.	
	5.9	Implement fully the Biodiversity Strategy described in Section 2.15 of the *Environmental Assessment*, including ensuring that the strategy would be implemented in perpetuity.	
	5.10	Prepare a Biodiversity Management Plan in consultation with the relevant government agencies and surrounding community within 12 months of receipt of the project approval. That plan would: – specify biodiversity-related actions to be undertaken during the life of the Project and for several years after the site has been decommissioned; – incorporate the above commitments; – describe management of the proposed biodiversity area; – describe the proposed revegetation and amelioration program, including identification of areas to be revegetated/ameloriated and the species to be used; and – involve, where practicable, local community groups in management of biodiversity with in the Project Site.	Within 12 months of commencement of mining operations.
6.6 GROUNDWATER			
Mitigate potential adverse impacts to surrounding groundwater users.	6.1	Undertake consultation with the owners of bores or users of springs that are predicted to be adversely impacted by the Project or have been determined by an independent hydrologist to have been adversely impacted by the Project. The consultation would be directed at seeking to adequately mitigate or compensate the owners or users for the identified adverse impacts. Options include deepening or redrilling and re-equipping the existing bores or providing additional water from another source to compensate for the reduced groundwater supply.	Prior to and during the life of the Project.

Table 10 (Cont'd)
Statement of Commitments for the Dargues Reef Gold Project

Desired Outcome	Commitment		Timing
6.6 GROUNDWATER (Cont'd)			
Mitigate potential adverse impacts to surrounding groundwater users. (Cont'd)	6.2	Monitor groundwater levels in surrounding, privately-owned bores on request. The Proponent would ensure that all landholders in the vicinity of the anticipated zone of groundwater drawdown are briefed on the anticipated impacts and that an appropriate monitoring program is negotiated. In addition, a similar offer would be made to all other land owners with bores in the vicinity of the Project Site. Monitoring frequency would be reviewed at least annually and adjusted, as required. This may include removing some monitoring locations in consultation with the relevant government agencies.	
Compensate for anticipated reduced groundwater discharges to surface water.	6.3	Release water sourced primarily from the harvestable rights dams at the rates identified in **Table 4.20** of the *Environmental Assessment* into Majors Creek at the confluence of Majors and Spring Creeks. These environmental discharges are to continue from the commencement of mining operations until 2 years after the cessation of dewatering operations.	From commencement of mining operations until 2 years after the cessation of dewatering operations.
	6.4	Negotiate an appropriate arrangement with the owners of Lot 210, DP755934 to allow construction or equipping of a bore to access groundwater within the Snobs workings.	Prior to construction of that bore and extraction of water.
Confirm the accuracy of the groundwater model and anticipated impacts.	6.5	Undertake a review of the numerical groundwater model. In the event that the actual impacts are significantly greater than those presented in AGE (2010), then the Proponent would consult with NOW in relation the revised modelling results and would develop appropriate management and mitigation measures to address those impacts.	Prior to commencement of mining operations and every two years following commencement.
Minimisation of groundwater contamination.	6.6	Store all hydrocarbon and chemical products within a bunded area complying with the relevant Australian Standard.	Continuous during the life of the Project.
	6.7	Refuel all equipment within designated, sealed areas of the Project Site, where practicable.	
	6.8	Undertake all maintenance works involving hydrocarbons, where practicable, within designated areas of the Project Site such as the maintenance workshop.	
	6.9	Direct all water from wash-down areas and workshops to oil/water separators and containment systems.	
	6.10	Ensure all hydrocarbon and chemical storage tanks are either self-bunded or bunded with an impermeable surface and a capacity to contain a minimum 110% of the largest storage tank capacity.	

Table 10 (Cont'd)
Statement of Commitments for the Dargues Reef Gold Project

Desired Outcome	Commitment	Timing
6.6 GROUNDWATER (Cont'd)		
Minimisation of groundwater contamination.	6.11 Design and construct the tailings storage facility as described in Section 2.7 and in accordance with the requirements of the relevant government agencies. Key design parameters would be as follows. – Construct the floor and walls of the tailings storage facility in a manner that would achieve a permeability of less than 1x10-9m/sec. Ensure that the tailings storage facility embankment is keyed into the underlying material in a manner that would prevent down slope migration of potentially contaminated groundwater from the facility. – Place residue uniformly around the perimeter of the tailings storage facility via several slurry spigots. – Construct seepage collection structures at the foot of the tailings storage facility embankment and ensure that any captured seepage is pumped back to the tailings storage facility. – Install piezometers at the base of the tailings storage facility embankment and monitor these regularly to assess the integrity of the facility (see Section 4.5.6).	Continuous during the life of the Project.
	6.12 Cap the tailings storage facility during final shaping and rehabilitation to minimise the potential for infiltration of surface water into the facility. The nature of the cap is to be determined in consultation with the relevant government agencies during preparation of the *Closure Plan*.	During final rehabilitation
6.7 SURFACE WATER		
Appropriately document Surface Water, Sediment and Erosion management measures.	**General Management and Mitigation Measures** 7.1 Prepare a detailed *Surface Water, Sediment and Erosion Control Plan*, including a description of surface water management structures and procedures to ensure that the criteria identified in Section 4.4.3 of the *Environmental Assessment* and any additional criteria included in the Environment Protection Licence or project approval, assuming that they are granted, are achieved. This would include a description of how all potentially chemical-laden or contaminated water would be retained within the Project Site and returned to the process water system for re-use within the processing plant.	Prior to commencement of mining operations.

Table 10 (Cont'd)
Statement of Commitments for the Dargues Reef Gold Project

Desired Outcome	Commitment	Timing
6.6 GROUNDWATER (Cont'd)		
Minimise the volume of water required to be used for mining-related purposes	7.2 Ensure that the site access road is treated using chemical dust suppressants or similar to ensure that regular watering is not required.	Continuous during the life of the Project.
Minimisation of erosion and sedimentation.	**Erosion and Sediment Control Measures** 7.3 Ensure that best-practice erosion and sediment control measures as identified in Landcom (2004) Managing Urban Stormwater: Soils and Construction, 4th ed, Landcom, NSW, Sydney and Department of Environment and Climate Change (DECC). (2008a). Managing Urban Stormwater: Soils and Construction. Volume 2E Mines and Quarries. NSW Department of Environment and Climate Change, Sydney. Department of Environment and Climate Change (DECC). (2008b). Managing Urban Stormwater: Soils and Construction. Volume 2C Unsealed Roads. NSW Department of Environment and Climate Change, Sydney are implemented during both the construction and operational stages of the Project.	
	7.4 Construct appropriate sediment basins of sufficient size to contain a five-day, 75th percentile rain depth of 18mm during construction of the Project and a 20-day, 90th percentile rain depth of 73.7mm during operation of the Project.	Continuous during the life of the Project.
	7.5 Ensure that sediment basins have a minimum of 0.6m of freeboard and a spillway that is sized and lined for stability in a 100-year annual recurrence interval (ARI) rain event.	
	7.6 Ensure that water discharged from the sediment basins has a total suspended sediment concentration of less than 50g/L. This may require flocculation.	
	7.7 Ensure that accumulated water within sediment basins is removed from the basins within 5 days of the end of a rain event.	
	7.8 Ensure that water within the sediment basins is not used for mining-related activities unless the volume of the sediment basins have been included in the harvestable right calculations.	

Table 10 (Cont'd)
Statement of Commitments for the Dargues Reef Gold Project

Desired Outcome	Commitment		Timing
6.7 SURFACE WATER (Cont'd)			
Minimisation of erosion and sedimentation.	7.9	Ensure that the upper limit of the Sediment Storage Zone, as defined in Landcom (2004) Managing Urban Stormwater: Soils and Construction, 4th ed, Landcom, NSW, Sydney, is identified with a peg and accumulated sediment removed as required.	
	7.10	Ensure that surface water flows are diverted away from disturbed areas and that potentially sediment-laden flows from disturbed areas are diverted to sediment basins. All diversion structures would be sized and lined for stability in a 10-year ARI time-of-concentration rain event during construction of the Project and the 20-year ARI time-of-concentration rain event during operation of the Project.	Continuous during the life of the Project.
	7.11	Ensure that disturbed areas are stabilised through the use of vegetation or artificial covers to achieve a long-term C-factor of 0.05 (equivalent to 70% grass cover). Where such areas are to be subjected to channelized water flows, they should be stabilised within 10 days of completion of construction and before they convey any flows.	
	7.12	Inspect all surface water control structures at least quarterly and following any rainfall event of more than 10mm in 24-hours to ensure their adequacy and identify where remedial action is required.	
	7.13	Ensure that all roads within the Project Site are constructed in accordance with Department of Environment and Climate Change (DECC). (2008b). Managing Urban Stormwater: Soils and Construction. Volume 2C Unsealed Roads. NSW Department of Environment and Climate Change, Sydney.	Continuous during the life of the Project.
	7.14	Construct table drains along the sides of roads within the Project Site, with regular turn-out drains constructed at-grade approximately every 50m.	
	7.15	Continue to maintain and upgrade, as required, the existing soil conservation measures in areas of active and stabilised gullying.	
Prevention of contamination of surface waters.	**Water Quality Measures**		
	7.16	Ensure that the tailings storage facility is effectively sealed to prevent leakage.	
	7.17	Ensure that potential surface water run on onto the tailings storage facility is diverted around the facility using a surface water diversion structured designed to effectively convey the 100-year ARI, time-of-concentration flow from the upstream catchment.	Prior to the commencement of processing operations.

Table 10 (Cont'd)
Statement of Commitments for the Dargues Reef Gold Project

Desired Outcome	Commitment		Timing
6.7 SURFACE WATER (Cont'd)			
Prevention of contamination of surface waters.	7.18	Ensure that all fuel and chemical storage, delivery and handling areas are appropriately sealed and bunded and that overflow pipes are installed in a manner that would minimise the potential for pollution in the event of overfilling.	Continuous during the life of the Project.
	7.19	Ensure that no low grade ore material is used to construct the ROM Pad or is stored in areas where potentially low-pH leachate may flow to natural drainage	
	7.20	Ensure waste rock material to be used during site establishment operations is tested for acid generation potential and any potentially acid generating material is appropriately managed.	
	7.21	Ensure that all water with the potential to contain processing reagents, hydrocarbons, other chemicals or lowered pH is contained within a bunded Contaminated Water Management Area and that all surface waters within the that area retained and pumped to the Process Water Tank for use within the processing plant.	
6.8 ABORIGINAL HERITAGE			
Site activities are undertaken without impacting upon any Aboriginal heritage items.	8.1	Re-identify Sites GT0S1 & GT0S2 in the field with the assistance of a suitably qualified archaeologist and community representative(s). A fence a minimum of 20m on all sides of the artefact would then be erected, access to the fenced area would be restricted and appropriate signage would be displayed.	Prior to the commencement of site establishment operations.
Site activities are undertaken without impacting upon any Aboriginal heritage items.	8.2	Identify all other sites on plans held by the Environmental Manager and Mine Surveyor and activities in the vicinity of those sites would be prohibited. Those sites would not be fenced to limit the potential for inappropriate identification and disturbance of the sites.	Prior to the commencement of site establishment operations.
	8.3	If items of suspected Aboriginal heritage significance are identified throughout the life of the Project, the following procedures would be implemented. – **Step 1 -** No further earth disturbing works would be undertaken in the vicinity of the suspected item of Aboriginal heritage significance. – **Step 2 -** A buffer of 20m x 20m would be established around the suspected item of Aboriginal heritage significance. No unauthorised entry or earth disturbance would be allowed with this buffer zone until the area has been assessed.	

Table 10 (Cont'd)
Statement of Commitments for the Dargues Reef Gold Project

Desired Outcome	Commitment	Timing
6.8 ABORIGINAL HERITAGE (Cont'd)		
Site activities are undertaken without impacting upon any Aboriginal heritage items.	– **Step 3 -** A qualified archaeologist or the DECCW would be contacted to make an assessment of the discovery. Mitigation procedures would then be developed and implemented based on the assessment.	Continuous during the life of the Project.
	8.4 If, throughout the life of the Project, suspected human remains are identified, the following procedures would be implemented. – **Step 1 -** the suspected skeletal remains would not be touched or disturbed. – **Step 2 -** A buffer zone of 50m x 50m would be established around the suspected remains and all work in the vicinity of the suspected remains would be suspended until the area has been assessed. – **Step 3 -** The NSW Police and the DECCW would be contacted to make an assessment of the discovery. If appropriate, mitigation procedures would then be developed in consultation with the registered stakeholders.	
6.9 NON ABORIGINAL HERITAGE		
Site activities are undertaken without impacting upon any significant non-Aboriginal heritage items.	9.1 Identify on plans held by the Environmental Manager and Mine Surveyor, where relevant, all identified sites and ensure that activities in the vicinity of those sites are appropriately managed.	Prior to the commencement of site establishment operations.
Site activities are undertaken without impacting upon any significant non-Aboriginal heritage items.	9.2 If items of suspected non-Aboriginal heritage significance are identified throughout the life of the Project, the following procedures would be implemented. – **Step 1 -** No further earth disturbing works would be undertaken in the vicinity of the suspected item of non-Aboriginal heritage significance. – **Step 2 -** A buffer of 20m x 20m would be established around the suspected artefact. No unauthorised entry or earth disturbance would be allowed with this buffer zone until the area has been assessed. – **Step 3 -** A qualified archaeologist would be contacted to make an assessment of the discovery. Mitigation procedures would then be developed and implemented based on the assessment.	Continuous during the life of the Project.

Table 10 (Cont'd)
Statement of Commitments for the Dargues Reef Gold Project

Desired Outcome	Commitment	Timing
6.10 TRAFFIC AND TRANSPORTATION		
Achieve safe and efficient transport operations.	**Site Access Road** 10.1 Ensure horizontal alignment complying with the maximum grades and changes of grade outlined in the Australian Standards for Off-Street Commercial Vehicle Facilities. Maximum vertical grades would be approximately 10%.	During site establishment operations.
	10.2 Grade the gravel surface of the road treated with chemical suppressants to minimise dust generation.	Continuous during the life of the Project.
	10.3 Construct the road layout to ensure that all vehicles would enter and exit the site in a forward direction.	During site establishment operations.
	Operational Controls 10.4 Load all heavy vehicles transporting concentrate using a front-end loader fitted with a bucket load indicator. All vehicles would be loaded in a manner that would ensure that they were not overloaded.	Continuous during the life of the Project.
	10.5 Establish a speed limit of 40km/hr on the site access road and 20km/hr in the operational sections of the Project Site.	During site establishment operations.
6.10 TRAFFIC AND TRANSPORTATION (Cont'd)		
Achieve safe and efficient transport operations.	10.6 – Ensure all Proponent-controlled heavy vehicle movements are scheduled for between 7:00am and 6:00pm. Furthermore, the movement of such heavy vehicles to and from the Project Site would be avoided during the hours of 7:00am to 8:30am and 3:00pm to 5:00pm on school days to avoid potential conflict with the local school bus services. – Require, where practicable, that all non-Proponent-controlled heavy vehicle movements are scheduled for between 7:00am and 6:00pm. Furthermore, request that the movement of such heavy vehicles to and from the Project Site be avoided during the hours of 7:00am to 8:30am and 3:00pm to 5:00pm on school days to avoid potential conflict with the local school bus services.	Continuous during the life of the Project.

Table 10 (Cont'd)
Statement of Commitments for the Dargues Reef Gold Project

Desired Outcome	Commitment	Timing
6.10 TRAFFIC AND TRANSPORTATION (Cont'd)		
Achieve safe and efficient transport operations.	10.7 Develop and enforce a Code of Conduct for all drivers for all heavy vehicles that travel to and from the Project Site regularly. The Code of Conduct would stipulate safe driving practices must be maintained at all times and nominate the maximum vehicle speed on Majors Creek Road of 80km/hr for heavy vehicles travelling to and from the Project Site. The code would also include specific requirements for practices to be adopted during periods of fog, such use of headlights / fog lights and adopting vehicle speeds appropriate to the conditions as required, as well as limiting noisy driving practices in the vicinity of residences.	During site establishment operations.
	10.8 Approach Palerang Council with a view to erecting signs in appropriate locations requesting heavy vehicles to consider residents and limit noisy driving practices.	
	10.9 Investigate immediately any complaints received and substantiated incidents acted on decisively, which could include the banning the offending driver(s) from the Project Site.	Continuous during the life of the Project.
	Road Upgrades 10.10 Provide centreline road marking along the full length of Majors Creek Road between the Araluen Road and Majors Creek immediately, irrespective of whether project approval is granted. This will assist drivers using Majors Creek Road to drive on the left of the centreline at all times, particularly those times of low visibility, and will assist in maintaining road safety.	During site establishment operations. (Note: this was completed in November 2010).
	10.11 Provide signage/delineation and appropriate barriers such as guardrails at the culverts on Majors Creek Road at 4.4km and 4.9km from the intersection of Majors Creek Road and Araluen Road, as well as at the bridge structure over Honeysuckle Creek. The Proponent has committed to completing this road upgrade prior to the commencement of the operational phase of transport operations.	During site establishment operations.
	10.12 Provide pavement widening on curves and crests on Majors Creek Road at the following chainages, as measured from the intersection of Majors Creek road and Araluen Road.	
	Road Maintenance 10.13 Formalise a Section 94 Contributions arrangement or section 93F Planning Agreement for ongoing road maintenance with Palerang Council	Prior to the commencement of transportation operations.

Table 10 (Cont'd)
Statement of Commitments for the Dargues Reef Gold Project

Desired Outcome	Commitment	Timing
6.11 AIR QUALITY AND ENERGY		
Site activities are undertaken without exceeding DECCW air quality criteria or adversely impacting upon surrounding receivers.	11.1 Implement "best practice" management for pollution control.	Continuous during the life of the Project.
6.12 VISUAL AMENITY		
Limit the visibility of operational areas from nearby residences and Majors Creek Road.	12.1 Construct and revegetate a 5m high bund on the southern and western edge of the ROM pad as soon as practicable after the commencement of mining operations. This bund, together with the southern and western faces of the ROM pad, would be temporarily covered with soil material and revegetated with appropriate species as soon as practicable after completion to ensure that the visual impact of the ROM pad and bund is minimised to the greatest extent practicable.	During site establishment operations
	12.2 Ensure progressive reshaping and rehabilitation of areas that are no longer required for mining related purposes.	During progressive rehabilitation operations.
	12.3 Continuation of the existing tree planting program to limit views of the Project Site from areas to the southwest, south and southeast of the Project Site.	During progressive rehabilitation operations.
	12.4 Construction of the processing plant and other infrastructure within the Project Site from non-reflective, neutral-coloured material.	During site establishment operations.
	12.5 Selection and placement of permanent and temporary lights such that the lights – do not impact on the vision of motorists using the Newell Highway; – do not point towards surrounding residences; or – minimise the 'loom' created by the lights.	
	12.6 Consider any reasonable request by a potentially affected resident for assistance to create a visual screen adjacent to their residence through planting of fast growing vegetation and/or landscaping where such a screen would effectively reduce the visual impact of the Proponent's activities during the life of the Project.	Continuous during the life of the Project
6.13 SOILS AND LAND CAPABILITY		
Maintenance of soil value for rehabilitation and minimisation of soil loss through erosion.	13.1 Strip soil materials to the depths identified in Table 2.2.	During site establishment operations.
	13.2 Strip soil materials only when they are moderately moist to preserve soil structure.	
	13.3 Stockpile topsoil and subsoil materials separately.	

Table 10 (Cont'd)
Statement of Commitments for the Dargues Reef Gold Project

Desired Outcome	Commitment		Timing
6.13 SOILS AND LAND CAPABILITY (Cont'd)			
Maintenance of soil value for rehabilitation and minimisation of soil loss through erosion.	13.4	Construct soil stockpiles as low, flat, elongated mounds on slopes of less than 1:10 (V:H). Topsoil stockpiles would be less than 2m high and subsoil stockpiles would be less than 3m high.	During site establishment operations.
	13.5	Ensure that soil stockpiles and rehabilitated areas achieve a 70% vegetative cover within 10 days of formation. This may be achieved through use of recycled organic material.	
Maximising the potential for successful rehabilitation of disturbed sections of the Project Site	13.6	Place soil material in areas to be rehabilitated in the same stratigraphic order in which they were removed. Topsoils of one soil landscape unit may be mixed with topsoils soils of the other landscape unit. Similarly, subsoils of one soil landscape unit may be mixed with subsoils soils of the other landscape unit.	During rehabilitation operations.
Minimise the potential for erosion and sedimentation	13.7	Ensure that ground disturbing activities are limited to the period from 1 March to 30 November, unless measure identified in Landcom (2004) Managing Urban Stormwater: Soils and Construction, 4th ed, Landcom, NSW, Sydney and Department of Environment and Climate Change (DECC). (2008a). Managing Urban Stormwater: Soils and Construction. Volume 2E Mines and Quarries. NSW Department of Environment and Climate Change, Sydney. Department of Environment and Climate Change (DECC). (2008b). Managing Urban Stormwater: Soils and Construction. Volume 2C Unsealed Roads. NSW Department of Environment and Climate Change, Sydney are implemented, including ensuring that soils are not exposed during any period when the three-day weather forecast suggests rain is likely.	During site establishment operations.
	13.8	Ensure that slope lengths are no longer than 80m.	
	13.9	Ensure that run-on from upslope is diverted away from disturbed areas.	
6.14 SOCIO-ECONOMIC			
Maximise the positive impacts and minimise any actual or perceived adverse impacts on the social fabric or facilities available to the community surrounding the Project Site.	14.1	Engage each of the communities surrounding the Project Site in regular dialogue in relation to the proposed and ongoing operation of the Project and maintain an "open door" policy for any member of those communities who wishes to discuss any aspect of the Project.	Prior to, during and following the life of the Project.
	14.2	Proactively and regularly consult with those residents most likely to be adversely impacted by the Project, particularly those within the Majors Creek Community.	

Table 10 (Cont'd)
Statement of Commitments for the Dargues Reef Gold Project

Desired Outcome	Commitment		Timing
6.14 SOCIO-ECONOMIC (Cont'd)			
Maximise the positive impacts and minimise any actual or perceived adverse impacts on the social fabric or facilities available to the community surrounding the Project Site.	14.3	Continue to support community organisations, groups and events, as appropriate, and review any request by a community organisation for support or assistance throughout the life of the Project. Particular emphasis would be placed on providing support to those organisations, groups or events that service the communities in Majors Creek, Araluen or Braidwood.	
	14.4	Form and maintain a Community Consultative Committee (CCC), including representative members of the community and Palerang Council. It is noted that the Proponent has previously consulted with the Majors Creek Community Liaison Committee. The Proponent would continue to do so, either as part of the CCC or separately.	Prior to, during and following the life of the Project.
	14.5	Regularly brief the CCC and wider community on activities within the Project Site and seek feedback in relation to Project-related impacts whether actual or perceived. In addition, seek advice in relation the most appropriate manner in which to provide assistance to the community in an effective, fair and equitable manner.	
	14.6	Advertise and maintain a community complaints telephone line.	
	14.7	Give preference when engaging new employees, where practicable, to candidates who are part of the Majors Creek, Araluen or Braidwood communities over candidates with equivalent experience and qualifications based elsewhere and ensure that the mining and other contractors do so as well.	
	14.8	Encourage the involvement of the local Aboriginal community in the workforce.	
	14.9	Encourage and support participation of locally based employees and contractors in appropriate training or education programs that would provide skills and qualifications that may be of use to encourage and further develop economic activity within the surrounding communities following completion of the Project.	
	14.10	Give preference, where practicable, to suppliers of equipment, services or consumables located within the Palerang LGA.	
	14.11	Assist community members and others, as appropriate, to establish complimentary businesses within the Palerang LGA where those businesses would provide a benefit to the community through increased economic activity or development.	

Table 10 (Cont'd)
Statement of Commitments for the Dargues Reef Gold Project

Desired Outcome	Commitment	Timing
6.14 SOCIO-ECONOMIC (Cont'd)		
Maximise the positive impacts and minimise any actual or perceived adverse impacts on the social fabric or facilities available to the community surrounding the Project Site.	14.12 Assist Palerang Council to promote and encourage economic development that would continue beyond the life of the Project.	Prior to, during and following the life of the Project.
	14.13 Ensure that infrastructure and services installed for the Project, including the electricity transmission facilities, road improvements and water supply bores, remain available for alternative uses during and/or following completion of the Project.	
	14.14 Encourage and support, in consultation with the local community, the provision of services to the community. These may include health, education, transportation and other services.	
	14.15 Prepare and implement a *Property Vegetation Plan* as described in Section 2.15, of the *Environmental Assessment* including continued management of weeds, pests and bushfire risks on land held by the Proponent in consultation with surrounding landowners.	
	14.16 Ensure that the land capability of those sections of the final landform to be used for agricultural purposes is similar to the current land capability.	
6.15 ENVIRONMENTAL MONITORING		
Ongoing monitoring and reporting of Project-related environmental impacts.	**Noise** 15.1 Present the results of the monitoring program in the Annual Environmental Management Report that would be prepared for the Project to ensure that noise and vibration impacts associated with the Project are managed appropriately.	Prior to, during and following the life of the Project.
	15.2 Prepare a Noise and Vibration Monitoring Program prior to commencement of site construction. This program would be developed in consultation with the Department of Planning, Department of Environment, Climate Change and Water and the local community, and include the following elements.	
	– Noise compliance monitoring would be undertaken during both the daytime and night time periods during the site establishment phase.	
	– Routine noise compliance monitoring would be conducted on a quarterly basis during the first two years of the operational stage of the Project. The frequency of ongoing monitoring would be determined based.	

Table 10 (Cont'd)
Statement of Commitments for the Dargues Reef Gold Project

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Desired Outcome	Commitment	Timing
6.15 ENVIRONMENTAL MONITORING (Cont'd)		
Ongoing monitoring and reporting of Project-related environmental impacts.	– Suitable monitoring locations would include R107, R108, R31, R30, R27, R34 and R10 which are the closest locations surrounding the Project Site and compliance at these locations would imply compliance at more distance receivers.	Prior to, during and following the life of the Project.
	– Noise monitoring would be undertaken by a suitable qualified and experienced acoustical consultant.	
	Ecology 15.3 Ensure that the following ecology-related monitoring is undertaken during the life of the Project. The results of the monitoring program would be reported in each Annual Environmental Management Report prepared for the Project.	
	– Ensure that searches for Major's Creek Leek Orchid are undertaken during the flowering period for the orchid, both within suitable habitat areas within the Project Site and within the Majors Creek Cemetery.	
	– Ensure that all areas undergoing rehabilitation are be monitored on a 6 monthly basis to determine the success or otherwise of the management, mitigation and ameliorative measures and the rehabilitation programs.	
	– Establish a set of photographic reference points and ensure that photographs are taken at six monthly intervals to document activities within the Project Site, including weed control and revegetation actions.	
	– Ensure that flora and fauna species and vegetation communities within the Project Site are monitored regularly, indicatively every two years, to identify any Project-related impacts.	
	Groundwater 15.4 Monitoring of groundwater levels in the bores, exploration holes and workings identified in **Table 4.21,** *in the Environmental Assessment as well as other bores and springs surrounding the Project Site as required or as requested by landholders,* using manual or automated methods.	Prior to, during and following the life of the Project until relevant government agencies agree that further monitoring is not required
	15.5 Continuous monitoring of groundwater levels in 8 bores/exploration holes using an automated standing water level monitor to determine the groundwater response following rainfall events.	

Table 10 (Cont'd)
Statement of Commitments for the Dargues Reef Gold Project

Desired Outcome	Commitment		Timing
6.15 ENVIRONMENTAL MONITORING (Cont'd)			
Ongoing monitoring and reporting of Project-related environmental impacts.	15.6	Monitoring in the field of pH, temperature and EC of groundwater in the bores, exploration holes and workings identified in **Table 4.21** in the *Environmental Assessment* as well as other bores and springs surrounding the Project Site as required or as requested by landholders,	
	15.7	Monitoring in the laboratory of groundwater in the bores, exploration holes and workings identified in **Table 4.21** of the *Environmental Assessment* for the following parameters. – Alkalinity. – Major cations and anions. – Nutrients – (ammonia, nitrate, nitrite). – Metals – (iron, lead, chromium, cadmium, zinc, arsenic, copper and nickel).	
	15.8	Continuous monitoring of the volumes of all water pumped or permitted to flow around the Project Site using inline meters. This would include water pumped or permitted to flow: – from the Dargues Reef Mine to the surface and visa versa; – from the harvestable rights dams; – from the historic workings; and – to and from the tailings storage facility.	
	15.9	Review of all data on receipt against previous monitoring results. Where the review indicates a sudden or unexpected change in a bore, then further investigations by an independent expert would be initiated. If the investigation indicates that the Project has caused the sudden or unexpected change, then the Proponent would negotiate an appropriate arrangement with the owner of the bore.	
	15.10	Undertake a formal assessment of the groundwater model within two years of the commencement of mining operations to ensure that the observed groundwater data matches the expected groundwater impacts.	Prior to, during and following the life of the Project.
	15.11	Annual analysis of monitoring data and trends in the site's Annual Environmental Management Report.	

Table 10 (Cont'd)
Statement of Commitments for the Dargues Reef Gold Project

Desired Outcome	Commitment	Timing
6.15 ENVIRONMENTAL MONITORING (Cont'd)		
Ongoing monitoring and reporting of Project-related environmental impacts.	**Surface Water** 15.12 Undertake monthly surface water monitoring at the following locations (**Figure 4.3**). – Location 1 – Majors Creek upstream of the confluence of Spring & Major's Creek. – Location 2 – Majors Creek downstream of the confluence of Spring & Major's Creek. – Location 3 – downstream of the tailings storage facility. It is noted that this sampling location would be incorporated into the Tailings Management Plan. – Location 4 – Spring Creek downstream of main Project infrastructure and sediment basin outlets. – Discharge point for the compensatory flows (sampling to be undertaken initially daily for the first three months of the program, with the frequency to be increased in consultation with the relevant government agency after that period).	
	15.13 Undertake sampling monthly for the following Field measurements. – Field pH. – Field Electrical Conductivity. – Dissolved Oxygen. – Oxidation Reduction Potential. – Temperature. Laboratory analysis. – pH. – Electrical Conductivity. – Total Suspended Solids. – Major cations i.e. sodium, potassium, calcium. – Major anions i.e. chloride and sulphate. – Total Kjeldahl Nitrogen (organic nitrogen plus ammonia nitrogen). – Total Oxidized Nitrogen (also referred to as NOx-N = nitrate + nitrite nitrogen forms). – Ammonia Nitrogen. – Total Phosphorus and Reactive Phosphorus. – Metalloids (aluminium, arsenic, total iron and filterable iron, zinc). The frequency of monitoring is to be reviewed in consultation with the relevant government agency after completion of the initial 12 months of monitoring.	Prior to, during and following the life of the Project.

Table 10 (Cont'd)
Statement of Commitments for the Dargues Reef Gold Project

Desired Outcome	Commitment	Timing
6.15 ENVIRONMENTAL MONITORING (Cont'd)		
Ongoing monitoring and reporting of Project-related environmental impacts.	**Air Quality** 15.14 Implement an Air Quality Monitoring Program in consultation with DECCW and the surrounding Community. Given the relatively low level of impact associated with the Project, it is anticipated that this would be restricted to the installation and management of several dust deposition gauges surrounding the Project Site.	Prior to, during and following the life of the Project.
6.16 DOCUMENTATION		
Ensure Appropriate documentation of the proposed mining-related activities.	16.1 The Proponent would prepare the following documentation.	
	– Mining Operations Plan. – Noise Management Plan. – Traffic Management Plan. – Noise and Vibration Monitoring Program. – Groundwater Monitoring Program. – Air Quality Monitoring Program.	Prior to the commencement of site establishment operations.
	– Biodiversity Management Plan. – Property Vegetation Plan.	Within 12 months of commencement of mining operations.

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Appendices

(No. of pages including blank pages = 27)

Appendix 1 Spectrum Acoustics (2010b) – Letter Report re: Noise Assessment in the absence of Crushing Operations

Appendix 2 Spectrum Acoustics (2010c) – Letter Report re: Residence R108

Appendix 3 Archaeological Surveys and Reports Pty Ltd (2010c) – Letter Report

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Appendix 1

Spectrum Acoustics (2010b) – Letter Report re: Noise Assessment in the absence of Crushing Operations

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SPECTRUM ACOUSTICS
NOISE AND VIBRATION CONSULTANTS

2 December 2010

Ref: 09522/3789

Mr Mitchell Bland
R.W. Corkery & Co. Pty. Limited
Suite 15/256 Anson Street
Orange NSW 2800

RE: DARGUES REEF PROJECT – ADDITIONAL NOISE MODELLING

This letter report presents the results of additional noise modelling conducted for the Dargues Reef project near Majors Creek NSW. The assessment has been requested by R. W. Corkery and Co. Pty Ltd following a commitment made by the proponent, Cortona Resources, to limit operation of the crushing line to no more than 20 nights per year.

Accordingly, the rock breaker, crusher, screens, and front-end loader have been removed from the noise model and point calculations performed for all receivers included in the original modelling (plus the additional receiver R108, which was the subject of our previous letter report 09522_3768 dated 1 November 2010).

Table 1 shows predicted operational noise levels at the assessed receivers with the original predicted levels (ie, with crushing line operating) in brackets.

Spectrum Acoustics Pty Limited
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Table 1
Predicted Operational Noise Levels at Non-Project-Related Residences

Residence	Residence coordinates		Predicted level dB(A),$L_{eq(15min)}$			Criterion
	MGA (E)	MGA (N)	Neutral	Inversion	NW wind	dB(A),$L_{eq(15min)}$
R1	747879.1	6061551	<20 (21)	26 (29)	27 (28)	35
R2	748282.7	6060745	<20 (20)	25 (30)	27 (30)	35
R3	747335.2	6060881	<20 (<20)	21 (24)	<20 (22)	35
R4	747310	6060968	<20 (<20)	21 (24)	<20 (22)	35
R5	747214.7	6061290	<20 (20)	26 (31)	25 (29)	35
R6	748266.8	6060716	<20 (20)	25 (30)	26 (30)	35
R7	748276.1	6060732	<20 (20)	25 (30)	27 (30)	35
R8	748159.6	6060853	<20 (<20)	20 (24)	<20 (22)	35
R9	748010.1	6060909	<20 (<20)	20 (24)	<20 (22)	35
R10	748240.4	6061016	<20 (20)	26 (29)	26 (29)	35
R11	748102.7	6061050	<20 (21)	26 (32)	28 (32)	35
R12	747864.5	6061207	<20 (22)	27 (32)	28 (32)	35
R13	747765.3	6061162	<20 (20)	27 (32)	27 (31)	35
R14	747807.6	6061351	<20 (20)	26 (31)	26 (30)	35
R15	747542.9	6061602	<20 (22)	28 (33)	28 (31)	35
R16	748393.9	6060905	<20 (20)	26 (31)	27 (31)	35
R17	748419	6060961	<20 (21)	26 (31)	28 (31)	35
R18	748473.3	6061007	<20 (21)	26 (32)	28 (32)	35
R19	748450.8	6060826	<20 (20)	25 (31)	27 (31)	35
R20	748630.8	6060788	<20 (20)	26 (31)	27 (31)	35
R21	748730	6060750	<20 (20)	26 (30)	27 (31)	35
R22	748579.2	6060863	<20 (20)	26 (31)	27 (31)	35
R23	748542.1	6060980	<20 (21)	27 (31)	28 (31)	35
R24	748822.7	6061033	<20 (21)	26 (32)	28 (32)	35
R25	749348	6060822	<20 (21)	26 (31)	28 (31)	35
R26	749365.2	6060938	<20 (22)	26 (31)	28 (32)	35
R27	749095.3	6061420	20 (24)	28 (33)	31 (34)	35
R28	749285.8	6060974	<20 (22)	27 (31)	29 (32)	35
R29	748315.8	6061770	<20 (<20)	<20 (23)	<20 (20)	35
R30	748198	6061792	<20 (20)	22 (25)	21 (24)	35
R31	748149	6062512	<20 (25)	27 (31)	26 (31)	35
R32	747611.8	6061880	<20 (23)	26 (31)	28 (32)	35
R33	747398.7	6061798	<20 (22)	26 (30)	27 (30)	35
R34	751031.3	6065138	<20 (<20)	26 (31)	<20 (<20)	35
R35	750004.4	6065577	<20 (<20)	22 (27)	<20 (<20)	35
R37	749010.6	6059938	<20 (<20)	23 (27)	24 (27)	35
R38	748195.4	6059877	<20 (<20)	23 (27)	24 (27)	35
R39	748236.4	6060190	<20 (<20)	24 (28)	24 (27)	35
R40	748253.6	6060213	<20 (<20)	24 (28)	24 (28)	35

Table 1 (Cont'd)
Predicted Operational Noise Levels at Non-Project-Related Residences

Residence	Residence coordinates		Predicted level dB(A),$L_{eq(15min)}$			Criterion dB(A),$L_{eq(15min)}$
	MGA (E)	MGA (N)	Neutral	Inversion	NW wind	
R41	748539.5	6059898	<20 (<20)	23 (27)	24 (27)	35
R42	748409.8	6060021	<20 (<20)	23 (28)	24 (28)	35
R43	748277.4	6060053	<20 (<20)	24 (28)	24 (28)	35
R44	748337	6060161	<20 (<20)	24 (28)	24 (28)	35
R45	748290.7	6060237	<20 (<20)	24 (29)	24 (29)	35
R46	748438.9	6060091	<20 (<20)	23 (28)	24 (28)	35
R47	748539.5	6060090	<20 (<20)	24 (28)	24 (28)	35
R48	748527.5	6060147	<20 (<20)	24 (28)	25 (28)	35
R49	748616.2	6060174	<20 (<20)	24 (28)	24 (28)	35
R50	748654.6	6060141	<20 (<20)	24 (28)	24 (28)	35
R51	748809.4	6059976	<20 (<20)	23 (28)	24 (28)	35
R52	748982.8	6059653	<20 (<20)	22 (27)	23 (27)	35
R53	749010.6	6060221	<20 (<20)	24 (29)	25 (29)	35
R54	749026.5	6060262	<20 (<20)	24 (29)	24 (29)	35
R55	749017.2	6060340	<20 (<20)	25 (29)	25 (29)	35
R56	748843.8	6060352	<20 (<20)	25 (29)	25 (29)	35
R57	748702.2	6060373	<20 (<20)	24 (29)	25 (29)	35
R58	749092.6	6060503	<20 (20)	21 (25)	21(24)	35
R59	748981.5	6060594	<20 (20)	25 (30)	26 (30)	35
R60	748645.3	6060525	<20 (20)	25 (30)	26 (30)	35
R61	748445.5	6060472	<20 (<20)	25 (29)	25 (29)	35
R62	748409.8	6060537	<20 (<20)	25 (30)	26 (30)	35
R63	748284	6060493	<20 (<20)	25 (30)	25 (29)	35
R64	748196.7	6060309	<20 (<20)	24 (29)	25 (28)	35
R65	748200.7	6060398	<20 (<20)	25 (29)	25 (29)	35
R66	748182.1	6060435	<20 (<20)	24 (29)	25 (29)	35
R67	748171.6	6060467	<20 (<20)	25 (29)	25 (29)	35
R68	748174.2	6060503	<20 (<20)	25 (29)	24 (29)	35
R69	750679.4	6060484	<20 (<20)	25 (29)	<20 (<20)	35
R70	748385.9	6060620	<20 (<20)	25 (30)	25 (30)	35
R71	748845.2	6060632	<20 (20)	26 (30)	26 (30)	35
R72	748911.3	6060628	<20 (20)	26 (30)	26 (30)	35
R73	747442.4	6059728	<20 (<20)	22 (27)	21 (25)	35
R74	747553.5	6059939	<20 (<20)	23(28)	21 (26)	35
R75	747606.5	6059971	<20 (<20)	<20 (22)	<20 (21)	35
R76	747443.7	6060037	<20 (<20)	23 (28)	22 (26)	35
R77	747801	6060080	<20 (<20)	23 (28)	23 (27)	35
R78	747771.9	6060148	<20 (<20)	22 (28)	20(23)	35
R79	747732.2	6060252	<20 (<20)	20 (24)	23 (27)	35

Table 1 (Cont'd)
Predicted Operational Noise Levels at Non-Project-Related Residences

Residence	Residence coordinates		Predicted level dB(A),$L_{eq(15min)}$			Criterion dB(A),$L_{eq(15min)}$
	MGA (E)	MGA (N)	Neutral	Inversion	NW wind	
R80	747909.5	6060033	<20 (<20)	23 (28)	23 (27)	35
R81	747905.5	6059858	<20 (<20)	23 (27)	23 (27)	35
R82	748024.7	6059762	<20 (<20)	22 (27)	22 (26)	35
R83	748082.9	6059758	<20 (<20)	23 (27)	23 (27)	35
R84	748118.6	6059952	<20 (<20)	23 (27)	23 (27)	35
R85	748131.8	6059979	<20 (<20)	23 (28)	23 (27)	35
R86	748138.5	6060009	<20 (<20)	23 (28)	24 (28)	35
R87	748150.4	6060083	<20 (<20)	24 (28)	24 (28)	35
R88	748171.6	6060141	<20 (<20)	24 (28)	23 (27)	35
R89	747361.6	6060279	<20 (<20)	23 (28)	23 (27)	35
R90	747532.4	6060360	<20 (<20)	<20 (22)	<20 (21)	35
R91	748178.2	6060230	<20 (<20)	23 (28)	24 (28)	35
R92	747041.4	6060411	<20 (<20)	<20 (22)	<20 (21)	35
R93	748176.8	6060627	<20 (<20)	24 (30)	25 (30)	35
R94	748123.9	6060599	<20 (<20)	24 (30)	25 (30)	35
R107	746955.3	6062872	24 (27)	29 (33)	23 (27)	35
R108	748631.3	6062617	23 (26)	27 (31)	25 (29)	35

The results in Table 1 show levels generally 3-4 dB below predicted levels under adverse conditions with the crushing line operating.

Maximum noise levels (as opposed to $L_{Aeq(15minute)}$) were generally due to the movement of a haul truck at the surface in the ROM area. This noise source would remain in the remodelled scenario and therefore maximum noise levels equal to those in Table 7 of the noise impact assessment would occur. These levels are, however, at least 3dB below the sleep disturbance criterion of 45 dB(A),$L_{1(1minute)}$.

We trust this report fulfils your requirements at this time, however, should you require additional information or assistance please contact the undersigned on 4954 2276 or 0409 181888.

Yours faithfully,
SPECTRUM ACOUSTICS PTY LIMITED

Neil Pennington
Acoustical Consultant

Appendix 2

Spectrum Acoustics (2010c) – Letter Report re: Residence R108

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SPECTRUM ACOUSTICS
NOISE AND VIBRATION CONSULTANTS

1 November 2010

Ref: 09522/3752

Mr Alex Irwin
R.W. Corkery & Co. Pty. Limited
Suite 15/256 Anson Street
Orange NSW 2800

RE: DARGUES REEF PROJECT – ADDITIONAL RECEIVER

This letter report presents noise modelling results for an approved residential receiver that was not included in the Noise Impact Assessment for the Dargues Reef project near Majors Creek, NSW. Figure 1 shows the location of the additional receiver, denoted R108, which is between R31 and R107 to the west of the site.

Figure 1. Location of additional receiver R108.

The coordinates of R108 were entered as a new receiver in the Environmental Noise Model (ENM) originally developed to assess potential noise impacts from the project. Point calculations were performed for R108 for all scenarios included in the original NIA and are summarised below.

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Night-time construction				
Meteorological Condition:	Neutral	Inversion	NNW wind	Criterion
Predicted level dB(A), $L_{eq(15minute)}$	20	34	33	35
Daytime construction				
Meteorological Condition:	Neutral	Criterion		
Predicted level dB(A), $L_{eq(15minute)}$	33	35		
Operations (24-hour)				
Meteorological Condition:	Neutral	Inversion	NNW wind	Criterion
Predicted level dB(A), $L_{eq(15minute)}$	28	34	30	35
Sleep Disturbance (night)				
Meteorological Condition:	Inversion	Criterion		
Predicted level dB(A), $L_{1(1minute)}$	41	45		

The above results show that applicable noise criteria will be achieved at R108 under all modelled scenarios and meteorological conditions.

We trust this report fulfils your requirements at this time, however, should you require additional information or assistance please contact the undersigned on 4954 2276 or 0409 181888.

Yours faithfully,
SPECTRUM ACOUSTICS PTY LIMITED

Neil Pennington
Acoustical Consultant

Appendix 3

Archaeological Surveys and Reports Pty Ltd (2010c) – Letter Report

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Archaeological Surveys & Reports Pty Ltd

John Appleton
A.C.I.S., A.C.I.M., B.A. (Hons)

16 Curtis Street, Armidale, NSW 2350
Tel. 02 6772 6512 Fax 02 6772 4567 Mob. 0428 651 789
Email japples@northnet.com.au

ABN 67 075 625 722

R.W. Corkery & Co. Pty Limited 9th November 2010

Re: Archaeological investigation: Dargues Reef, Majors Creek

Response to issues raised by DECCW.

1. Literature Review

ASR has obtained copies of reports referred to in the DECCW review of the archaeological report and comments as follows:

Byrne, D. 1981. Wandella Dampier: Archaeological Survey. Unpublished report for Forestry Commission NSW.

The context.

Byrne's study areas were in the Dampier-Wandella Forests and Five Forests, the first of which is over 40km to the south of Majors Creek. Byrne's study was of forested areas of between 10m to 760m AHD.

The results.

Byrne recorded 27 "relatively small" sites consisting of "surface scatters of flaked stone artefacts", all of them on ridge/saddles, ridge/flats, ridge/summits, not surprisingly as he concentrated his survey on the ridges where he predicted there would be sites. Byrne found that there were no sites above approximately 560m AHD, and that none of the sites he recorded were large enough to suggest long-term occupation.

Summary of Byrne's findings

Byrne's study was to "clarify the effect of forestry operations on archaeological sites and places of significance to the Aboriginal community". In the introduction to his report Byrne states, "there is however, an obvious need for caution in using the results of this survey to predict the archaeological situation in other forested environments". He also made the assumption, "that people only camp on ground with a surface gradient of less than 15 degrees". He therefore concentrate his survey on ridge tops and valley bottoms.

ASR's assessment:

That there are several reasons why Byrne's report is of little relevance to the Majors Creek study area.

- Byrne's study area was 40 km to 120km from Majors Creek – effectively three days (minimum) or more on foot through dense woodland to the Aboriginal travellers.
- The study area was of forested areas, not of cleared pastures and gold mining country, and Byrne's study areas and Majors Creek were arguably of different pre-settlement environments.
- Byrne stated, "that the survey strategy thus made the assumption that sites were most likely to be found on flat terrain and the underlying assumption that Aborigines would choose flat ground for campsites".
- Byrne's findings, were based on a "three-tier stratified random sampling" method on targeted environments such as creeks and where he assumed there would be rock-shelters in which he assumed Aboriginal sites would be and did not include environments in which he assumed sites would not occur.
- Byrne focussed on, "the tops of crests of ridges and the flats marginal to creeks/rivers". The Majors Creek survey area contains a ridge crest of 730m AHD, and all creek lines have been totally destroyed by gold mining, hence there are no intact flats marginal to watercourses.
- Contrary to Byrne's stratified survey strategy in which he found no sites above 560m AHD sites were recorded between 620m AHD and 660m AHD at Majors Creek.

ASR's Conclusion

The results of Byrne's survey are of only passing interest to the study of Majors Creek. If the environments and history of land use were similar at Majors Creek to Byrne's study area, and the two areas were adjacent, and Byrne's survey strategy had been more comprehensive to include environments in which he assumed sites would not occur then perhaps Byrnes results would be relevant to those in the study area. Of course he found

sites only on the ridges, but if he didn't survey the land units in which he predicted sites would not occur then how could he claim that the Predictive Model for site location was relevant?

.....

Bonhomme, T. 1984. Ballalaba Bridge: An Aboriginal Archaeological Sites Survey. Unpublished report for Search-Archaeological Enterprises on behalf of The Department of Main Roads.

The context.

Ballalaba Bridge crosses the Shoalhaven River 7km to the west of Majors Creek at an elevation of 660m AHD.

The results.

Two small artefact scatters were recorded on the banks of the Shoalhaven River, the major permanent watercourse in the area.

Summary of Bonhomme's findings

Bonhomme recorded a "possible" scarred tree, a scatter of 13 artefacts, and another scatter of 10 artefacts all within or adjacent to the footprint of the replacement bridge and its approaches.

ASR's assessment:

The Ballalaba Bridge site is in a relatively undisturbed area where the artefacts were visible in erosion features. There is a significant difference between the reliability in water flow between Majors Creek and Shoalhaven River and it would be predictable that 'camp' sites are most likely to be found along the Shoalhaven.

ASR's Conclusion

Bonhomme's results are interesting in that they provide evidence of Aboriginal use of the local environment, however there is a considerable difference in the impact to the two environments of the Ballalaba Bridge site and Majors Creek from land use. The fact that there is such evidence only a short distance from Majors Creek does provide a cultural link between the two, however in the absence of dating for the sites in both locations there is no evidence to argue for contemporaneous use of the two environments.

.....

Barber, M. 2000. An archaeological sub-surface investigation at Jerrabattgulla Creek, south of Braidwood, NSW. Unpublished report by Southern Cross Heritage Surveys Pty Ltd, on behalf of Tallaganda Shire.

The context.

The Jerrabattgulla Creek is a southern tributary of Shoalhaven River approximately 8.5km to the south of Bonhomme's study area (see above).

The results.

A single artefact was recovered from 0.61 cubic metres (in excess of 600kg) of sieved excavated material.

Summary of Barber's findings

Barber excavated 11, 30x30cm test pits along the centre line of a proposed road realignment 350m from the junction of Jerrabattgulla Creek with Shoalhaven River in the Shoalhaven flood plain.

ASR's assessment:

Isolated artefacts occur throughout the landscape and in this instance, because no other artefacts were found in Shoalhaven flood plain alluvial there is no way of knowing whether the artefact has been moved from its depositional context by past flood waters or whether the artefact is in its depositional context.

ASR's Conclusion

The finding of the artefact is of only passing relevance to the Majors Creek study area. It is generally accepted by archaeologists that Aboriginal people have been in Australia for at least 50,000 years and that during that time they would have walked over all but inaccessible terrains and so it is not surprising that a single artefact was found not far from a resource rich environment – a confluence of two watercourses.

.....

Fearey, S. And S. Dovey (ranger). 1987. Archaeological sites on "Manar" property 25km southeast of Bungendore, Shire of Tallaganda. Manuscript reporting the finding of sites.

The context.

The survey was of a proposed road through the "Manar" property, 25km southeast of Bungendore (*northwest of Braidwood*).

The results.

The sites were recorded as:

- Scatter (?) of silcrete and quartz flakes and flaked pieces.
- Scatter (?) of flakes of silcrete, chalcedony and quartz points.
- Scatter (?) quartz, black chert and silcrete flakes.
- Cores and flakes of silcrete and quartz.
- Scatter (?) of silcrete and quartz flakes and flaked pieces.
- Scatter (?).
- Scatter (?).
- Scatter (?).
- Scatter (?).
- Scatter (?).

The one useful description is that the scatters, "were found on flat or gently sloping ground, within a few hundred metres of permanent water (Woolshed Creek)" – however there is no indication of what constitutes "a few hundred metres".

Clearly these descriptions are of limited use, having neither the size of the study area, the areas of sites, quantities of artefacts, artefact densities and distribution, the environmental and topographical context, or the availability of useful resources, etc. The only worthwhile information is that sites were identified – although in the absence of a glossary of diagnostic terms there is no way of knowing what diagnostic features were used to identify the artefacts.

Summary of Feary's findings

The two page report (plus two pages listing 10 artefact scatters) is not much more than a "sketch" report containing no plans, no maps, and very little description of either the sites or their contents.

ASR's assessment:

While the fact that sites existed is useful information, the information is so devoid of any detail that the "report" is of very little value.

ASR's Conclusion

That sites exist is near water courses is of no surprise but the lack information on the site contents makes the 'report' all but useless for the study of Majors Creek.

.....

Grindberg Knight & Associates. 1995. Archaeological Survey: Queanbeyan & Badja Management Areas. Unpublished report for R.L. Newman & Partners Pty Ltd.

The context.

The study area stretched along the spine of the Great Dividing Range from approximately 15km to the northwest of Braidwood in an almost due north/south trending line 100km to the south. This irregularly shaped strip varied from nearly 15km to 2km wide. It was bracketed by the river valleys of the Molonglo River, the Queanbeyan River and the Bredbo River and the Big Badja River along its western flank; and by the Shoalhaven River and the Tuross River along its eastern flank.

GK identified four geological regimes, "granites, granite/volcanic, sedimentary/granite, and sedimentary; and eight land systems, "rolling, hilly, mountainous, mountainous hilly, rugged mountains, flat/rolling, hilly/rolling, and hilly rugged" – all of which were within the state forests. Also, eight vegetation regimes: Montane Sclero.Wood, Wet Sclerophyll, Intermed. Sclerophyll, Dry Sclerophyll, Snow Gum, Wet Alpine Heath, Riparian, and Snowgrass Plain".

The results.

GK recorded 1,734 artefacts of which 64 were isolated artefacts; 156 were artefact scatters (*more than two artefacts at one location*); 7 scarred trees; 3 rock shelters; and one "ceremonial or spiritual place". Interestingly sites were found in all land systems the greatest numbers being in the mountainous/hilly and mountainous land systems: and the greatest number of sites occurred in granite/volcanic and granite geological regimes.

With regards to vegetation regimes the greatest number of sites occurred in "Dry Sclerophyll and Intermediate Sclerophyll regimes". Interestingly, of the 156 artefact scatters 57 occurred on level ground (0-2 degrees); 76 occurred on gentle slopes (3-5 degrees), 19 occurred on moderately sloping ground (6-10 degrees), and 4 occurred on incline surfaces (11-20 degrees) - (*as a general observation most archaeologists predict that no site will be found on slopes greater than 10 degrees unless they are quarries*).

GK also found that 61% of the total assemblage was quartz, 17% silcrete, 15% volcanics, 4% chert, and 3% quartzite. Sites were found to be 94% quartz dominated on ridges, and 84% dominated in lower lying zones.

Summary of Grindberg & Knight's findings

Grindberg Knight & Associates (GK) recorded 231 Aboriginal sites using a "landscape survey methodology" in a survey of the Queanbeyan & Badja Management Areas, an area encompassing Tallaganda, Badja, Bendoura and Berlang State Forests – with a total area of 78,500ha – a site distribution of one site per 3, 398 300 sq.m.

GK claimed an effective survey coverage of 23,842ha (30.37% - an extremely high figure given that the survey area was all in state forests in which leave detritus and ground cover, as well as tree-trunk "footprints" could be expected to occupy at least 50% of the forests, and watercourses and swamps at least 5%); of which 49.3% was in Dry Sclerophyll Forest/woodland.

ASR's assessment

The GK survey was a comprehensive study from which the results can be claimed to be truly representative of the surface archaeology of the forests of the Queanbeyan and Badja Management Areas - although the claim for an effective survey coverage of 23,842ha (30.37%) is unrealistic. The survey strategy was well constructed and the analysis of the results insightful. There is unlikely to be such a comprehensive study of forested mountainous areas in the Queanbeyan and Badja Management Area again, and nor need there be. This is a well managed investigation and the authors should be commended on their thoroughness.

ASR's Conclusion

ASR does not believe that the GK study of the forested spine of the Great Dividing Range has a bearing on site distribution in the Majors Creek Area which is not mountainous or

forested other than to illustrate the point that it is unwise to state that sites are unlikely to occur above any particular elevation or in any particular environment.

GK's results clearly show that elevation, temperature, or resource availability are not constraints or determining factors as to past Aboriginal use of all and any environments, and they also show that there are "preferred" land systems such as ridge tops and watercourse flats where sites are more likely to be *visible*, and that there is a very low expectation that sites will be found on slopes in excess of 10 degrees regardless of the vegetation regime.

If there is a failing in this report it is that it does not address the extent to which groundcover was a constraint to archaeological visibility; or that the limitations of the results that they were only of the artefactual record that was visible on the surface; and the differential representativeness of artefacts on degrading surfaces that expose, and in aggrading deposits that conceal.

.....

Attenbrow, V. 1984. Welcome Reef Dam Project: Investigations into Aboriginal Archaeological Sites – Stage II. Unpublished report to Metropolitan Water Sewerage and Drainage Board.

The context.

Attenbrow investigated the site of the proposed Welcome Reef Dam across the Shoalhaven River approximately 5km downstream of its junction with the Mongarlowe River – the southern end of the inundation area being 4km north of Braidwood and more than 20km to the north of Majors Creek.

Attenbrow identified five geological units; Tertiary alluvium, Quaternary alluvium, Ordovician metasediments, and Silurian acid volcanics.

Attenbrow estimated that she had surveyed 23 sq.km (15%) of the 153 sq.km inundation area.

Summary of Attenbrow''s findings

Attenbrow undertook the investigation in two stages. In Stage 1 Attenbrow recorded 124 sites, comprising 121 artefact scatters, two rock shelters, and a shell midden. In Stage II

Attenbrow recorded 76 artefact scatters, 2 "possible scarred trees", and one "possible stone arrangement" – although one of the artefact scatters was associated with a "possible silcrete quarry". Except for one of the artefact scatters all were located in naturally eroded areas or areas disturbed by animals or land use – such as ploughing, mining and roads).

Attenbrow found that 75-80% of all artefact scatters contained fewer than 50 artefacts, but unfortunately there is no breakdown of the numbers of artefacts per site, thus a scatter of two artefacts is lumped together with sites of 49 artefacts, and while two artefacts may represent a single activity, 49 artefacts may represent a knapping floor or a camp site.

Attenbrow interpreted the results of the analysis of the sites as indicating that, "on average low densities of sites occur on Quaternary alluvium, medium densities on Tertiary alluvium and Devonian granites, and high densities on Ordovician metasediments. No sites were found on Silurian acid volcanic".

Unfortunately Attenbrow did not analyse the site locations in terms of slope or elevation, nor did she indicate which of the sites were in degrading contexts, and which ones were in an aggrading context, or which sites were in stable undisturbed deposits.

ASR's assessment

As with the Grindberg Knight investigation, Attenbrow's investigation provided evidence of a background of Aboriginal sites across the landscape, albeit that 210 sites in a 23sq.km search area averages out to one site per 110,000sq.m. Similarly the vast majority of sites in both investigations were artefact scatters: 95.2% (220 of 231 sites) recorded by Grindberg Knight; and 97.6% (124 of 127 sites) recorded by Attenbrow. Interestingly Grindberg Knight recorded 64 isolated artefacts while Attenbrow didn't record any. This might suggest that Attenbrow is one of many archaeologists who see isolated artefacts as "background scatter" and therefore not a site; whereas Grindberg Knight believe (as does Appleton, ASR) that isolated artefacts are markers of Aboriginal life-ways and therefore constitute Aboriginal activity places in the archaeological landscape and therefore warrant being recorded as sites.

ASR's Conclusion

Attenbrow's results duplicate those of Grindberg Knight to the extent that they both illustrate that isolated artefacts and artefact scatters predominate all other site types in the general region. However some caution should be exercised in assuming that the data is completely comparable.

Over such large survey areas there are a variety of post-depositional impacts from differing land use, the degrees of disturbance to surface deposits, and surface visibility. Also, the survey conditions may have varied between Attenbrow's investigation in 1984 and Grindberg Knight's survey of 1995. Other differences are likely to occur as a result of the differences in fieldwork abilities and artefact identification between the "other" investigators in both investigations who made up the survey teams.

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Summary

Isolated artefacts and low density artefact scatters may occur widely dispersed across the ridges tops and river flats of the Great Dividing Range, but generally the larger scatters are likely to be found adjacent to reliable water courses.

Other site types such as scarred trees and ceremonial sites may also be present but are likely to be rare – and perhaps therefore of high cultural significance.

Artefacts will not be found on sloping ground in excess of 10% unless they are associated with quarries.

As a consequence of reviewing the above reports as recommended by DECCW, Appleton (ASR) considers that the Predictive Model for Site Location used in his report of the archaeological investigation of the Majors Creek was appropriate and does not require amendment.

Footnote
Some recent requests from ASR to DECCW for AHIMS listings of sites have been criticised for the size of the search area, and in some instances the only listings supplied by the AHIMS office have been for the project site itself. Also, recent advice from the AHIMS office was that no details of the sites should be included in the archaeological report for site security reasons. It therefore appears to be inconsistent to now require that there should be a review of other reports when from the AHIMS listing there has been no sites previously recorded in the Dargues Reef Project Site.

2. Archaeological Significance

The reviewer's requirement that there should be an assessment of the representativeness ... rarity both locally and regionally, educational value and aesthetic value of five sites, all in highly disturbed contexts and containing a total of 10 artefacts, only one of which was positively diagnostically identified as a tool, the others being waste material, would appear to be out of proportion to the quantity and character of the artefactual material. Appleton exercised judgement as to whether such assessments were relevant when writing the report and decided they were not. However to address the reviewer's concerns the assessments are provided below.

On the grounds that the five sites all occur in highly disturbed contexts and occur in locations in which the public would not be allowed access, on the grounds that this is/will be an operational gold mine on private land, and in which the sites are in potentially hazardous locations, all five sites are assessed as follows:

Representativeness.

As predicted in the Predictive Model for site location isolated artefacts can occur anywhere in the landscape as can very low density artefact scatters. As Attenbrow (1984) and Grindberg Knight (1995) – see previous, reported isolated artefacts and low density artefact scatters occur across the regional landscape. While it could therefore be argued that the five sites are typical and therefore representative of the archaeological record it doesn't require much imagination to assess every artefact as representative of something. Representativeness alone is not a valid reason for protecting low density scatters and isolated artefacts in a disturbed context.

Rarity

Clearly if isolated artefacts and low density artefact scatters are 'representative' then they cannot be rare.

Educational value

The only educational value of ten artefacts in five locations is the information they provide – which has already been obtained by measurement and description in this report. The only other educational value is to demonstrate that not all artefacts and/or sites are of such archaeological significance as to warrant their protection and conservation.

Aesthetic value

The artefacts and their locations are of no aesthetic value. The contexts in which they occur are the abandoned, highly disturbed gold-workings that scar the landscape - two of the artefacts occur on a dam wall, three on a spoil-heap, three are temporarily suspended on the edge of an actively eroding creek bank, and two are on 'benches' midway down eroding creek banks.

The artefacts are not aesthetically pleasing to look at and their contexts are reminders of the devastation that was caused by former gold-mining methods.

3. Site Recording Forms

The DECCW requirement to submit Site Recording Forms within two weeks of discovery totally ignores the concept of "Intellectual Property". Archeology Consultants are bound by the laws of "Intellectual Property" just as are DECCW staff are bound not to release information of Aboriginal Secret Sites or sites with a 'Restriction' on who can view the reports or SRFs.

One of the major issues in archaeological consultancy in major projects, particularly Part 3A projects, is that at the time of the field investigation there is no certainty of where the final footprint will be. To release site information before the project goes on public exhibition is to give those who oppose the project an opportunity to introduce archaeological material to the critically important areas of the project site in order to provide ammunition to others in order to prevent the project from succeeding.

Some years ago Appleton was required to appear twice in the Land & Environment Court to be questioned on some artefacts and scarred trees that were found on the project site. The artefacts appeared subsequent to the field investigation 15cm below the B Horizon in logging tracks that had previously been investigated, which would have made them over 65 million years old based on the age of the B Horizon. The scarred trees that were claimed by two well known consultant archaeologists who were in sympathy with those opposing the project to be Aboriginal scars were subsequently successfully argued by Appleton and an expert engaged by DECCW to have resulted from contact with logging trucks, fallen limbs and natural events.

The reviewer may not be aware that Archaeological Consultants are now required to take out Professional Liability/Indemnity insurance cover for $20,000,000. As no other project is likely to be considered in the project site the information on the sites it might contain is of only regionally contextual interest to other archaeologists. Meanwhile the archaeologist is required under Contract or Mercantile Law to act with confidentiality as to the location and content of the sites until such time as the proponent decides. The reviewer may not be aware that most Local Councils now require consultants to sign a Confidentially Agreement that they will not publish part or all of the report of an archaeological investigation undertaken on behalf of the council without council permission. As the final report will contain details of the sites, to prematurely provide the information of those sites on Site

Recording Forms without written council permission could constitute a breach of the agreement and be subject to court action.

As result, ASR contends that the DECCW requirement is unreasonable.