George Mobayed - Reference number 10 0054

From: Mandy <mand1976@hotmail.com>
To: <comment@planning.nsw.gov.au>, <plan_comment@planning.nsw.gov.au>
Date: 11/11/2010 12:31 PM
Subject: Reference number 10 0054

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 kilometer 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.

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.

I also request that a detailed assessment be made of heritage and Indigenous sites 2-6 kimometres down stream from the proposed mone site and the tailings dam.

Amanda Williams

George Mobayed - Proposed Dargues Reef mining project

From: "Graham & Lorena Ethell" <gethell@bigpond.net.au>
To: <plan_comment@planning.nsw.gov.au>
Date: 12/11/2010 11:51 AM
Subject: Proposed Dargues Reef mining project
CC: <barrycollier@parliament.nsw.gov.au>

Reference Number 10 0054

To Whom it may Concern

We 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 kilometre radius of the mine, nor on the fragile and threatened ecosystems below the mine.
We 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.
We 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.
We 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.

Regards

Lorena & Graham Ethell
13 Roma Place
Sylvania 2224

George Mobayed - Dagues Reef Mine destruction impacts

From: Vivienne Ortega <ortega707@aanet.com.au>
To: <plan_comment@planning.nsw.gov.au>
Date: 4/12/2010 9:16 AM
Subject: Dagues Reef Mine destruction impacts

Reference number 10 0054

To those concerned with NSW Planning - Dargues Reef Mine

We would like to support Jackie French in the protection of wildlife that are threatened by the Dargues Reef Mine proposal.

The Dargues Reef Mine proposes to remove 66.2 megalitres of water per year from the local water table, leading to a drop in ground water levels of between 1.5 and 10.5 metres. This is an extraordinary and devastating amount.
Plants take their moisture from groundwater. Without it, they die.

Animals drink from springs, fed by groundwater. Without it, they die.

The result of taking this amount of water from an ecosystem will mean that it, too, will die.

No studies have been done for the Environmental Assessment on how taking *this amount of water will affect the land* beyond the actual mine site. There is no mention of the endangered, critically endangered and threatened species in the gorge *below the mine*, ranging from the Powerful Owl to the critically endangered eucalyptus Kartzoffina.

If this mines goes ahead the animals and plants of the valley may die. The wombat of Diary of a Wombat may die.
The wombats, the wallabies, the Powerful Owls- are already *isolated by surrounding human farms* and settlement and *starting to be affected by the environmental impacts of climate change.*

We 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 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.

We also request that a detailed assessment be made of **heritage and Indigenous sites 2-6 kilometres down stream from the proposed mine site and the tailings dam.**

The Federal Government has a duty under international agreements to protect threatened, endangered and critically endangered species. The mining company will need to show that their operations will either have no effect on the species immediately below the mine, or that they have taken steps to protect them.

Cortona plan to mix soil from the mine with concrete to fill the areas that have been mined. This will have a dramatic and devastating effect on the aquifer- concrete is strongly alkaline and most native species need slightly acidic conditions. In tests here even 2 square metres concrete paving affects native plants 50 metres away.

Cortona plan to use the chemical Xanthate to process the ore. Any release of Xanthate into the water system or aquifer could also be devastating.

Cortona have publicly stated that they plan to mine three times the amount stated under this present proposal, and that all material from their new sites will be processed at the Dargues reef site, 1.5 km upstream from the Major's Creek National Park Reserve.

We have reports that breeding sites of powerful owls and gang gangs have already been disrupted by trials at Dargues Reef. For the first time in 36 years powerful owls appear to have failed to nest in the Major's Creek National Park Reserve gorge, almost certainly because of vibration and explosions.

We hear that Cortona have done no survey of endangered flora and fauna, nor any investigation into their ecology or breeding patterns. without this no assurances can be given that there will be no threat.

Federally listed animals within four kilometres downstream of the mine site include:

New Holland mouse (Pseudomys novaehollandiae)
Status: vulnerable

Zieria adenophera (Araluen Zieria)
Status: endangered

Button Wrinklewort (Rutidosis leptorrhynchoides)
Status: endangered

Araluen Gum (Eucalyptus kartzoffiana)
Status: vulnerable

Grey Deua Pomaderris (Pomaderris gilmourii var. cana)
Status: vulnerable

Spotted-tailed Quoll (Dasyurus maculatus)
Status: endangered

These native species and their habitats do not need political spin, but a survival plan. Australia is a mega-diverse continent, and this year is the International Year of Biodiversity. We need to protect our biodiversity and give them priority over profits. Our future depends on an intact environment, and ecological systems remain strong with all species safe. Losing and/or denying land and sustenance to our iconic native animals is shameful to Australia.

Thank you for considering this proposal.

Vivienne Ortega
Vice President
Australian Wildlife Protection Council Inc
KINDNESS HOUSE
Suite 18, 288 Brunswick St
Fitzroy 3065 Victoria

George Mobayed - Dargue's Reef Alternative

From: Jackie French <jfrench@dragnet.com.au>
To: <George.Mobayed@planning.nsw.gov.au>
Date: 6/12/2010 12:09 PM
Subject: Dargue's Reef Alternative

Re the **Submission on the proposed Dargues Reef Mine, Majors Creek, NSW**
Reference: 10_0054
Subject: **How to minimize the threat from the Dargue's Reef mine, but still allow the development to proceed.**

Dear Sir,

Given the enormous public concern about the Dargue's Reef proposal, and given the severity of threat to both the ecology and business downstream, I offer the following solutions to the problem.

The measures below have been suggested by a variety of experts. They would minimize the threats from development but still allow the project to proceed.

Yours faithfully,

1. **Move the proposed tailings dam 1 km from the proposed site, to place it on the other side of the Major's Creek Ridge.**

According to experts we have consulted, there are also suitable sites within 2- 2.5 Km of the proposed Dargue's Reef site, each far safer than the existing proposal.

Cortona have publicly stated that they have access to this land both to test and mine the ore body there. They also have a small parcel of land already owned on the other side of the Major's Creek Ridge. (References available).

This single action would remove most of the current objections.

The land on the other side of the Major's Creek ridge is a gentle slope, not the steep gorge below the present site. It is also close to the area that Cortona have recently stated they intend to mine, and use Xanthate to process the resulting ore at the proposed Dargue's Reef site, thus creating an even greater threat to the ecology and businesses downstream of the site presently proposed.

Moving the tailings dam would also minimize the effect of noise, dust and disturbance to the village of Major's Creek.

The farmland below the new site is low value rough grazing, not the valuable agri businesses below the present site. It is also further from natural watercourses.

There are no threatened, endangered nor critically endangered species downstream, as there are in the present proposed site.

The water table on the new site is also far larger than the depleted Major's Creek Araluen water table, where agricultural development is already having to be curtailed for lack of water.

It would be possible at the new site to dig a tailings dam into the gentle slope, rather than the 25 metre high walls that are required at the present site. The tailings dam would thus be structurally far sounder, and much less likely to impact the surrounding area.

While we understand that Cortona is unwilling to take on the cost of modifying any of the present plan, moving the tailing's dam seems a reasonable compromise, especially given the high profits Cortona claim the development will present. Cortona already own land on that side of the ridge, and, according to their quarterly report, have access to a much greater quantity of land in that area.

2. **Declare the present EA invalid, and ask that a new EA be prepared, detailing the current**

greatly expanded development plans as outlined in Cortona's quarterly report.

3. **Instal two test bores within 4 km downstream of the proposed mine, so that ground water force, quantity and quality can be measured.**

Data from these bores should be available publicly on a monthly basis, and assessed by an independent expert.

If the data indicated the ground water is being affected by the development, all work should cease until remediation can be effected.

4. **Prohibit the use on Xanthate and any form of processing in the Major's Creek Araluen catchment**

5. **Prohibit the addition of concrete to the tailings that will be replaced in the mine once mining has ceased.**

Concrete is extremely alkaline, and will have a long term and possibly devastating effect on the quality of water downstream. native species have evolved in a mildly acidic environment, and any addition of an alkaline substance will mean the extermination of many species downstream.

The engineering and hydro geologist experts consulted have not able to visit either the proposed Dargue's Reef site nor the new sites prosed for the tailings dam, however the latter are easily visible from the road, and from maps of the area. If you would like more details about this proposal, please contact me and I can put you in contact with the experts concerned. I can also provide press releases from Cortona detailing their expansion plans, and the areas in which they plan to mine.

Yours sincerely, Jackie French

From: Jackie French <jfrench@dragnet.com.au>
To: <plan_comment@planning.nsw.gov.au>
CC: <premier@nsw.gov.au>
Date: 13/12/2010 10:36 am
Subject: urgent: Dargue's Reef Mine

This is a plea to accept another urgent submission before the decision is made to approve the proposed Dargue's reef Mine at Major's Creek.

I know that the submission period has now passed, however information has become available since the close of submissions that are vital to any in depth assessment of the Dargue's Reef Proposal.

These include:

. that contrary to Section 2.7 of Cortona's EA, where it states that they are not considering it as part of a larger project, Cortona's last quarterly report stated that two other nearby ore bodies have been found viable, and ore will be processed at the Dargue's reef tailings dam.

This will make the development at least three times the size of the existing proposal, and greatly increase the chances of accidentally leakage of Xanthate treated material, affecting the orchard, market garden and other businesses downstream, as well as threatened, endangered and critically endangered species and ecosystems immediately downstream, from the project.

. that Cortona now propose to add concrete to the tailings placed back into the used mine workings. This has the potential to increase the ph of the local and downstream groundwater significantly. Any increase in ph may lead to the destruction of the rainforest communities from 2-4.5 km downstream.

. that I be given a further four weeks to commission a report on the effect of Xanthate leakage on the rainforest remnants on my property, as there was no time to commission such a report given the short period allowed for submissions, and the breadth of material that was needed to organise.

that I be given a further two weeks to prepare a submission on the critically endangered species 1.5- 4 km downstream that were not included in my earlier submission, as there was not time to contact the many experts who have surveyed the extraordinary diversity of species here. More of these reports are now accessible, and need to be considered before any decision is made.

I urge the Premier, Minister and Department :

. to ask for an EO from Cortona outlining the full development planned for the Dargue's reef site, not the far smaller proposal submitted

. to ask for a feasibility study that places the tailings dam 1.5 km from Dargue's reef, over the ridge, so that it is no longer above the steep and vulnerable Major's Creek Gorge and Araluen valley.

. to ask that data from test drilling below the proposed development be gathered, evaluated and made public before and final consideration be given to the project. Note: despite agreement to the contrary, no such test bores downstream of the development have been organised by Cortona, nor was any such testing done in preparation for the EA.

I further request:
.That if approval is given for the project, that the Department ensure that the company had adequate resources to compensate for any damage to the households and businesses downstream, and that Cortona be asked to prepare an estimate of what this damage might be. . Conservatively, any damage to properties 4-10 km downstream from the mine this would amount to many hundreds of millions of dollars.

Yours sincerely, Jackie French

381 Major's Creek Rd
Araluen valley
2622

02 48464036

George Mobayed - Dargues Creek Goldmine; ref 100054

From: "Steve Bone" <belindasteve@gmail.com>
To: <information@planning.nsw.gov.au>
Date: 13/12/2010 8:28 AM
Subject: Dargues Creek Goldmine; ref 100054

Dear sir/madam,

I would like to register my extreme concerns regarding the proposed gold mine at Majors Creek. I am not opposed to gold mines per se, but we need to learn from previous mistakes here and overseas which had had devastating effects on the environment. I do not believe that the mining company has proven that it has taken into account all factors that may have an on-going and irreversible impact on local fauna and flora in this area should the mine proceed as is currently intended.

I look forward to following events leading up to decisions being made by the NSW State Government and hope that the pro-environment forces are not overwhelmed in favour of corporate profits, as so often seems to be the case.

Yours Sincerely,

Steven Bone
Hurstbridge, Vic

From: helen walker <helen.walker@gmail.com>
To: <plan_comment@planning.nsw.gov.au>
Date: 10/02/2011 2:57 pm
Subject: Dargues Reef mine comment

Dear Planning authorities,

Reference number 10 0054

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 kilometre 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.

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.

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.

Please take time to consider this.

regards
helen walker

George Mobayed - A incredible concern from a student.

From: Adrian D <adel-re@hotmail.com>
To: <plan_comment@planning.nsw.gov.au>
Date: 18/03/2011 10:37 PM
Subject: A incredible concern from a student.

Name: Adrian Del Re
Reference Number 10 0054

Hi there,
I'm 15 years old, and currently a student. I've recently been made aware of the proposed Dargues Reef mining project. So I won't ramble on
too much, because I'm sure you can guess I strongly oppose it. But before you totally dismiss this letter, please read on for a while...

As a child, I always watched shows to do with Australia's natural environment, never a sucker for too many children's cartoons! Though I've never actually
been to a native forest, I've seen them and sourced a great sense of harmony from them, a harmony I'm having trouble with finding anywhere else. Now that
I'm fifteen, I understand where the harmony comes from, it's because I'm Australian, and so too are the forests and ecosystems, it's only natural. And as
an art student, I find Australia's natural environment a great source of inspiration, if great even begins to cover it. I'm not sure about you, but inspiration
seems to come more easily from natural things then it would from a mine.

You can't mine inspiration and harmony - you can only kill it.

So please take the time to assess the threatened wildlife and ecosystems, the loss of groundwater and ultimately your actions at Majors Creek. And please also
take a good look at the heritage and Indigenous sites a few kilometres downstream from the proposed mine site.

Please stop killing our harmony and everything natural that truly defines Australia. For our country cannot be described in words, but in our wonderful environment
and only our positive actions. Take some time to consider it,

Adrian Del Re
Student

(If you have got to the end, thank-you for taking the time to read this.)

Araluen Valley Producers and
Protectors of the Eco-System Coalition
(AVPPEC)
C/ - Robyn Clubb
Wisbeys Orchards
PB 2 Araluen Road
ARALUEN NSW 2622

28 March 2011

The Department of Planning
GPO Box 39
SYDNEY NSW 2001
ATT: Ms Sara Wilson
By email : Sara.Wilson@planning.nsw.gov.au

Dear Ms Wilson

RE: Major Project Application
Dargues Reef Mine – Majors Creek

It is with extreme concern that we approach the NSW Department of Planning, to again express major misgivings in respect of the passage of the subject proposal and indeed the proposal itself.

Independent investigation to date has shown Cortona's assertions, on even as basic a matters as the homogenous granite geology of the region and the subsequent effect on the downstream aquifer, to be inaccurate, misleading or unsubstantiated, with no reference to dangers such as the lead and manganese content of the ore, future expansion, or extreme weather events. The inaccuracy of the geological assessment means that no reliance can be placed on assertions that there will be minimal effect on the aquifer, on the environment, businesses, orchards or households downstream.

We are deeply concerned that the proposal has been assessed on such inaccurate and incomplete data provided by the proponent, with no real time on-site assessment by any government authority, or time given in the initial assessment period for local landowners to commission such reports. No time has been allowed for the current independent assessments of the complex hydrology of the area to be completed. It is essential that such investigation be undertaken, completed and evaluated for any accurate assessment to be made,

A matter of further concern is the department's apparent failure to take account of the misgivings of other government authorities such as the Office of Water, the Southern Area Catchment Authority and Department of Environment, even when they, too, are reliant solely upon data supplied by the developer.

Proposals to mine the Dargues Reef site have been rejected twice before, in 1982, and by the Land and Environment Court in 1984-87. Neither proposal included the major processing facility proposed by Cortona, which in effect places an 800,000 cubic

metre toxic waste dump *on a waterway* at the head of a unique series of public and private nature reserves and a agriculturally productive valley. The greater risks of pollution to the creeks, rivers and aquifer are no less significant than the extreme and real risk posed to the agriculture, businesses and fragile and endangered species and bio-regions directly downstream by loss of water to processing.

The Dargues Reef region is an area of extreme weather events, with severe land slumpage associated with extreme rainfall events, and extreme lowering of the water table in dry periods. The local agricultural businesses have been able to survive these periods due to rigorous water conservation measures. The endangered species have survived due to continued deep waterholes in Major's Creek, fed by seepage from the Major's Creek fault. Neither is likely to survive the added burden of the removal of 130 mega litres of water a year for ore processing.

As you may or may not be aware, the level of community disquiet continues to mount and build on the ground swell of local, state, national and international opposition, as clearly evidenced, not only in the submissions generated by the public exhibition, but by growing media interest, letters to local newspapers, and the continuing volume of petition documents being received calling for more stringent conditions and independent assessment of the Dargues Reef project.

We have taken the opportunity to appraise ourselves of the nature and extent of submissions furnished, both private in nature and Government agency generated.

The proponent's response to the submissions has further entrenched our concern with the proposal. Despite minor concessions by the proponent and reflected to large part in revised commitments, there remain glaring inaccuracies inadequacies that militate against any contemplation of approval the Department may nurture. Cortona appears unwilling to make any of the substantial changes necessary to ensure the safety of this proposal, nor to undertake the more detailed hydrological study of areas downstream.

The areas of major concern that the AVPPEC Coalition still harbours include, in summary:

Local Geology and Hydrology.

Cortona's assertion that there will be no harmful outcomes caused by the extraction of water from the aquifer and that their activities will not result in any pollution of the aquifer is entirely based on their claim that the underlying rock is homogenous granite. Independent and government assessment, however, provides evidence that the area directly below Dargues Reef is not homogenous granite, but contains various anomalies including fractured sandstone bands through which water percolates from the development site into the Majors Creek Gorge and Araluen Valley.

This alone should warrant further on-site assessment.

In addition, the Majors Creek fault line is directly adjacent to the proposed development, substantiated and detailed in a government survey (see Araluen Geological Map, BMR 1984). Cortona has studied neither the fault nor its importance to local water movements, despite its prominence in the Government geological map.

Pollution.

Cortona have yet to substantiate claims that use of Xanthate and other chemical processing is safe when sited on a waterway, directly above steep and vulnerable orchard and conservation areas, as well as within half a kilometre of households that depend on that water for domestic use. There have also been contradictory accounts about the likely amounts of lead involved in the project. Cortona's recent assertion that the percentage of lead is only slightly above normal background levels are contradicted by the 1.83% lead content of ore, stated in a November 2010 press release by Cortona.

Water Management

- Extreme Weather Events: Cortona's use of misleading and inaccurate rainfall data omits the recurrent extreme weather events that have led to major land slumps and even avalanches in the area. Over the past thirty years these intermittent but severe downpours have caused land slump and erosion at the development site itself.
- No data has been provided, nor studied commissioned, on how the downstream nature reserves and the orchards downstream will be affected by the removal of 130 mega litres of water per annum in the dry years.
- A satisfactory Water Management Plan is still to be prepared to address water quantity and quality (inclusive of groundwater). Underpinning hydrological parameters adopted in the modelling/evaluation remain unconfirmed.

  Such material is fundamental to informed decision-making and cannot be deferred.

Agriculture

The downstream impacts on the immediate Araluen Valley community, and in particular its rural enterprises (with annual revenue exceeding $4 million), and its further employment potential, have been ignored. Potential for heavy metal pollution from manganese and lead would destroy the downstream orchard that relies of water taken from potentially polluted water waterways. Cortona's plan proposes to remove 130 mega litres of water a year from the Majors Creek and Araluen River water tables alone will be devastating on an aquifer already stress. This plan is in no way mitigated by their proposed release of water from on site dams, as these dams, too, would have removed water from the downstream aquifer.

Tailings Dam/Processing Plant

It is inappropriate in the extreme to site a tailings dam and processing centre, using chemicals such as Xanthates, on a waterway such as Spring Creek, especially one that leads into the waterways of Major's Creek, Araluen, Deua and Moruya rivers. The tailings dam and processing plant should be re-sited in more risk-averse settings, away from the headwaters of the identified waterways. Such a site is easily accessible, over the ridge to the north, in an area that Cortona has identified as being their major area of expansion.

There is no detailed data relating to the permeability of the proposed linings neither for the tailings dam/processing centre nor on the expected effective life span of those linings.

Given the hazardous nature of sodium ethyl xanthate and its persistence in the soil and groundwater, it can be assumed that the tailings dam and its contents will remain hazardous for many decades to come, if not indefinitely.

Cortona has failed to substantiate claims that this tailings dam and its contents of processing residue will be leak- and erosion-free in the long term. It is difficult to see how any such substantiations could realistically be made, given that this is such a steep area subject to climatic extremes of both temperatures and precipitation.

Riparian Rights/Domestic Beneficiaries

The downstream water evaluation inadequately addresses the riparian impacts upon the major agricultural enterprises in the Araluen Valley (and beyond). Further, it fails to appropriately address the impacts upon local domestic water supplies in the Valley (and beyond). Once again, the removal of 130 mega litres of water a year will have a devastating effect in dry years.

Lack of Systems/Catchment Focus

The overarching focus upon the site and immediate Majors Creek community is particularly" insular" and one-dimensional.

It fails to address the natural systems and community of interest from a broader catchment focus – including in particular Araluen Creek and the Araluen community.

Economic/Social Impact

The relevant analysis is particularly introverted and Majors Creek/Braidwood focused.

The potential negative impacts upon rural production and tourism are ignored.

Rare and Endangered species.

Apart from on short and cursory study of one species, which did not take into account the areas most likely to be affected by extreme water loss or pollution, Cortona have made no study of the many endangered and critically endangered species in what is an extraordinarily diverse and preserved are directly downstream, with proved extreme resilience despite other pressures.

Mining and Geological Instability

A failure to address the proposed mine and moreover mining methods in an area of noted geological instability is a potentially negligent act.

Risk Analysis

The risk analysis fails to adequately address possible impacts upon downstream

systems, activities and communities, as referred to above.

Attached is an expanded version, titled ***Proposed Dargues Reef Mine Site; 'Supporting Document: Request for Further Assessment',28 March 2011***, of the foregoing presented as a suggested path for further essential independent assessment.

Previous Refusal to Mine (1982-7)

Previous attempts to develop the gold-mining site at Dargues Reef were refused by authorities at the time. The case files, which include reports from various experts, highlight very similar concerns as expressed in this letter and attachments. In addition, a substantial assessment was also carried out on the social cost of a mine failure resulting in pollution of the water flows to the Araluen Valley, the Deua River, and on to Moruya. We have only just obtained these files and hence require more time to seek a review by independent experts as to their significance.

It should be possible to tap the gold reserves of the Major's Creek/Dargues reef region in a safe and equitable manner, by correct siting and design of the tailings dam and the processing centre on a nearby gently sloping site above marginally productive grazing land, with no endangered species, and by sourcing the water for processing from the nearby far larger and untapped Jembaicumbene aquifer. If the project is indeed commercially viable then surely the company can and should bear the costs of such changes to design, rather than have the downstream community bear the environmental costs of water loss and possible pollution.

Conclusion

May we conclude by reinforcing our concern that the glaring deficiencies in the environmental assessment undertaken to date and Statement of Commitments, together with the lack of transparency attached to final statutory authority liaison, are such that we will approach the Minister for Planning as soon as he/she is appointed.

We also ask that time is permitted for:

- The completion and submission of the necessary independent hydrological assessment now being carried out on behalf on landowners downstream;
- Further monitoring of the endangered species; and
- A complete cost benefit analysis of the Dargues Reef proposal versus the other commercial opportunities documented and on hold due to the uncertainties of the development's impact on the Araluen aquifer.
- An assessment of the social cost to the hundreds of people and related enterprises downstream of the proposed mine site.

We thank you for your willingness to hear our continued concern and look forward to our case being put to the Minister for the relevant action as petitioned above.

Yours sincerely

Ms Jackie French Ms Robyn Clubb

For the Araluen Valley Producers and Protectors of the Eco-System Coalition (AVPPEC)

Proposed Dargues Reef Mine Site

Supporting Document: Request for Further Assessment

28 March 2011

1. ***A full on-site independent assessment of the areas where Cortona's Environmental Assessment (EA) has been cursory and inaccurate. This would include:***

. full geological mapping of the area within a 2 km radius of the development, with particular attention to soil and rock types;

. a seismological assessment of the dangers and potential movement and consequences of drilling and explosives adjacent to the Majors Creek fault line, and the potential for earth movement including slippage or failure of the tailings dams and damage to households and businesses adjacent to the fault line;

. a full on-site hydrological assessment, as required by the Office of Water, with forty test bores including test bores to at least two kilometres downstream of the development**;**

. a full on-site study of the rare, endangered and critically endangered species up to four kilometres downstream of the development, including all species recorded in the area;

. a full study of the economic impact on businesses downstream of the site, with a comparison between the employment offered by the proposed development, and the cost to future development if the Dargues Reef project goes ahead as presently designed;

. a full study of the lead content of tailings and ore and the developer required to detail and substantiate the safeguards to be applied both to the processing of the ore and to the storage of the tailings; and

. a full economic cost-benefit analysis to be done on any effects that spillage or toxicity from tailings would have on the orchard, market garden, tourism and other major industries immediately downstream, as well as the health of those households who draw their water downstream of the proposed development.

2. ***Removal of the tailings dam and processing to a safer site.***

Any tailings dam or ore processing site, especially where chemicals such as xanthates are used and lead-rich ore is processed, should not be located at the steep and precipitate headwaters on the steep to precipitate slopes above the headwaters of the vulnerable Majors Creek and Araluen, Deua and Moruya Rivers with their rich agricultural and tourism industries, but located on the northern side of the ridge 0.5-1.5 km beyond the proposed site, an area of gentle slope or level ground on rough grazing country, being the area especially as this is the area from which the developers are proposing to extract the majority of their ore.

3. ***All water for processing should be taken from the far larger aquifer on the northern side of the development, where there has been no water shortage, even in the droughts of the past forty years, instead of the already stressed Majors Creek and Araluen Valley aquifers, which are relied upon by orchardists, market gardens, numerous households, and rare and endangered species.***

If this cannot be done, then the water allocation should be dependent on annual rainfall. The two water licence holders below the proposed development take far less than their allotment in dry years. This is voluntary, but a similar condition needs to be imposed on Cortona i.e. the water allocation reduced on a monthly basis by a similar percentage to the deviation from mean annual rainfall of 900mm PA.

4. ***Given Cortona's unwillingness to provide data, and the inaccurate data they have provided in the past, that independent monitoring be permitted by landowners downstream to ensure that Cortona abide by all conditions.***

Reasons for Further Assessment

1. The proven inaccuracies of the most basic data in the EA:

- The geology of the development area and the area directly below it is not homogenous granite, as Cortona claims, but contains various anomalies including fractured sandstone bands through which water percolates from the development site into the Majors Creek Gorge and Araluen Valley.
- Cortona's assertion that there will be no harmful outcomes caused by the extraction of water from the aquifer, and that their activities will not result in any pollution of the aquifer, is entirely based on their claim that the underlying rock is homogenous granite. This alone should warrant further on-site assessment.
- The Majors Creek fault line, which is directly adjacent to the proposed development, is substantiated and detailed in a government survey (see Araluen Geological Map, BMR 1984). Neither the fault nor its importance to local water movements have been studied by Cortona, despite its prominence in the Government geological map. There is no evidence of geo-tech work having been undertaken.
- There have been contradictory accounts about the likely amounts of lead involved in the project**.** The 1.83**%** lead content of ore, given in a November 2010 press release by Cortona, has since been contradicted by **s**ubsequent statements from Cortona that the percentage of lead is only slightly above normal background levels.
- Cortona's use of misleading and inaccurate rainfall data that omits the recurrent of extreme weather events that have led to major land slumps ad even avalanches in the area. Over the past thirty years these intermittent but severe downpours have caused land slump and erosion at the development site itself.

- The lack of data and the consequent lack of substantiation of claims of the true extent of the Majors Creek/Araluen aquifer and the likely effect that the removal of so much water from the headwaters of this system will have on the entire system.
- The absence of any mention of, or study into the rare and endangered species, adjacent to and downstream of the site in the EA, and only a cursory and misleading study of one such species after much public pressure.
- The failure to mention in the EA the number of households that take their drinking water from either Majors Creek or the Araluen river within from half to four kilometres downstream of the proposed development.
- Cortona's statement that the development will be on level or gently sloping ground is misleading. An on-site assessment would show that the land directly below the development site drops more than 300 metres in less than one kilometre.

Further Reasons for Seeking Full On-Site Assessment

2. The lack of on-site assessment by any of the government bodies that will have over-sight into the project. Instead they are all relying on unsubstantiated data provided by Cortona.

3. Requests by the government authorities that asked for further testing be asked to substantiate the need for those tests, rather than requesting the developer either to comply with such testing or substantiate the reasons why it should not occur.

4. The unwillingness of Cortona to do any but the most cursory further on-site assessment, or to discuss or accept necessary changes such as further downstream test bores, secondary walls for the tailings dams, or moving the site to a safer zone.

5. The lack of openness on the part of Cortona, by describing the development in 2010 as one in which there would be no chemical processing and no on-site ore processing or removal of water, so that no adequate independent assessment could be made.

6. The repeated lack of transparency on the part of Cortona by failing to provide copies of the EA in a timely fashion to those most affacted by the development, thus reducing the available time to have it professionally assessed, as well as making misleading statements designed to discourage such investigations (e.g. a personal assurance that there would be no chemical processing on site, despite evidence to the contrary already being provided in the EA). Further instances include advertising an incorrect date for a public meeting in Braidwood on the issue.

7. The proposed design for the tailings dam is manifestly inadequate. Cortona has stated that the tailings dam will comply with 'world's best practice'. However, according to New Scientist, 18 October 2010, 'world's best practice' for all tailings dams involves a secondary wall in case the first fails. No secondary wall is proposed for the tailings dam at Majors Creek. Cortona has stated that such a wall would be impractical, despite the fragility of the environment and the steepness of the terrain below the development site.

Worst-case Projections

1. The collapse of the tailings dams above the extreme steepness of the Major's Creek gorge, due to either extreme weather events or slippage along the adjacent Majors

Creek fault line, would result in lead and xanthate pollution over the flood plain of the northern Araluen valley, with consequent pollution problems flowing into the Deua and Moruya Rivers and Eurobodalla water systems.

2. An avalanche of lead and xanthate-rich material squeezed through the narrow Majors Creek Gorge, so that it emerges as a twenty metre wave of sediment over the properties at the north end of the Araluen valley, with consequent loss of life and damage to infrastructure and the environment.

3. Changes to the hydrology of the north end of the Araluen valley, with a lowering of the water table leading to the loss of Wisbey's peach orchards, the arboretum run by Jackie French and Bryan Sullivan, and the extinction of the rare, endangered and critically endangered species of the Major's Creek State Conservation Area and to private nature reserves below the development site.

Rainfall Patterns

The Dargues Reef site, the Major's Creek Conservation Area and Lot 581 Parish of Araluen, (Neverbreak Hills), adjacent to the Reserve are subject to substantially different rainfall patterns from the rest of the district, due to the confluence of easterly and westerly rain-bearing winds and the steepness of the ridges. The area is subject to a far greater number of extreme weather events than the neighbouring area. This region stops at the ridge in the middle of Neverbreak Hills – one can walk through a curtain of rain out onto dry soil.

Because of these extreme rainfall events, and the steepness of terrain (See Geological map) this area is prone to frequent minor and major avalanches and slippages.

Note (1): One of the reasons for the dismissal of a mining development application for the Dargues Reef site by a different company in the Land and Environment Court in 1985 was the difficulty of ensuring adequate tailings dam safeguards given the steepness and the extreme rainfall events and landslides.

Note (2): The area is approximately 1.25% warmer on average than it was 25 years ago rainfall is more erratic, and extreme climate events more common. This trend towards increasingly extreme climate events is likely to continue and worsen what is already a major land management problem in this steep and slippage prone country.

Extreme weather events include:

<u>September 1947</u>

The entire valley floor was inundated for a period of three weeks after a freak late snowstorm covered the district and then melted. The only access was by helicopter – one landed on the highest of Wisbey's paddocks for an emergency childbirth.

Source: The Tallaganda Times, September 1947, and oral history.

<u>April 1978</u>

Two flood events saw the entire valley floor inundated for over a day each time. No accurate rainfall measurement was possible in the district as rain gauges were flooded within an hour and rising waters meant they were inaccessible, however more than 125 mls fell in less than an hour on both occasions, and at least three times this amount within a three hour period.

On both occasions the only access to the Araluen Hotel was by boat. Severe slippage closed both Araluen roads. The Dargues Reef site and other slopes around Major's Creek were also subject to severe erosion and slippage.

Note: The present severe blackberry and broom infestation of the Dargues Reef area is due to this recurrent slippage and erosion in severe weather incidents. When the site slumps or washes away the weeds infest and hold together the exposed soil. Areas of blackberry and broom infestation in the Majors Creek area are characteristically those where erosion and slippage reoccurs.

Source: Detailed records kept by Jackie French, Neverbreak Hills, Araluen, substantiated by accounts in the Tallaganda Times, April – May 1978.

May 1979:

21 inches in a three-hour period on 12/5/1978

68 inches in a three-week period in May 1978

Result: Major slumping of even forested slopes in the Majors Creek and Araluen catchments as well as dam wall collapse.

Source: Detailed records kept by Jackie French, Neverbreak Hills, Araluen, substantiated by accounts in the Tallaganda Times of May, 1978.

January 1, 1983

More than twenty inches in a one and a half hour period; far more fell as hail but due to repeated hail incidents blocking the rain gauge, accurate measurement was impossible.

The valley floor and slopes were inundated for approximately three hours.

Major rock falls and avalanches in the Majors Creek Gorge.

Major erosion and slumpage in the Dargues Reef-Spring Creek area. Results:

Major's Creek Mountain road blocked by landslide through most of 1983;

Araluen Bridge washed away three times in a six-week period;

Major avalanche events along the entire Major's Creek escarpment;

Source: Detailed records kept by Jackie French, Neverbreak Hills, Araluen, substantiated by accounts in the Tallaganda Times. Council records should also substantiate this.

5 February, 2011

Araluen Valley received over 110 mm in less than 45 minutes (photos as record). People who have lived in the Valley for over 70 years stated they had never seen such an extreme rain event or such large volumes of water. Rain came from both the North West (Majors Creek area) and the South East (Moruya). There was extensive damage to a number of houses, fences, and roadways together with numerous piles of large trees and other debris pouring down with the water.

Source: rainfall recording at Wisbeys Orchards

22 March, 2011

Braidwood received 14 mm of rain in the 24-hour period.

Neverbreak Hills and by inference the Dargues Reef site received 71.3 mm.

Result: A major rock fall on the boundary of the Major's Creek State Conservation Area.

An area of approximately 0.4 of a hectare of rock and soil fell in one slide into the creek, temporarily blocking it. This was followed by another fall of approximately another 0.2 of a hectare slumping into the creek soon after.

Source: Weather zone (Braidwood rainfall); Bryan Sullivan (Neverbreak Hills rainfall) and Jackie French (rock slippage).

Geology

Note: A further far more comprehensive study is currently being undertaken but as the area is far more geologically complex than detailed by Cortona, it will be several weeks before even the initial study is completed.

Initial studies, however, suggest that both the geology and the hydrology of the development area and the land directly downstream may be contrary to the assumptions in the EA.

1. Cortona have based their case for the safe removal of water from the aquifer and the lack of danger of pollution of the aquifer or the area immediately downstream on the development site being part of the uniform and homogenous granite of the Majors Creek region upstream of the site.

According to experts in the area (see below) this is not the case. The area also includes bands of sandstone, which is a major conductor of water into the valley. These bands are visible and prominent. The 1984 government report also mentions siltstone and conglomerate although they have not yet been noted in the immediate area.

Report by Dr. D. Wyborn and Dr. M. Owen

Report by Dr Andrew Glickson, below.

The Officer in Charge

Environment Australia

Dear Sir/Madam

I refer to the:

Big Island Mining subsidiary of Cortona Resources Limited/Mining/60km south east of Canberra & 13km south of Braidwood/NSW/Dargues Reef Gold Mine Project Reference 2010/5770

Reading the environmental statement I suggest further environmental tests are undertaken with regard to:

1. The effects of potential changes in the level of ground water due to mining and of overflow/spillage from the tailings dam on irrigation of the significant stone fruit orchards in the Araluen valley, about 4-5 km from Major Creek.

2. The effects of potential changes in the composition and alkalinity of ground water due to mining and overflow/spillage from the tailings dam on the fruit orchards in the Araluen valley.

3. The permeability of the fractured granite and intercalated sediments and the effect of ground water level and spillage on natural flora and fauna, in particular in the Major Creek Gorge.

4. The stability of the tailings dam in view of extreme weather events such as floods and storms in the area.

Yours sincerely

(Dr) Andrew Glikson

10 December, 2010

Dr Andrew Glikson

Earth Scientist

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geospec@iinet.net.au

Further report by Dr. Glikson:

'*The Araluen 1:100,000 geological map, part of which I attach, delineates the NW-SE trending Major Creek Fault along the Gorge. As you are aware faults form conduits for ground water.*

My own brief observation on the walk Bryan took me on is that there exist more than one elongated enclave of siltstone/sandstone sediments broadly parallel to the strike of the gorge. Such enclaves would form conduits for ground water. To ascertain the overall permeability of granite+sediment enclaves along the fault and the gorge would require detailed geological mapping, including monitoring of springs.

With best wishes

Andrew Glikson

A further corroboration by Dr Glikson, as part of the present ongoing investigation into the hydrology of the area:

Dear Jackie,

As discussed on the phone:

A statement "the geology of the area appears not to be homogenous" is based on:

1. An official report published by the Bureau of Mineral Resources, authored by Drs. Wyborn and Owen, which indicates the Major Creek Gorge area is intersected by a northwest-southeast-trending geological fault line. This by definition renders this bedrock inhomogeneous, with implications for ground water which migrate along faults.

2. My submission to "Environment Australia" which states among other (item 3): "The permeability of the fractured granite and intercalated sediments and the effect of ground water level".

What would be required is a request for further environmental tests, which is where a geological examination of the bedrock would be required.

I hope Dr. Doone Wyborn, given his earlier geological mapping work in the area, will be able to be of help.

Andrew

26-3-11

From another geologist who at present wishes to have his name withheld, but who will present his findings to the hydrologists currently working in the area:

'Gold deposits tend to be associated with fault lines as the gold is deposited there as water moves towards the fault lines. That this is why gold mining is so commonly associated with slippage of fault lines i.e. earthquakes and tailings dam failures.'

From the 1:100 000 BMR geological Map Commentary by Drs. D. Wyborn and M Owen:

'The sequence comprises inter-bedded sandstone, siltstone and shale, all of which show evidence of deposition from turbidity currents.'

Threat to Endangered Species, Critically Endangered Species and Threatened Species in the four kilometres below the Proposed Mine Site

The Majors Creek National Park State Conservation Area, 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. Even major bushfires have 'jumped' the gorge, leaving the habitats and biodiversity below untouched. While Majors Creek dries up in dry years, the deep spring-fed rock pools have allowed remnant populations to survive and breed again in wet years, as has remarkably been the case in the explosion of frogs and seedlings in the very wet 2010-2011 season.

The four kilometres directly below the proposed Dargues Reef mine ranges from rainforest dominated by *Backhousia myrtifolia* (one of the few and possibly the only such 'dry temperate' rainforest remnant in Australia) to grasslands, with a fern and tree fern understory typical of south-east rainforest, 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.

Threats to species by the proposed Dargues Reef development include:

1. Cortona made no attempt in their EA to identify any of the many critically endangered, endangered or threatened wildlife or fauna in the biologically diverse and

extraordinary Majors Creek Gorge area below the dam that would be affected by either loss of groundwater or failure of the tailings dam.

Due to extreme public pressure Cortona has commission one cursory report into only one of the species, *Eucalyptus kartzoffiana*. There are reasons given below why this study is likely to be inaccurate and incomplete, including the the failure to survey the area below the development, including the properties of Sullivan, French, and Wisbey as well as the lower end of the Conservation Area**,** ie all of the areas that may be most affected by the development.

Note: there has been no on-site assessment of the species of the Majors Creek State Conservation Area since an afternoon excursion by Steve Dovey of the National Parks and Wildlife Service approximately twenty years ago, when he collected what subsequently proved with DNA analysis to be hairs of the endangered brush-tailed rock wallaby.

2. Slumpage and collapse of the processing area, failure or overflow of the tailings dam or accidental spillage during extreme weather events that this area is prone to.

During drought years, when northerly, easterly and southerly rainfall vanishes from the area and rain is mostly in the form of thunderstorms from the west and southwest, Braidwood receives a greater annual rainfall than Major's Creek. Rainfall patterns here are complex, and are not covered or understood in the EA.

Cortona was offered local rainfall figures but preferred to use those monitored in Braidwood. Not only are the figures inaccurate, they do not include any of the extraordinary deluges the area is periodically subject to.

The Dargues Reef mine and processing centre plan makes no mention of local deluges nor has the design of the tailings dam been calculated to withstand these deluges.

It is inevitable that leakage of xanthates and other toxic materials will occur during similar deluges in the future. In many areas, these contaminants would be so diluted that they would be swiftly carried downstream, causing little damage.

This is not the case in this terrain.

The Majors Creek Gorge is narrow – in some places no more than twenty-five metres across. This means that a relatively small flood is confined within a narrow bottle-neck in which the water rises rapidly then on the other side of the constriction it is released into a wider area, briefly but swiftly flooding the grassy plains on either side.

This means that a relatively small amount of rainfall can cause a flood that then briefly but significantly inundates the grasslands and forests on either side of Majors Creek to a distance of one kilometre on either side. There has been no study of the impact of this feature of the terrain in the Dargues Reef EA. This is one of the features of this area, however, that makes it so extraordinarily vulnerable to contamination from activity upstream.

3. The dependence on the water from the Dargues Reef site

Despite the steepness of the area and the numerous gullies, even in times of extreme rainfall events more than 90% of the water that flows 1.5 km downstream (i.e. that area that contains the greatest number and variety of threatened, endangered and critically endangered species) comes from the Majors Creek catchment, not from the

surrounding hills. Spring Creek, on which the proposed Dargues Reef development is planned to be sited, flows directly into Majors Creek above the Majors Creek Gorge.

In dry times this proportion is even higher, with 100% coming from the area directly downstream from the proposed development. Any leakage in dry times would be as devastating as that caused by a localised flood event, although for different reasons, as animals would be forced to drink from contaminated water, and the uptake from flora along the creek would be contaminated as well.

Majors Creek and the downstream Araluen and Deua Rivers also rise and fall swiftly – the flood plain can be inundated for as brief a time as twenty minutes and rarely for more than twenty-four hours. This means that contaminated material from upstream infiltrates the soils of the flood plain but isn't carried away. Most inundations are shallow – usually no more than 30-40 cm.

It is worth noting the Cortona has failed to include data on the last ten years of rainfall (a decade of persistent low rainfall) even from Braidwood, presumably because that did not fit in with the projections needed for water to replace that used at the site.

3. The potential for sodium ethyl xanthate or potassium amyl xanthate used at the proposed Processing Centre (part of the proposed Dargues Reef Ore Processing Development) to destroy both the flora and fauna directly downstream.

The assessment of xanthate carried out under the National Industrial Chemicals Notification and Assessment Scheme, described sodium ethyl xanthate as having '… a large potential for environmental and occupational hazard', '… the lack of information on its health and environmental effects…' and its '… potential to decompose to CS_2 [carbon disulphide]'.

Xanthates cause moderate oral and acute dermal toxicity in animal studies and they are an eye and skin irritant. Only limited data are available on the likely effects resulting from long-term exposure to xanthates, but it can be assumed that in both the long- and short-term, such exposure to xanthates might lead to either death, especially in the case of amphibians like the Green and Golden Bell frog or juveniles of the various endangered species listed below or, at the least, increased vulnerability to cancers, parasite attack due to skin irritation and failure to thrive.

According to the report xanthates are '… associated with a number of long-term effects which include cardiovascular, neurological and reproductive effects'. Once gain, these would be devastating to wildlife downstream.

The report also states that sodium ethyl xanthate should not be allowed to enter drainways and river systems and contaminated soil and spill absorbents should be disposed of '… as hazardous waste.'

This processing centre effectively puts an 800,000 cubic metre 'hazardous waste' dump at the top of a steep, precipitous and rocky slope. The escarpment drops more than 300 metres within two kilometres and the water carried by Majors Creek enters one of Australia's most diverse and beautiful ecosystems.

The immediate toxic and irritating qualities of xanthate on flora and fauna however are only a small part of the threat.

Xanthate in all its forms is strongly alkaline. The existing water table is mildly acidic and all forms of native flora below the site have evolved to thrive in such conditions. The continued use of alkaline processing chemicals – even apart from their toxicity – has the potential to destroy the flora and its dependent fauna downstream.

This would be a dangerous situation were there to be only five years of mining and processing, as outlined in the present proposal. Given the true nature and likely scale of the Dargues Reef development, the potential for devastating flow-on effects is enormous.

Even constant monitoring of the groundwater and flow of Majors Creek would provide insufficient protection for many of the endangered and critically endangered species downstream. Once a leakage or a change in pH was detected it would be too late to protect the most vulnerable aquatic species – the water, and its pollutants, would already have affected them, due to the extreme proximity of the mine and processing centre to the vulnerable plant and animal communities.

If the spill or leakage occurred during a time of flood or heavy rainfall – again, a likely occurrence due to Cortona's reliance on rainfall data from Braidwood that suggests lower and more even rainfall distribution, rather than local data – then any pollution would either cover the entire creek flats (in the event of one of the extreme rainfall events) or be taken up by subduction by the flora on either side of the creek (after very heavy rain).

The Majors Creek Gorge, and its associated flora and fauna, is too close to the proposed development and the country too precipitous, for any monitoring to be effective or timely enough to save species in the event of either minor or major leakage.

Copper sulphate pentahydrate will also be used in the proposed Ore Processing Facility. This is an irritant and its presence would severely affect the endangered creek and river species. It does not, however, appear to have the devastating potential posed by the large quantities of xanthates needed to process the amount of ore Cortona has indicated that it will be trucking to the site from other areas, as well as from the mining on site contained in the current, incomplete development plan.

Cortona Pty. Ltd. have acted deceptively towards the community in the lead-up to this development with public written assurances that there would be no chemical processing at the site and that the mining activity would only last five years.

It was only when the EA was published that there was any mention of processing with xanthates.

Cortona have also acted deceptively in submitting a proposal for a far smaller development than they actually intend. Even when the EA was submitted Cortona's publicity was assuring potential investors that they planned to process far greater quantities over a longer time frame than were indicated in the EA. Their November 2010 Quarterly Report to shareholders published only a month after submitting the Development Application, states that other local ore bodies are now feasible and that more ore will be trucked to the Dargues Reef site for processing.

5. Dangers of storage of xanthates above a steep and fragile ecosystem

Large amounts of sodium ethyl xanthate will need to be stored for processing on the scale proposed. (ie the Company's actual plans as presented to shareholders and the market, not just the development addressed in the current EA.)

Given the steepness of the site and the proximity to critically endangered species and the frequency of leakage from tailings dams at similar mine sites in Australia and overseas, even on sites far less steep than Dargues Reef, it is inevitable that at some stage leakage will occur, with devastating effects on the threatened, endangered and critically endangered species below.

6. The effect of large amounts of concrete on the flora and fauna downstream

According to a representative of Cortona, Cortona initially planned to leave pillars of earth to support the mining tunnels. However, given the evenness with which the ore is distributed in the soil, they now plan to mine the entire tunnel and to use cement mixed with tailings to stabilise the tunnels during mining, the mix of cement and tailings to fill the tunnels after extraction has been completed. There appears to be no acknowledgement that such enormous amounts of concrete, at a depth of half a kilometre, would have a permanent and extremely alkalinising effect on the local water table.

The native species below the mine site are all extremely sensitive to changes in pH. Any such large scale use of concrete would change the pH of the groundwater for many kilometres, ensuring the destruction of all native flora that need acid soil and water to survive. Note: I have only tested the effects of neutral to alkaline water and soil on a limited number of the native species here, but given that none of those survived a rise in alkalinity, it seems likely that most, at least, of the local native species are similarly vulnerable to a rise in alkalinity.

This would mean that all species periodically inundated by Majors Creek, or whose root systems tap into the water table or draw up water through subduction would be adversely affected by a rise in alkalinity (i.e. all species within 25 metres of the creek bed in the narrow parts of the gorge to up to one kilometre of the Majors Creek waterway in the wider areas downstream in the Araluen Valley).

7. The effect on threatened flora and fauna of a dramatic drop of the downstream watertable.

Cortona proposes to remove 130 megalitres of water a year from the Majors Creek and Araluen River water tables. According to independent assessment and observations by French and Sullivan, from 1974 to 2011, of the water table during testing at the Dargues Reef site, this would cause the watertable to drop to depths of from 10.5 metres adjacent to the proposed mine to a fall of about half a metre four kilometres from the mine site.

There has been no testing of the effect of that loss on groundwater below the proposed development. Cortona's view appears to be that because they have been granted that amount, then there is no need to substantiate what the effects downstream may be.

It is impossible to know what the effect on the local aquifer will be of a mine that is half a kilometre deep (which is the depth of one of three mines currently proposed by Cortona in this immediate area) with two kilometres of tunnels, without approriate on site testing.

Reports of independent hydrologists submitted to the Araluen Progress Association (see the submissions to the N.S.W. Planning Department) indicate that even this may not be valid, due to the disturbance by mining in the past mining and it may be impossible to extrapolate what affect a bore – much less such a massive mine –even twenty metres away in this terrain.

8. Effect of the Majors Creek Fault line on Local Hydrology

Cortona's EA made no mention of the significant fault line adjacent to their proposed development, nor on the effect that that must have on the hydrology of the area, nor do they appear to have made any attempt to assess it or, if they have, to make their findings public.

Majors Creek waterway runs directly along the large Majors Creek fault line, mapped by government geologists in their 1984 geological map and described in their commentary.

The Majors Creek area also contains several smaller fault lines. Fault lines have an unpredictable effect on the movement of underground water. They may hinder such movement or facilitate it – it is impossible to predict, although the fact that surface water runs along the fault line, and the presence of springs on either side of the creek, suggest that there is also substantial ground water movement. Further on-site assessment is needed, however, to determine what is happening in this complex area. Despite the proximity of the proposed development to these fault lines no mention was made of them or their possible effects on the local hydrology in the EA.

The EA for the project site and surrounds ('the surrounds' only consist of an area with a radius of about two kilometres from the mine site in terms of ground and surface water assessments) fails to recognise the connectivity of the surface and ground water systems, and the ecosystems and biodiversity issues all of which are obviously interdependent.

9. The lack of any hydrological or geologic testing on the vulnerable areas downstream of the proposed development, and the inaccuracy and misleading nature of the data supplied by Cortona.

Although Cortona states that they have placed bores to test the effect on groundwater within a two kilometre radius of the mine, apart from two bores immediately adjacent to the mine, no other bores have been placed downstream of the proposed development in the area that is most likely to be critically affected by a 500 metre deep mine containing two kilometres of underground tunnels.

Cortona made assurances to French and Sullivan that two such test bores would be placed on their property within certain time frames but refused, however, to accept the request that water from these test bores would also be tested for xanthates or other pollutants.

In 2010, during Cortona's drilling tests, natural springs on our property and in the Majors Creek State Conservation Area dried up and Majors Creek stopped flowing, despite an unusually wet season. Jackie French measured a .4 of a metre/40 cm drop in the water table on the property adjacent to the Major's Creek State Conservation Area, four kilometres directly downstream from the proposed development. Similar or greater drops were seen in local bores – one dropped over ten metres during test drilling by Cortona.

It would appear that, despite Cortona's assertion that the homogenous granite soil and rock type does not permit great movement of water nor water-borne pollutants, there is a major hydrological connection between the area downstream and the development area and the area several kilometres downstream, possibly connected by the bands of fractured sandstone. These bands were either unknown or ignored by Cortona and therefore not mentioned in their EA.

Despite Cortona's claims that the area is homogenous granite, this cannot be sustained and is contraindicated both by on-site sandstone scree slopes and the findings of independent geologists.

Note: An on-going hydrological assessment of the Araluen/ Major's Creek gorge is being made as of March 24, 2011. The findings, however, are still at least several weeks from completion.

It is a reasonable assumption that a 500-metre deep mine, extending horizontally 150 metres below the Majors Creek State Conservation Area and our property will have a major effect on the water table.

The threatened, endangered and critically endangered species downstream are already under considerable further threat from increasingly variable rainfall and climate change.

Any further drop in groundwater would mean the death of individuals, and the possible extinction of some species, and the destruction of the rainforest remnants in the State Conservation Area and on our property.

This threat is even greater when combined with possible pollution of waterholes from xanthate leakage from the processing site. In dry times the deeper waterholes of Majors Creek are the only available water for wildlife for at least 25 square kilometres.

10. The projected true extent of the development

Within a month of the closing of submissions on the Dargues Reef EA, Cortona published its quarterly report to shareholders indicating that two more ore-bearing loads were 'feasible' near the Dargues Reef mine. Ore from these deposits would be trucked to the Dargues Reef site for processing.

A YouTube advertisement for the Dargues Reef mine also indicates that the development is expected to be at least three times larger than submitted, and that Cortona was aware of this when they submitted their proposal. It is easier to get approval for a small proposal and have subsequent additions approved for what will be viewed as only alterations to an already existing development, than to state the true nature and scope of a project in the initial development application.

11. Inadequate study of flora and fauna in and around the development site.

The EA only addresses flora and fauna issues on the actual site of development, not the vulnerable and unique series of ecosystems directly downstream, nor were any studies done before drilling, explosions and trucking destroyed any flora or fauna values at the site, apart from one instance of the Majors Creek orchid and one species of native grass.

Threats to specific, federally-listed animal species within four kilometres directly downstream of the mine and ore processing site.

As stated previously, the water holes between .5 and 4.5 kilometres directly downstream from the mine are the only source of water for these animals in dry periods. If Cortona were to be allowed to take 130 megalitres of water a year from this aquifer, these 'dry times' will be more frequent, more severe and more devastating.

Animals will be particularly vulnerable during these times to any pollution by xanthates. Due to the persistence of xanthates in both soil and water and due to the inadequate design of the proposed tailings dam and the periodic extreme rainfall events that Cortona have made no provision for, it is inevitable that such pollution will occur.

Any pollution by the highly alkaline xanthates and cement will change the pH of water in Majors Creek and the ground water, both in the creek and waterholes and in the silt from periodic inundations. Most of the native species below the mine site are extremely sensitive to any rise in pH, and any such rise may lead to the death of all such species affected.

The threatened, endangered and critically endangered species below the mine site will thus be threatened not just by the contamination of their water supply, but deprived of the trees, grasses, and sub-shrubs that form their food supply and habitat.

Endangered, Critically Endangered or Vulnerable Species in the area .1-6km directly downstream from the proposed Dargues Reef Development.

The following are endangered or critically endangered species that will be threatened, or possibly wiped out, by the impacts mentioned above of the proposed Dargues Reef mine.

As there has been no assessment of these species in the Dargues Reef Mine Environmental Assessment, apart from a cursory attempt to locate *Eucalyptus kartzoffiana*, it is essential that an in-depth assessment is made of the risk to these species.

1. **The Araluen Scarp Grassy Forest**

Status: 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, as well as possible contamination by heavy metals and xanthates. The latter, however, is a far smaller risk to this particular ecosystem than ground water depletion.

The largest protected area of the Araluen Scarp Grassy Forest lies in the Majors Creek State Conservation Area as well as on the private Neverbreak Hills Nature Reserve. There has been no stock grazing on the land for over two decades, and limited grazing in the decades before that. Due to this there is **a** high representation of many species growing in close association that exists nowhere else.

This area is partly on the valley floor and on the gently rising slipes above, and has been inundated by extreme weather events four times in the past 37 years. It had been dramatically affected by drought, but remnant species that were severely depleted during the most recent drought years have recolonised in the past eighteen months. It is unlikely, however, that these species would have the resilience to survive the combination of another prolonged drought combined with the effects of on-going water loss from water being extracted for the proposed mine and associated processing. The affect of siltation, further heavy metal pollution or xanthate contamination is unknown.

In 2006, the NSW Scientific Committee, established by the Threatened Species Conservation Act, 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 the listing of Endangered Ecological Communities.

The Araluen Scarp Grassy Forest is also listed as an endangered ecological community under the Environment Protection and Biodiversity Conservation (EPBC) Act. In 2003-'04 evidence of eucalypt dieback was observed and related to the drought years. Any prolonged reduction in groundwater, which in turn will also reduce the creek flows, has not been researched, quantified or mitigated in the proponent's EA.

Spotted-tailed Quoll *(Dasyurus maculatus*)

Status: Endangered

Jackie French has been tracking spotted-tailed quolls in what is now the State Conservation Area since 1974, following their movements via scats. Spotted-tailed quolls occur close to the proposed mine site. They almost certainly occupied the area prior to test drilling and other disturbance there two years ago, and are attracted to the fringes of Majors Creek town ship, adjacent to the mine site, by hen houses.

The quoll habitat extends beyond the Majors Creek State Conservation Area and the Sullivan-French property, into the Bells Creek watershed and then across to Monga State Forest. Spotted-tailed quolls also use a corridor of privately-owned land as a link from the Majors Creek State Conservation Area to the Deua National Park downstream. The number of scats, and the range of scat sizes, from adult to juvenile, indicates that quolls survive and the continued appearance of scats appears to suggest that there are still sufficient numbers for breeding.

Disruption by the noise of drilling and explosions from the mine site will almost certainly scare quolls from the area downstream of the mine. This will further fragment a small and most endangered population, leading to further declines in breeding and may mean that what appears to be a sustainable breeding population becomes too isolated to survive.

A greater danger is from water-holes polluted by xanthates, causing death, danger to unborn young or, in lower concentrations, making the quolls more susceptible to various cancers and disease.

Like all predators at the top of the food chain, quolls are susceptible to the 'accumulation' of toxins in their food. Quolls eating rodents and birds affected by xanthates may become even further affected themselves. This is, however, an unknown factor – there hasn't been sufficient study of the effects of long-term exposure to low levels of xanthates for any firm conclusions to be drawn.

The failings in the design of the proposed Dargues Reef tailings dam and processing site, however, make it probable that within a five-year period there will be a major rainfall event and that, when that occurs, the dam, or even the storage site, will be unable to cope with the run-off, leading to pollution of the flood plain and waterholes downstream. Once the flood plain is polluted it is likely that xanthates will persist in the soil for many years, particularly as the periodic inundation is usually swift – a fast rise and a fast fall. (A longer period of inundation would mean a greater chance that unpolluted floodwater might wash the area clean, although that, of course, would

merely carry the problem further downstream to the Deua National Park or the recreational fishing and wildlife of the Moruya River estuary.)

The large areas of privately-held 'wild' land, including that of French, Sullivan and Wisbey, adjacent to the Majors Creek State Conservation Area, allow sufficient territory for the quolls to survive. Any destruction of the smaller mammals that they prey on, however, could also result in their local extinction.

Red-tailed Black-Cockatoo (coastal subspecies) *(Calyptorhynchus banksii banksii)*

Conservation status in NSW**:** Critically endangered

The Red-tailed Black Cockatoo is a transitory bird species, visiting the Majors Creek Gorge area usually for two to three weeks in December or early January in flocks of 5-27. They nest in tree-hollows, in the trunk, spout or stump, primarily of *Eucalyptus* spp. They nest in October to November but only in dry years – they appear to have preferred nesting sites elsewhere.

If the springs or the waterholes in the conservation Area dry up this refuge will no longer be available, leading to the extinction of this particular flock or flocks.

Rufous Bettong (*Aepyprymnus rufescens*)

Conservation status in NSW: Vulnerable

Rufous bettong exist in several small and possibly interlocking populations in the Majors Creek State Conservation Area and on the private reserve of Neverbreak Hills. Their characteristic tussock nests are numerous in wet seasons. In dry seasons their numbers drop dramatically. It is unlikely that this species would survive the further depletion of the aquifer and the subsequent loss of the springs and waterholes on which they depend if Cortona is permitted to extract the water they require for processing, or if the aquifer is damaged by other changes to the hydrology.

The NSW government's stated aim for this species is to:

• Protect forested corridors;

• Retain and protect stands of native vegetation; and

• Enhance forested corridors.

Gang-gang Cockatoo (*Callocephalon fimbriatum*)

Conservation status in NSW: Vulnerable

This species both feeds and nests in the Majors Creek State Conservation Area and in the adjacent private reserve owned by Sullivan and French. Although small numbers are present and nest each year, i.e. about 6-8 pairs, numbers of up to 40-64 may be present in years of drought or nearby bushfire. It appears that this area is both a nesting place and a refuge.

According to DECC data: 'Individual pairs show high fidelity to selected nesting trees (choosing nesting hollows of particular shape, position and structure).'

Given the fragile nature of the aquifer, and the already significant water stress, any further loss of ground water, with its consequent destruction of flora and lack of food supply, would mean the extinction of these local colonies.

The NSW recovery strategy for this species includes:

• Survey mapping and habitat assessment and

- Identifying important nesting habitat on public lands.

Note: The gang-gang is not even listed on the NSW website as nesting in the Major's Creek-Araluen areah area. A local survey of its nesting sites and habits should be given priority.

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Brown Treecreeper, Eastern subspecies (*Climacteris picumnus victoriae*)

Conservation status in NSW: Vulnerable

The brown tree creeper is present all year round in this area, foraging primarily on the banks of Majors Creek and rarely more than five metres from the creek bed. They forage for ants and other insects both on the Allocasuarinas and in the leaf litter below. As insect eaters they would be vulnerable to any accumulation of heavy metals, especially lead, as well as to chemical pollution, and to loss of habitat from further stress on the aquifer.

References:

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Red Goshawk (*Erythrotriorchis radiatus*)

Conservation status in NSW: Critically Endangered

National conservation status: Vulnerable

Red goshawks inhabit the Major's Creek Gorge area, possibly as a corridor between the Monga and Deua National Parks. They both breed and live in the Majors Creek State Conservation Area, linking with Monga Forest. Only one young goshawk is generally seen per year. Food ranges from frogs to Wonga pigeons and domestic hens. The red goshawks are particularly fond of the hens at the property of Sullivan and French, consuming all but the spine and legbones.

The gorge area, however, is of critical significance to the local species as both corridor and refuge from extreme weather events such as drought, fire and storm. Various raptors as well as other birds make use of the relatively mild and protected gorge micro-climate especially at times of winter wind or storm.

NSW government strategies for recovery (with those strategies particularly relevant to the local situation underlined) include:

• Protect known or potential habitat, and especially nesting trees, from too-frequent burning.

• Reduce the use of pesticides.

• Protect known or potential nesting sites with substantial buffer zones.

• Identify and protect known and potential floodplain and riparian habitat from draining or clearing.

• Protect known habitat from logging.

• Rehabilitate known and potential habitat.

• Locate, monitor and protect known nesting sites and birds. However, the location of all sites should remain confidential to ensure the sites are not then exposed to other threats (such as egg-collecting).

• Educate poultry and pigeon owners in areas near Red Goshawk habitat to ensure that they are advised of the importance and legal status of the species and of ways to protect their birds without shooting Red Goshawks. Report cases of illegal shooting to DECCW.

• Report any records, particularly of nesting birds, to the DECCW.

References:

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Araluen Gum *(Eucalyptus kartzoffiana*)

Status: Vulnerable

E. kartzoffiana exists in its natural form only from one kilometre to seven kilometres directly downstream of the proposed development.

E. kartzoffiana was first identified on the property we now own by Kartzoff in 1967. In 1973, I was present when a local botanist, the late Dr. Val Plumwood, showed a group of botanists the stand of trees that had been originally identified as a new species. This stand still exists on the southern edge of our property, although about a third of the trees have since died as a result of drought or, in one case, a local whirlwind.

Although some individuals of this species have been planted elsewhere, including on the Bell's Creek side of the Major's Creek State Conservation Area, the only naturally occurring stands of *E. kartzoffiana* are from three to eight kilometres directly below the proposed mine site. (Note: A stand of *E. maidenii* near Bells Creek was incorrectly identified as *E. kartzoffiana* in the 1980s, and another misidentification has also occurred downstream. As *E. kartzoffiana* flowers and sets seed so rarely, it is easy to pick up seeds from other species on the ground near the trees and, in the case of both *E. maidenii* and *E. tereticornis*, mistake either of these more commonly occurring species for *E. kartzoffiana*. The only positive identification can be from seeds or flowers picked while the tree is blooming, or observation of the characteristic juvenile foliage which persists for between five and seven years after the tree is mature, although this period can be longer if the tree is stressed by drought. This means that the species can be difficult to identify with any certainty in most years without DNA testing.)

E. kartzoffiana only naturally occurs on the flood plain of Majors Creek, in the gorge directly below the proposed development and for another three to four kilometres downstream from our property. *E. kartzoffiana* only survives where its roots can reach the water table i.e. within ten metres of the Majors Creek watercourse. This probably accounts for their fast growth. Until the flood of January 1, 1983, *E. kartzoffiana* was confined to the property of Sullivan and French adjoining the State Reserve, and on the

land of what is now the Majors Creek State Conservation Area. After that flood there was some colonisation on either side of the Majors Creek waterway and these trees still survive as adults today. There appears to be some germination and growth of juveniles in the past twelve months, but due to identification problems it is impossible to ascertain if these are *E. kjartzoffiana* or *E. maidenii* or *E. tereticornis*. The botanist who discovered and described *E. kartzoffiania*, Kartzoff, declared that identification correctly distinguishing between these species that naturally co-exist was difficult, and fruit was necessary for positive identification.

It is noteworthy that some individuals of both *E. kartzoffiana* and *E. maidenii* retain glaucous juvenile foliage until maturity; others of both species do not and, therefore, this is not a reliable diagnostic tool.

Any pollution from any of the xanthates may result in the extinction of naturally occurring *E. kartzoffiana*. A further severe threat, however, comes from the company's plans to 'backfill' the mine site with concrete made of tailings mixed with concrete.

E. kartzoffiana has evolved in an unusually acid environment. I have observed that it will neither germinate nor grow near concrete, due to the lime leaching from the cement and raising the soil pH, nor will it grow in an area where the pH has been raised by the use of agricultural lime.

It is inevitable that such a large amount of concrete, extending through two kilometres of tunnels 500 metres deep will affect the pH of the local aquifer, thus leading to the extinction of all natural stands of *E. kartzoffiana*.

E. kartzoffiana rarely flowers. I have been unable to determine what the trigger for flowering is. Other eucalypt species here may flower in a wet year, or before a wet year, or even flower annually (i.e. *E. smithii*) or biennially. *E. kartzoffiana* appears to bloom only about once a decade. While it germinates reasonably readily in potting mix designed for native species, *E. kartzoffiana* appears to need the acid conditions that occur after a natural flood for it to germinate. If the pH of the water in Majors Creek is changed due to xanthate or the large-scale use of concrete, then no more *E. kartzoffiana* will germinate.

Perhaps half of the naturally occurring *E. kartzoffiana* have died in the past ten years, due to the effects of drought and other pressures on the water table. This species in its naturally occurring form is under severe pressure. The ones that survive are mature trees.

E. kartzoffiana is fast growing in the right conditions, as found in its limited natural habitat, but it also appears not to be a long-lived tree. If no new trees germinate over the next twenty years, this species will become extinct in its natural state. If the proposed development goes ahead in its proposed form, with an inadequately engineered tailings dam and insufficient safeguards for ore processing, as well as concrete used in large quantities on site, it is inevitable that *E. kartzoffiana* will become extinct in its only natural habitat.

In March 2010, Cortona commissioned a cursory study of *E. kartzoffiana*. The day before this survey was to take place they phoned Jackie French asking her to show the couple doing the study how to recognise *E. kartzoffiana*. On the same day they called Robyn Clubb**,** on the property further downstream, asking for permission to study *E. kartzoffiana* on her land. Both French and Clubb stated that they would only permit access after a written application was made. No such written application was given, therefore the two most common areas for *E.kartzoffiana* have not been surveyed by

Cortona, nor have they had access to the lower gorge accessible through the Sullivan-French property.

It must be noted that no identification can be relied upon for this species without an example of fruit or blossom. It must also be noted that stands of *E. kartzoffiana* have been panted along the Araluen road. This planting should not be confused with their natural occurrence.

Giant Burrowing Frog *(Heleioporus australiacus*)

Status: Vulnerable

This frog is rare in the area .5-4 kilometres directly below the proposed development, but the species has been able to survive repeated droughts. They appear to live mostly in the damp gullies along the course of Majors Creek waterway. Given the periodic inundations by floods and the depth of subduction by large trees like the rusty (*Ficus rubiginosa)* and sandpaper *(F. coronata)* figs, these gullies would be affected by any spillage or leakage of xanthates.

Like all life associated with the Majors Creek water table, this species is unlikely to survive a rise of pH associated with the use of sodium ethyl xanthate and the large amount of concrete, nor any exposure to the toxic effects of xanthates. Frogs are extraordinarily sensitive to any pollution. Increased silt from the mine workings will also threaten the continued existence of this species in the area. Irritation from an increased level of copper sulphite pentahydrate might also lead to its local extinction.

The NSW government plan for species recovery includes:

• Retain native vegetation and minimise ground disturbance where the species occurs. This is essential within 300 m of known breeding sites.

• Protect breeding sites from disturbance, sedimentation and pollution.

References:

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Cogger, H.G. (2000) Reptiles and Amphibians of Australia. 6th ed. Reed New Holland, Sydney.

Robinson, M. (1993) A Field Guide to the Frogs of Australia. Reed Books, Sydney.

Little Eagle (*Hieraaetus morphnoides*)

Conservation status in NSW: Vulnerable

The Little Eagle exists as a minimum of one breeding pair resident in the Majors Creek Gorge. As the species is seen regularly over the past 37 years it is likely that more than one breeding pair exists in the area; however only single birds sometimes accompanied by juveniles have been observed.

As with any species high on the food chain, the Little Eagle is vulnerable to the accumulation of heavy metals from ore in its food supply, as well as water

contamination or scarcity. Any further drop in the already stressed aquifer would mean the loss of the smaller species that comprise its food supply.

The NSW government plan for species recovery includes:

- Buffer habitat areas from the impacts of other activities.
- Protect known populations and areas of potential habitat from clearing, fragmentation or disturbance.
- Rehabilitate known and potential habitat.
- Retain and protect nesting and foraging habitat.

References:

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Green and Golden Bell Frog *(Litoria aurea*)

NSW Status: Vulnerable

The Green and Golden Bell frog can be found in large numbers in the Majors Creek Gorge area only in wet years, when the population rises, or in very dry years, when they are attracted to the moister area around the house of Sullivan and French. Otherwise the populations exist further up the gorge, towards the proposed mine and processing site. It is unlikely that the frogs exist in the now disturbed and cleared area of the current mine site, but they do exist within one kilometre downstream.

In the last year there have been numerous sightings of Green and Golden Bell frogs, as well as identifiable calls.

Any change in the pH of the water or pollution by xanthates, even for a short period of three to six weeks (the time that would be taken before any leak could be remedied**)** would almost certainly lead to the local extinction of the Green and Golden Bell frog. Irritation from an increased level of copper sulphite pentahydrate might also lead to its local extinction. Given the high pH of the materials to be used at the proposed development, there seems little, if any, chance of amphibians like the Green and Golden Bell frog surviving in the area 1.4 km downstream.

Note: All aquatic and amphibious species are at extreme threat from any major chemical use upstream.

NSW Government Recovery strategies for this species include:

• Maintain captive-bred populations for future possible re-introduction programs.

• Initiate community awareness programs that highlight the presence of populations and catchment management approaches to improving stormwater quality, habitat retention and management.

• Develop measures to control or eradicate the introduced Plague Minnow.

• Establish protocols for handling of frogs and educational strategies to minimise the inadvertent spread of fungal pathogens from site to site.

* Develop strategies to provide for the development or enhancement of frog habitat to improve reproductive success and recruitment at known sites.

• Develop site-specific plans of management to improve conservation outcomes for targeted populations.

• Develop strategies to provide disease-free and fish-free breeding habitat.

References:

Cogger, H.G. (2000) Reptiles and Amphibians of Australia. 6th ed. Reed New Holland, Sydney.

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Eastern Bentwing-bat (*Miniopterus schreibersii oceanensis*)

Conservation status in NSW: Vulnerable

These possibly exist only as one colony; sightings are common along the creek at night and occasionally up to 25 metres from the creek corridor. As an insectivorous species, these bats would be vulnerable to accumulated heavy metals in their diet, and, in dry times, to losses of waterholes that are reliant on an already stressed aquifer.

NSW Government listed threats include:

• Damage to or disturbance of roosting caves, particularly during winter or breeding.

• Loss of foraging habitat.

• Application of pesticides in or adjacent to foraging areas.

• Predation by feral cats and foxes.

To this should probably be added: pollution from mining residues in water or food supply.

NSW Government recovery strategies for this species include**:**

• Control foxes and feral cats around roosting sites, particularly maternity caves.

• Retain native vegetation around roost sites, particularly within 300 m of maternity caves.

• Minimise the use of pesticides in foraging areas.

• Protect roosting sites from damage or disturbance.

References:

Churchill, S. (1998) Australian Bats. New Holland, Sydney.

Dwyer, P.D. (1995) Common Bentwing-bat *Miniopterus schreibersii* pp. 494-5 in Strahan, R. (ed.) The Mammals of Australia. Reed Books, Sydney.

Powerful Owl (*Ninox strenua*)

Conservation status in NSW: Vulnerable

The powerful owl has been observed for the past 37 years in the Majors Creek Gorge area. Most years the nesting site has been found, and most years breeding appears to be successful. Although only one breeding pair at a time has been observed, given the continuity of calls and the location of calls, i.e. at three or four locations in any one calling period, it is highly likely that more than one pair exists in this area, sufficient to form a continuous and viable population. The powerful owl's main prey species are medium-sized arboreal marsupials. In this area these include the Greater Glider, Common Ringtail Possum and Sugar Glider, with a preference, according to scat results, for the ringtail possum, although this may be because ringtails are more populous in the area.

Pairs of powerful owls are believed to have high fidelity to a small number of hollow-bearing nest trees and will defend a large home range of 400-1450 ha.

It is noteworthy that the powerful owls did not successfully nest and breed in 2010 during the testing period for the proposed Dargues Reef mine. It is likely that the explosions and vibrations disturbed them. As well as being vulnerable to water loss, it is foreseeable that the disturbance of a mine so close to their breeding territory will mean the loss of this species entirely from the area.

NSW Government recovery strategies for this species (with those strategies particularly relevant to the local situation underlined) include:

• Searches for the species should be conducted in suitable habitat in proposed development areas and proposed forest harvesting compartments.

<u>• Retain at least a 200 metre buffer of native vegetation around known nesting sites</u>**.**

• Retain large stands of native vegetation, especially those containing hollow-bearing trees.

<u>• Protect riparian vegetation to preserve roosting areas</u>.

• Protect hollow-bearing trees for nest sites. Younger recruitment trees should also be retained to replace older trees in the long-term.

• Minimise visits to nests and other disturbances, including surveys using call playback, when owls are breeding.

• Assess the importance of the site to the species' survival. Include the linkages the site provides for the species between ecological resources across the broader landscape.

References:

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Pavey, C.R. (1995) Food of the Powerful Owl *Ninox strenua* in suburban Brisbane, Queensland. Emu 95**:** pp**.** 231-232.

Pavey, C.R., Smyth, A.K. and Mathieson, M.T. (1994) The breeding season diet of the Powerful Owl *Ninox strenua* at Brisbane, Queensland. Emu 94: pp**.** 278-284.

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Barking Owl (*Ninox connivens*)

Conservation status in NSW: Vulnerable

The barking owl appears to be only an occasional visitor to the Gorge country, presumably from its preferred territory in the Monga State Forest, appearing only in times of drought or at other times of climatic stress. There have only been two sightings and eighteen calls recorded in the past decade in this area. Any damage to the Majors Creek Gorge area may mean that this species vanishes from the area, and is unable to use the Majors Creek Gorge for refuge.

Note: The barking owl requires very large permanent territories in most habitats due to sparse prey densities. Monogamous pairs hunt over as much as 6000 hectares, with 2000 hectares being more typical in NSW habitats. Any disturbance, such as explosions or drilling, reduces the foraging time and can pull the female off her eggs even on cold nights.

NSW Government recovery strategies for this species (with those strategies particularly relevant to the local situation underlined) include:

- Apply a mosaic pattern during fuel hazard reduction burns to ensure the same areas are not burned too frequently.
- Retain standing dead trees and large fallen logs.
- Retain and enhance vegetation along watercourses and surrounding areas to protect important habitat of the owls and their prey.
- Protect woodland and open forest remnants, especially those containing hollow-bearing trees.
- Maintain a buffer of undisturbed native vegetation of at least 200 metres radius around known nest sites.
- Fence habitat remnants and protect from heavy grazing.

References:

Garnett, S.T. and Crowley, G.M. (2000) The Action Plan for Australian Birds 2000. Environment Australia, Canberra.

Higgins, P.J. (ed.) (1999) Handbook of Australian, New Zealand and Antarctic Birds. Volume 4: Parrots to Dollarbird. Oxford University Press.

NSW National Parks and Wildlife Service (2003) Draft Recovery Plan for the Barking Owl (*Ninox connivens*). NSW NPWS, Sydney.

NSW Scientific Committee (1998) Barking Owl - Vulnerable species determination - final. DEC (NSW), Sydney.

Robinson, D. and Traill, B.J. (1996) Conserving woodland birds in the wheat and sheep belts of southern Australia. RAOU Conservation Statement No. 10. Birds Australia, Melbourne.

Greater Glider (***Petauroides volans***) **population in the Eurobodalla local government area**

Conservation status in NSW: Endangered Population

The Eurobodalla region includes the lower end of the Araluen valley and, despite previous surveys, further investigation has shown that the population of Greater Gliders is continuous through the Duea National Park along the wildlife corridor provided by reserves such as Wisbey's orchards and the Sullivan and French Nature Reserve up to the Majors Creek State Conservation Area and through the Bells Creek area to Monga State Forest and National Park. Greater gliders are by no means common in this area, however, and have been sighted on only seven occasions in the past fifteen years. It is possible that their presence is transitory, with juvenile males using the wildlife corridor to find new territory. Normally greater gliders are strongly territorial, so their lack of a year-round presence suggests that this area is a travelling route, not a breeding ground or permanent territory.

NSW Government recovery strategies for this species (with those strategies particularly relevant to the local situation underlined) include:

• Through appropriate planning and assessment, ensure that the extent of habitat and the number of hollow-bearing trees is not compromised by development.

• Undertake revegetation programs to increase the extent and connectivity of habitat, particularly the north-south connection in the vicinity of the Congo settlement and to establish an east-west vegetated link just south of the Bingie Road and Princess Highway intersection.

• Encourage landowners to remove barbed wire from the top strand of existing fences and to not use barbed wire for the top strand of new fences in forested areas.

• Increase community awareness of the status, ecology and management of the population.

Brush-tailed Rock-wallaby (*Petrogale penicillata*)

Conservation status in NSW: Endangered

National conservation status: Vulnerable

This species exists in small numbers in the rocky outcrops of the Majors Creek Gorge directly below the development site. Its existence was verified by a DNA study of hair found in a rocky overhang in the Majors Creek Gorge by Steve Dovey of the NSW National Parks and Wildlife Service, approximately twenty years ago. A full report on this study is awaited.

The brush-tailed rock-wallaby inhabits steep, rocky areas, and only the steepness and inaccessibility of the gorge area has allowed its survival. Any further depletion of water, any pollution with xanthates or other heavy metal pollutants will see the extinction of this small colony, that has survived for so long despite drought and human settlement,.

Considerable significance and funds have been put into studying and conserving rock-wallabies and their habitat in Australia. It was decided at the time of the survey by Steve Dovey that the existence of this colony should not be made public, to protect it from shooters and trophy hunters, especially as their preservation was

being overseen by French and Sullivan ad their numbers and continued existence monitored.

It would be ironic and tragic if they survived until now only to be destroyed by a single ill-considered development. In retrospect and with the benefit of hindsight, publicising the extraordinary survival of this colony would have given them greater security in the face of the very real threat to their existence posed by the proposed mining and processing project.

On-site assessment of this colony is essential.

NSW Government recovery strategies for this species (with the strategy particularly relevant to the local situation underlined) include:

• Raise landowners' awareness about the presence of brush-tailed rock-wallabies and provide information to assist in their management.

• Undertake feral predator control around colony sites.

• Undertake feral goat control around colony sites.

• Retain rocky habitat and adjacent open forest or grassland areas.

• Retain habitat corridors between colony sites.

• Protect colony sites from human interference or disturbance.

References:

Department of Environment and Conservation (NSW) (2005) Draft Recovery Plan for the Brush-tailed Rock-wallaby (*Petrogale pencillata*). NSW DEC, Sydney.

Eldridge, M.D.B and Close, R.L. (1995) Brush-tailed Rock-wallaby *Petrogale penicillata* pp. 383-5 in Strahan, R. (ed.) The Mammals of Australia. Reed Books, Sydney.

Grigg, G., Jarman, P. and Hume, I. (eds.) (1989) Kangaroos, wallabies and rat-kangaroos. Vol. 1. Surrey Beatty & Sons Pty Ltd. Chipping Norton, NSW.

Menkhorst, P. and Knight, F. (2001) A Field Guide to the Mammals of Australia. Oxford University Press, Melbourne.

NSW National Parks and Wildlife Service (2003) Brush-tailed rock-wallaby (endangered Warrumbungles population) Recovery Plan. NSW NPWS, Hurstville NSW.

NSW Scientific Committee (2003) Brush-tailed rock-wallaby - Endangered species determination - final. DEC (NSW), Sydney.

Scarlet Robin (*Petroica boodang*)

Conservation status in NSW: Vulnerable

The scarlet robin breeds and forages in the Majors Creek Gorge and the private nature reserve of Sullivan and French adjacent the State Conservation Area. It is locally common, with numerous breeding pairs and successful reproduction each year over a 37 year period of observation. It exists primarily within 25 metres of the creek banks in summer, ranging further into the forest in winter, and so is vulnerable to any extreme weather event bringing down pollution that may accumulate in its primarily

insectivorous food supply, as well as loss of habitat and water from further stress on a water system that only just supports its existence in dry periods.

Note: Bryan Sullivan has been studying the nesting sites and successful breeding of this species in the area for 21 years.

NSW government recovery strategies (with those strategies particularly relevant to the local situation underlined) include:

• Retain existing forest, woodland and remnant grassland vegetation, including paddock trees.

• Retain dead timber on the ground in open forest and woodland areas.

• Enhance potential habitat through regeneration by reducing the intensity and duration of grazing.

• Fence off remnant vegetation to protect it from long-term, intense grazing.

• Increase the size of existing remnants, by planting trees and establishing buffer zones of unmodified, uncultivated pasture around woodland remnants.

• Keep domestic cats indoors at night; desex domestic cats; assess the appropriateness of cat ownership in new subdivisions adjacent to Scarlet Robin habitat.

• Avoid the use of exotic berry-producing shrubs in landscape and garden plantings in areas adjacent to Scarlet Robin habitats.

References:

Higgins, P.J. and Peter, J.M. (eds.) (2002) Handbook of Australian, New Zealand and Antarctic Birds. Volume 6: Pardalotes to Shrike-thrushes. Oxford University Press, Melbourne.

Pizzey, G. and Knight, F. (2003) The Field Guide to the Birds of Australia 7th Edition. Menkhorst, P. (ed). HarperCollins.

Scarlet Robin *Petroica boodang* (Lesson 1838) - vulnerable species listing NSW Scientific Committee - final determination at: http://www.environment.nsw.gov.au/determinations/scarletrobinFD.htm

Majors Creek Leek Orchid (*Prasophyllum sp. Majors Creek*)

Conservation status in NSW: Critically Endangered

Small discrete colonies of the Majors Creek leek orchid exist directly below and adjacent to the development site. Any further drop in the water table, or heavy metal pollution, may mean the destruction of these colonies.

Distribution – currently only known at various sites around Majors Creek.

NSW Government listed threats (with those threats particularly relevant to the local situation underlined) include:

• Plants could be threatened by earthworks.

• Plants may be threatened by trampling and illegal collection.

• Previous threats appear to have been loss, degradation and fragmentation of habitat and populations due to residential, infrastructure and agricultural developments.

• Current threats are inappropriate mowing regimes, especially if this occurs in spring and summer when above-ground parts are present.

• May be threatened by competition from other plant species (e.g. Kangaroo Grass, Snowgrass).

• May be threatened by inappropriate tree and shrub planting.

• Particularly vulnerable to chance extinctions because only one known population exists.

Note: It is now known that several populations exist; however this is still a most vulnerable species.

NSW Government recovery strategies for this species (with those strategies particularly relevant to the local situation underlined) include:

• Protect known population from changes to management, including competition from planted trees and shrubs.

• Do not allow mowing or other disturbances when above-ground parts are present.

• Establish the most effective means of management of competing species (e.g. slashing at appropriate times, or patch burning).

• Monitor the known population to ensure that management is retaining population.

• Prepare and implement a management plan for the site; monitor the plan's outcomes and review and rewrite after five years.

• Mark site and potential habitat onto maps of the remnant site and surrounding locality to be used for management and planning.

• Search for new populations in potential habitat in the surrounding locality.

References:

Jones, D.L. (2000) Ten new species of *Prasophyllum R. Br.* (*Orchidaceae*) from South-eastern Australia. The Orchadian 13, pp. 149-173.

NSW Scientific Committee (2002) *Prasophyllum sp. Majors Creek* (a terrestrial orchid) - Endangered species determination - final. DEC (NSW), Sydney.

Grey-headed Flying-fox (*Pteropus poliocephalus*)

Conservation status in NSW: Vulnerable

National conservation status: Vulnerable

Grey-headed flying fox roosting camps are generally located within twenty kilometres of a regular food source and are commonly found in gullies, close to water and in vegetation with a dense canopy. Any further lowering of the already stressed water table may mean local extinction of this species. The grey-headed flying fox depends

naturally upon flowering gum and other trees. Any lowering of the watertable would mean that these trees might, at best, fail to bloom reliably, or even die. This would increase the likelihood that local populations descend upon the orchard areas of the Araluen valley and local gardens.

Any further stress on the Majors Creek gorge area will have a disastrous effect on this colony's survival. Their roosting and breeding may be affected by explosions and drilling occurring at the proposed development. This, however, is purely theoretical. Given that colonies are known to be sensitive to disruption by noise and that this is the usual non-lethal method employed when trying to evict a colony, evidence should be produced to substantiate any claim that noise and vibrations from mining will not disturb the breeding, feeding or roosting of this vulnerable species.

NSW Government recovery strategies for this species include:

- Protect roost sites, and particularly avoid disturbance from September through November.
- Identify and protect key foraging areas.
- Manage and enforce licensed shooting.
- Investigate and promote alternative non-lethal crop protection mechanisms.
- Identify powerline blackspots and implement measures to reduce deaths.

References:

Churchill, S. (1998) Australian Bats. New Holland, Sydney.

Conder, P. (1994) With Wings on their Fingers. Angus and Robertson, Sydney.

Hall, L. and Richards, G. (2000) Flying Foxes; fruit and blossom bats of Australia. UNSW Press, Sydney.

NSW Scientific Committee (2001) Grey-headed flying fox - Vulnerable species determination - final. DEC (NSW), Sydney.

Tidemann, C.R. (1995) Grey-headed Flying-fox *Pteropus poliocephalus*. pp. 439-40 in Strahan, R. (ed.) The Mammals of Australia. Reed Books, Sydney.

Masked Owl (*Tyto novaehollandiae*)

Conservation status in NSW: Vulnerable

The continuity of the identified calls of this species over a 37 year period indicates that at least one breeding pair and probably more of the masked owl exists in the Majors Creek Gorge although only one specimen has been observed at any one time.

The masked owl roosts and breeds in moist eucalypt forested gullies directly below the proposed Dargues Reef development site, using large tree hollows or sometimes caves for nesting. The typical diet consists of tree-dwelling and ground mammals, especially rats. Pairs have a large home-range of 500 to 1000 hectares.

Any accumulation of heavy metal in the diet of this species may lead to their local extinction. They are also extremely vulnerable to any further drop in the water

table or pollution of the waterholes along Majors Creek as are the smaller animals that comprise their diet.

NSW Government recovery strategies for this species (with those strategies particularly relevant to the local situation underlined) include:

• Drive carefully at night through forest areas.

• Retain and protect stands of native vegetation, especially those with hollow-bearing trees.

• Retain hollow-bearing trees as well as large, mature trees that will provide hollows in the future.

• Limit the use of pesticides used in suitable native habitat.

References:

Department of Environment and Conservation (NSW) (2004) Recovery Plan for *Randia moorei* Spiny Gardenia. NSW DEC, Sydney.

Garnett, S.T. and Crowley, G.M. (2000) The Action Plan for Australian Birds 2000. Environment Australia, Canberra.

Kavanagh, R.P. and Murray, M. (1996) Home range, habitat and behaviour of the Masked Owl *Tyto novaehollandiae* near Newcastle, New South Wales. Emu 96: 250-257.

Newton, I., Kavanagh, R., Olson, J. and Taylor, I. (eds.) (2002) Ecology and Conservation of Owls. CSIRO Publishing. Collingwood Victoria.

Button Wrinklewort (*Rutidosis leptorrhynchoides*)

Conservation status in NSW: Endangered

National conservation status: Endangered

This exists in the Majors Creek State Conservation Area and on at least one site on our property, all within twenty-five metres of the Majors Creek waterway, on areas disturbed by entry roads and previous orchard areas. Any drop in the water table or change in the pH of ground water may mean the loss of this species, as it appears particularly sensitive to any changes in pH of the soil or water.

NSW Government recovery strategies for this species include:

• Protect known populations from changes to land use.

• Do not undertake road works, pasture modification or other changes in land use that may affect populations.

• Limit grazing on sites where populations occur; light grazing by sheep, particularly after the peak flowering season, appears to be tolerated (following the removal of domestic stock, significant recruitment has been observed in some populations).

• Do not increase grazing pressures on sites where populations persist – reduce grazing pressures where possible.

• Undertake weed control in and adjacent to populations, taking care to spray or dig out only target weeds.

• Undertake burning trials on sites to establish a suitable biomass control regime.

• Mark sites and potential habitat onto maps (of the farm, shire, region, etc) used for planning (e.g. road works, residential and infrastructure developments, remnant protection, rehabilitation).

• Search for new populations in potential habitat.

References:

ACT Government (1997) Button Wrinklewort (*Rutidosis leptorrhynchoides*): An endangered species. Action Plan No. 8. Environment ACT.

ACT Government (1997) Natural Temperate Grassland: an endangered ecological community. Action Plan No.1. Environment ACT.

Briggs, J.D. and Leigh, J.H. (1990) Delineation of Important Habitats of Threatened Plant Species in South-eastern New South Wales. Research Report to the Australian Heritage Commission. CSIRO, Canberra.

Eddy, D. (2002). Managing Native Grassland: a guide to management for conservation, production and landscape protection. World Wide Fund for Nature Australia. Sydney, NSW.

Eddy, D., Mallinson, D., Rehwinkel, R and Sharp. S. (1998) Grassland Flora: a field guide for the Southern Tablelands (NSW & ACT). Environment ACT, NSW National Parks and Wildlife Service, World Wide Fund for Nature Australia, Australian National Botanic Gardens, Natural Heritage Trust. Canberra, ACT.

Harden, G.J. (ed.) (1992) Flora of New South Wales Vol. 3. UNSW Press, Kensington, NSW.

Humphries, R. K. and Webster, A. (1992) Action Statement No. 28, *Rutidosis leptorrhynchoides*. Victorian Department of Natural Resources and Environment, Melbourne.

Marriott, N. and J. (1998) Grassland Plants of South-Eastern Australia. Bloomings Books, Melbourne.

Grey Deua Pomaderris *(Pomaderris gilmourii var. cana*)

Status: Vulnerable

This was believed to exist in the Majors Creek State Conservation Area, however it is now thought that the identification may be inaccurate. Further work is necessary at flowering time to determine the correct species. *Pomaderris gilmourii var. cana* however does exist further downstream in the Majors Creek, Araluen and Deua River catchment area in the Deua National Park, and it is reasonable to assume that the species may also exist further up the catchment in similar conditions.

As with all endangered species in this region, the onus should be on the developer to survey the area for any endangered species that have been identified as occurring in the region.

For both the Deua populations and any Majors Creek populations any drop in the water table may threaten colonies of this species and any change in the pH of local groundwater would mean the death of any existing pomaderris plants as well as the failure of any seeds to germinate. Pomaderris, like many native shrubs, is extremely sensitive to any rise in alkalinity that would be caused by any leakage of xanthates or

by water contaminated by cement-treated tailings for a minimum of two kilometres downstream.

Araluen Zieria (*Zieria adenophora*)

Conservation status in NSW: Critically Endangered

National conservation status: Endangered

Araluen Zieria grows in shrubland on a rocky granite hillside on the slopes of the Araluen valley. The species is currently documented only from a single population of less than 200 plants near Araluen south of Braidwood, however at least two other sites exist on the property of Sullivan and French and it is expected that they exist on similar sites in the unsurveyed portion of the Majors Creek Gorge. All sites for this species are in the Majors Creek-Araluen River **c**atchment; all in areas which experienced severe die back in the 2002-2009 drought, although new plants have grown speedily since the good rain of the 2010-2011 season. It appears that with minimal disturbance, protection from grazing and adequate water, this species will thrive. All known naturally occurring plants of this species can be expected to suffer, possibly catastrophically, with any further diminution of ground water, or by bushfire exacerbated by die back due to the lowering of the water table.

When Jackie French trialled growing *Zieria adenophera* here they failed to grow in even neutral soil, nor did bushes survive when planted near a concrete wall, where leaching causes the soil to be slightly alkaline or neutral. The existing acidity of the soil downstream of the proposed development is essential to the survival of the naturally occurring form of this species. It is impossible to ensure such acidity given the quantity of xanthates needed for processing and the use of large amounts of concrete made from alkaline cement mixed with tailings filling up the tunnels of the mine upon completion of extraction.

NSW government strategies for survival of this species (with those strategies particularly relevant to the local situation underlined) include:

• Ensure that Rural Fire Service is aware of the species and the possible threat to their continued existence from fire, including from prescribed fuel reduction burns.

• Maintain fences to exclude goats from the population.

• Monitor the population for changes.

• DEC to negotiate with the DIPNR and the private land-owner for the long-term security for the site.

• Search appropriate habitat for more populations.

References:

Harden, G.J. (ed.) (2002) Flora of New South Wales Volume 2 Revised Edition. UNSW, Sydney.

NSW National Parks and Wildlife Service (2001) *Ziera adenophora* (a shrub) Recovery Plan. NSW NPWS, Hurstville NSW.

A Scientific Assessment of the Conservation Value of Monga and Buckenbowra Forests, NSW, Australia. Mackey,B.G., Stein, J.A., Stein, J.L. and Gilles, J.

(Note : The Major's Creek State Conservation Area and private nature reserves form a wildlife and flora corridor between the Monga and Deua National Parks.

http://www.publish.csiro.au/samples/euclid/eucs/KARTZO.htm

Araluen Valley Agricultural Producers &
Protectors of the Eco-System Coalition (AVAPPEC)
C/ - Robyn Clubb
Wisbeys Orchards
PB 2 Araluen Road
ARALUEN NSW 2622

11 April 2011

The Department of Planning
GPO Box 39
SYDNEY NSW 2001
ATTENTION: David Kitto

RE: Major Project Application: Dargues Reef Mine – Majors Creek

You may recall at our meeting held with the Department on 30 March 2011 that AVAPPEC raised concerns about the inadequate nature of the groundwater assessment undertaken by Cortona for this proposal.

After having received further independent advice, we table this letter reiterating our concerns in the strongest possible terms that the groundwater assessment undertaken by the proponent is significantly inadequate and in our considered view does not deliver in accordance the Director General's Requirements issued on 23 April 2010. Only two of the test bores were downhill and downstream of the Dargues Reef site, with results averaged with sites that could be expected not to yield such dramatic effects as a 10.6 metre fall in groundwater.

Independent investigations in the effects of ground water and surface water are still ongoing. As you are aware, valid data takes time to both collect and assess, and the past month has provided only enough time to contact

professionals and for their most cursory study, not for the detailed assessment that is necessary.

We ask that the proposal be referred back to the proponent, with a request that further data as detailed below be required before any accurate assessment can be made.

We also ask that an economic statement be prepared and included in any assessment. The industries below the proposed development generate more income and employment that that development, and plans for further development in the Araluen Valley are on hold while the threat of major groundwater loss and pollution exist.

More specifically, we assert that the proponent has not undertaken a '**detailed** assessment' (DoP terminology) of the groundwater, as required by NOW, DECCW and the Department itself, because it only had minimalist baseline data upon which to prepare a model. In our view the model is fundamentally flawed because the baseline data used in the model was unrepresentative, being just:

- Level (i.e. not quality) measurements only taken from 35 'open exploration holes' (note not dedicated monitoring bores) on two close occasions namely in February 2010 and April 2010; and
- Seven monitoring bores sampled only once in April 2010 (see p3-44 of groundwater report).
- The majority of sampling was done uphill or upstream of the testing area, thus rendering any impact study on the effects downstream of the proposed development invalid;
- In our view it is totally unacceptable for a model to be based on such tokenistic information, given that the model output is crucial to

assessing and quantifying the level of impacts on three levels of aquifers, about 30 human users of ground and surface water immediately downstream, more than 80 NSW jobs and income of over $7 million per annum, as well as rare and endangered species. AVAPPEC requests that the DoP not determine this project until satisfactory baseline groundwater data has been collected to enable a sufficiently robust model to be built.

A connection between the reolith aquifer and the aquifer in the granadiorite has been demonstrated in Cortona's paired bores DRWO1 and DRWBO2 and also DRWBO3 and DRWBO4. Ground water can extend to great depth in fractured granites such as that of the Dargues Reef area, as demonstrated in the Cooper Basin, SA. In the views of independent experts, the EA has not adequately assessed the effect of drawing down groundwater from the existing disused mine areas, nor on the potential affects of drawing out ground water from the proposed 500-600 metre mine. Further data is needed before any accurate hydrological assessment can be made on the effect on surface and groundwater on the residents, businesses and endangered species directly downstream.

It is worth noting, as outlined below, that two of the key agencies required the Environmental Assessment for the Cortona project to go to significant lengths with respect to groundwater assessment.

A. NSW Office of Water (1 April 2010 letter)

The NSW Office of Water stipulates the following EA requirements.
The EA must include, for the pre-, during, and post- development phases of the project the following:

• identification of surrounding water users and any groundwater dependent ecosystems. (Note: The present EA is incomplete in that while it has identified some users of water downstream, it has neglected to identify or

count the majority of water users in the 2 km radius of the mine, nor water license holders 1-6 km downstream);

• **detailed explanation of potential groundwater volume, piezometric level, water table heights and the direction of flow and quality, through mine life and projections into the post-mine period, any identified connected water sources impacted by mining.** (Note: according to independent experts there is insufficient evidence to substantiate the proponent's claims on this matter)**;**

• **detailed explanation of groundwater drawdown or other impacts upon connected groundwaters**

• **explanation of the site water balance, including any changes to water balance inputs from rainfall runoff, additional supplies, dewatering requirements and/or groundwater seepage;**

• detailed description of any proposed water supply system utilising groundwater as a source, and assessment of current licensing arrangements against this;

• **detailed analysis of the impacts of dewatering if required for the project, identifying the magnitude and duration of pumping, the real extent of water level drawdown, the likely quality of extracted groundwater, alterations to site water balance, and the monitoring and reporting protocols to be adopted to meet licensing requirements;**

• measures to prevent contamination of the groundwater (Note: while this in covered in the EA no substantiating detail has been given); and

• no impact on adjacent licensed water users, basic landholder rights, minimum base flows, or groundwater dependent ecosystems (Note: the EA neglects to mention the majority of water users in the surrounding area or assess the effects on their continued water use);

B. Department of Environment, Climate Change & Water (1 April 2010 letter)

The DECCW stipulates that the EA should fully assess impacts including the following:

• Groundwater quality issues including the alteration of the groundwater recharge rates and possible contamination of groundwater from the recycled water scheme;

• Altered flow and drainage regimes and subsequent effects on the dynamics and recharge ability of groundwater aquifers; and long-term effects on stability and integrity of aquifers; and

• Impacts of altered flow and drainage regimes impacting on receiving waters including impact on creek morphology and ecosystem implications including aquatic ecology, riparian vegetation and weed distribution.

It is clear in our view and that of our independent experts that Cortona has adopted a simplistic and inadequate approach to groundwater assessment and it should be required to redo the work to a standard that satisfies the key water regulators.

The EA (See p 3-44 Groundwater Study) acknowledges that 'no long term monitoring had not been undertaken' yet goes on to make significant, unsubstantiated assumptions about water levels in bores being 'representative of long term average (steady state)' calibrations. The report admits however that 'there was no long term groundwater monitoring data on which to calibrate the model to transient conditions and hence to obtain calibration values for specific yield (Sy) and specific storage (Ss) of the aquifers' (p 3-48 Groundwater Study). Furthermore, p 3-58 of the Study infers caution when it states:

'The Dargues Reef model has been constructed on limited data and use of the model predictions should be treated as such'.

It goes on to say because there was no long term groundwater monitoring data .. *'there is some uncertainty with respect to the predicted flow to the Dargues Reef Mine and the former workings'* (p3 -58).

The views of AVPPEC regarding the inadequacy of the groundwater assessment are also supported by other key stakeholders as listed below:

A. Southern Rivers Catchment Management Authority (SRCMA):
   - **"The MUSIC modeling does not provide an accurate assessment of the catchment hydrogeology. Default, one off figures have been used with minimal monitoring. In fractured rock geology, high quality monitoring data is required to model the predictability of the hydrogeology"** (20/12/10 letter to DEWHA, Canberra);
   - **"SRCMA would argue that it is the proponent's role to ensure that this (i.e. adequate long term monitoring data) is assessed, as per the DGs requirement for the project"** (31/1/2011 letter to DoP); and
   - SRCMA does not support the project because it does not adequately address its concerns.

B. Palerang Council:
   - Is concerned that the groundwater modeling 'has not been satisfactorily undertaken', including a lack of 'critical data such as up-to-date rainfall data that reflects drought and climate change' (letter to DoP dated 1/2/11);

The proponent knows that the groundwater model is potentially suspect, conceding that after two years of operation the model will be reviewed 'and in the event that the actual impacts are significantly greater than those presented in AGE (2010) then the proponent would consult with NOW… and

develop appropriate management and mitigation measures to address those impacts" (EA p 4-80).

AVPPEC believes that adoption of the precautionary principle would preclude the Department of Planning from contemplating such an approach as proposed by Cortona. It is, after all, akin to shutting the door after the horse has bolted.

We thank you for your willingness to understand and appreciate our concerns and we look forward to a favourable response to our request, namely that the DoP will not determine this project until satisfactory baseline groundwater data has been collected to enable a sufficiently robust model to be built.

Yours sincerely

Ms Jackie French Ms Robyn Clubb

For the Araluen Valley Producers and Protectors of the Eco-System Coalition (AVPPEC)

Environmental Planning Officer
Regional Projects
NSW Department of Planning
GPO Box 39
Sydney NSW 2001

Re: Dargues Reef Gold Project, Major Project No10_0054

RECOMMENDATIONS

1. In assessing this project, the NSW Department of Planning should seek an independent appraisal of the mineral assets that are used to justify mineral extraction to a proposed depth in excess of 500 metres. I understand that the Proponent has used a consultant who has not used the Australasian Joint Ore Reserves Committee (JORC) Code standard of reporting. Information which helps to address risk is just as relevant to government agencies assessing development proposals as it is to the financial market and other stakeholders. Who is going to pay compensation for environmental damage in the event of mine failure?

> "High quality reporting is particularly important for the mining industry because, unlike many other industries, knowledge of its fundamental assets is always imperfect", said CRIRSCO Co-Chairman, Pat Stephenson. "This is why mineral resources and mineral reserves are estimates, not precise measurements. Given this imperfect but inevitable state of affairs, it is essential that the industry communicates the risks associated with investment effectively and transparently in order to earn the level of trust necessary to underpin its activities".

2. In no circumstances should polluted water from the historical mines be used to return water to the Majors Creek system to compensate for groundwater extraction. All offsets should come out of the proposed harvestable rights dams, or the entire project should be reduced accordingly. There has been an assumption that the harvestable right dams would not be used to supply any operational water, and that they would only be used to supply the return of flows to Majors Creek. There is no water quality analysis for the historical mines provided in the EIA.

3. The RATES surface water modelling does not include the years from 2002 to the 2010. Given that some of these years were severe drought years, why weren't they included? The RATES modelling should be redone using data including 2002 to the present.

4. Groundwater modelling has been done using borehole and other data currently available and requires a degree of subjectivity in populating intermediate grid cells with values. Is there any chance of getting a best-case, worst-case set of models generated which give an indication of potential groundwater drawdown? An independent opinion on this very important matter is required for the affected or potentially affected downstream users.

Richard Larson
BSc, Geology
PO Box 64
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April 14, 2011

George Mobayed - Dargues Reef mining

From: "Peter Fawcett-Dawson" <psfd@aliceadsl.fr>
To: <plan_comment@planning.nsw.gov.au>
Date: 16/04/2011 7:02 AM
Subject: Dargues Reef mining

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 kilometer 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.
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.
I also request that a detailed assessment be made of heritage and Indigenous sites 2-6 kimometres down stream from the proposed mone site and the tailings dam.

Monsieur et Madame Fawcett-Dawson

Monsieur Peter Fawcett-Dawson: Licence ès Science (B.Sc[Hons] Ecologie;PGDip; MBES

Madame Sarah V. Fawcett-Dawson: Licence ès Lettres (BA[Hons] ALA; Maîtrise Bibliothécaire