Queensland Government

Assessment Report under the

Environmental Protection Act 1994

on the

Environmental Impact Statement

for the

Cloncurry Copper Project

proposed by

Exco Resources Pty Ltd

28 June 2010

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1 Introduction

This report provides an evaluation of the Environmental Impact Statement (EIS) process pursuant to Chapter 3 of the *Environmental Protection Act 1994* (EP Act) for the Cloncurry Copper Project proposed by Exco Resources Limited (Exco). The Department of Environment and Resource Management (DERM), formerly the Environmental Protection Agency (EPA), as the administering authority of the EP Act, coordinated the EIS process. This assessment report has been prepared pursuant to Sections 58 and 59 of the EP Act.

The objective of this assessment report is to:

(a) addres the adequacy of the EIS in addressing the final terms of reference (TOR), and the adequacy of the draft environmental management plan (EM plan);

(b) summarise key issues associated with the potential adverse and beneficial environmental, economic and social impacts of the Cloncurry Copper Project, and the management, monitoring, planning and other measures proposed to minimise any adverse environmental impacts of the project; and

(c) make recommendations on the suitability of the project to proceed and where so, to make recommendations on necessary conditions for any approval required for the project.

Section 58 of the EP Act lists the criteria that the DERM must consider when preparing an EIS assessment report, while section 59 of the Act states what the content must be.

In summary, this assessment report assesses the adequacy of the submitted EIS in addressing the TOR, and the suitability of the draft EM plan. It also discusses in some detail those issues of particular concern that were either not resolved or require specific conditions for the project to proceed.

The giving of this EIS assessment report to the proponent completes the EIS process under the EP Act.

1.1 Project details

The Cloncurry Copper Project (the Project) is located in northwest Queensland within the Cloncurry Shire and comprises two separate mining areas; one at Mount Margaret and the other at Monakoff. The Mount Margret project area is approximately 39 kilometres northeast of Cloncurry and spans an area of approximately 1,836 hectares including existing Mining Lease 90157. The Monakoff project area is located approximately 20 kilometres northeast of Cloncurry and is 646 hectares in size, including the existing Monakoff Mining Lease (7122).

The copper-gold resource estimate for the project totals 43.6 million tonnes. The average copper grade of the ore is 0.85% and gold 0.24 grams a tonne. In addition there are significant quantities of magnetite within this ore that may be economically viable to recover.

The Project would consist of five open cut pits. The Mount Margaret group of deposits consists of an iron-oxide-copper-gold mineralisation system and will be developed into three pits; E1 North, E1 East and E1 South. The Monakoff group of deposits also consists of an iron-oxide-copper-gold mineralisation system and contains two prospective pits; Monakoff and Monakoff East. The ore will be mined with diesel-powered earthmoving equipment using conventional open cut, drill, and blast/load and haul methods. Once full scale mining operations have commenced, open cut mining will occur on a continuous basis 24 hours a day, 7 days a week

for 52 weeks a year. The life of mine is currently estimated at 8 years and the life of the Project as a whole is currently estimated to be approximately 10 years. Ore will be extracted from the deposits at a combined approximate rate of 3 million tonnes per annum. Ore from the Monakoff project area will be temporarily stockpiled near the pits and then trucked to the Run of Mine stockpile area at Mount Margaret via an 18km haul road connecting the two project areas. Ore from the Mount Margaret pits will also be truck dumped at the Mount Margaret Run of Mine stockpile area, which will allow for separation of ore types and grades where required.

The submitted EIS identified following 3 processing options:

- Option 1 - a 3 Million tonnes a year concentrating processing plant located on the Mount Margaret project area which would produce copper-gold concentrate.
- Option 2 - a 3 Million tonnes a year concentrating processing plant located on the Mount Margaret project area which would produce copper-gold concentrate and a magnetite concentrate; or
- Option 3 - hauling of ore off the Project site and delivery to the nearby Ernest Henry Mine (EHM) (owned by Xstrata) concentrator for processing. Under this option, no processing of ore would occur on the Project site.

The major infrastructure to be developed regardless of the processing option selected, includes:

- open cut pits;
- waste rock dumps;
- access roads, site roads and haul roads;
- stormwater dams and sediment ponds;
- run of Mine pads; and
- offices, ablutions and sewage treatment facilities.

Additional major infrastructure to be developed if Options 1 or 2 (on-site processing of ore) is selected includes:

- tailings storage facility;
- processing plant;
- process water dams;
- accommodation camp;
- powerlines;
- water pipelines;
- workshops, warehouses and offices;
- telecommunications infrastructure; and
- additional stormwater dams and sediment ponds.

A main access road for the Project will be constructed from Zingari Road to the Mount Margaret project area over a distance of 8 km. In addition, an existing 9 km track coming off Fisher Creek Road that, in turn, comes off the A2/A6 Highway between Mount Isa and Townsville, will be upgraded to provide access to the Monakoff project areas for light vehicles only.

There are several infrastructure corridors that will be associated with the Project. The submitted EIS proposed that these corridors will be covered by Mining Leases (Transport) and will include:

- A haul road from the Run of Mine pad at the Mount Margaret Project area running in a southerly direction to connect with the Monakoff East pit and Run of Mine stockpile pad. The haul road will then continue in a westerly direction to connect to the main Monakoff pit and Run of Mine stockpile;

- A water pipeline corridor which will connect the Mount Margaret Project area to the nearby Lake Julius/Sun Water Pipeline at Ernst Henry Mine (only required for processing options 1 and 2);
- A power corridor from the Ernest Henry sub-station to the processing plant site and accommodation camp (only required for processing options 1 and 2); and
- A haul road from the Mount Margaret Project area to the nearby Ernest Henry Mine for haulage of ore under processing option 3.

Processing Options

Under Options 1 or 2 (on-site processing), a concentrator will be constructed at the Mount Margaret project area for the processing of the ore (Figure 3). The processing plant will have the capacity to treat up to 3 Mtpa of ore to produce copper/gold concentrate and potentially magnetite concentrate (Option 2 only). The processing facility will consist of a conventional concentrator with crushing, grinding, flotation, dewatering, concentrate handling and reagent makeup circuits. For Option 2, magnetite will be recovered through magnetic separation. At full production the Project will generate approximately 130,000 tonnes per annum (tpa) of copper/gold concentrate and approximately 900,000 tpa of magnetite concentrate (Option 2 only). This equates to 360t of copper/gold concentrate per day and 2,630t of magnetite concentrate per day. The final copper / gold concentrate will be stored in a partially enclosed shed, prior to being transported off site.

Under Options 1 and 2, the concentrates will be transported off site by covered road trains to a contractor storage facility / rail yard in Cloncurry or to Mt Isa. From Cloncurry it will be railed to the Port of Townsville for export via existing concentrate storage and shipping facilities.

For processing Options 1 or 2, an impoundment style Tailings Storage Facility will be established on the Mount Margaret Project area just to the south of the processing area. Should processing Option 1 proceed, the Tailings Storage Facility design will need to account for the disposal of magnetite in the tailings stream and therefore the Tailings Storage Facility design for this processing option would be slightly larger than if magnetite was removed from the tailings (Option 2).

Under Option 3, there will be no processing of ore on the Project site and therefore no Tailings Storage Facility is required. Ore from both project areas will be stockpiled and transported by haul truck to Xstrata's Ernst Henry Mine via an 8km haul road. The ore will be processed through the already approved and constructed concentrator at Ernst Henry Mine.

Water Supply

If Options 1 or 2 proceed, the Project will require an external source of water for the first two years during construction and early operations. This initial water supply is expected to come from the Lake Julius – Ernest Henry pipeline. Once the Project becomes fully operational water will be sourced from open pit dewatering, excess water from the tailings storage facility, reclaimed water from stormwater ponds, and water recycled through the processing circuit. Potable water will be sourced from the Lake Julius – Ernest Henry pipeline and will be treated on site prior to supply.

If Option 3 proceeds, initial water will be supplied via the Lake Julius – Ernest Henry pipeline and once the open pits are developed water will exclusively be sourced from open pit dewatering.

Power Supply

Should Option 1 or 2 proceed, the power supply for the Project will likely be sourced from the CS Energy, Mica Creek (Mount Isa) gas fired power station. Electricity will be transmitted to the Project site by Ergon Energy, via the existing transmission system to Ernest Henry Mine and new power transmission lines from Ernest Henry to the Mount Margaret plant site and accommodation camp. The installed annual power requirement for the Project under Options 1 and 2 will be approximately 17 Megawatts or 23 Megawatts respectively, with an average continuous draw of approximately 11 Megawatts or 15 Megawatts.

Construction

If Option 1 or 2 is selected, the construction phase is anticipated to begin in the fourth quarter of 2010, and finish in the third quarter of 2011. Construction will take place in several stages that will occur simultaneously at some times and consecutively at other times. The stages of construction are as follows:

- civil & earthworks;
- concrete;
- structural steel;
- mechanical & piping;
- electrical & instrumentation; and
- cabling.

The main construction phase will be followed by a short commissioning phase of approximately two months which will bring the new infrastructure and mine into operation. The commissioning phase is likely to commence at the end of 2nd quarter 2011 and be completed mid way through 3rd quarter 2011. The majority of the processing plant will be constructed during the structural steel phase, and will be completed in the electrical and instrumentation phase. Once the processing plant has been commissioned, ore processing will commence. This is currently proposed during 2011.

Operations

The estimated mine life for the Cloncurry Copper Project is approximately 8 years, with the Project life 10 years in total. It is expected that mining will cease before mine closure, as stockpile ore will continue to be processed after the cessation of mining the pits. The marginal mineral concentrations contained in the ore including iron, cobalt, and uranium may also be recovered as by-products if economically viable and in the case of uranium if legislation changes and recovery of this metal were to be permitted. No other known resources will be sterilised by the mining activities.

1.2 Approvals

Table 1, the following approvals are required for the Cloncurry Copper project:

Approvals	Legislation (Responsible authority)
Environmental authority	*Environmental Protection Act 1994* – Chapter 5 Environmental Authority (Department of Environment and Resource Management)
Section 33 and 50 and 62 approvals	*Transport Infrastructure Act 1994* (Department of Transport and Main Roads)

1.3 Impact assessment process

1.3.1 The EIS process

The EIS for the Cloncurry Copper Project was conducted under Chapter 3 of the EP Act. The EIS process was initiated by Australasian Resource Consultants Pty Ltd (AARC) on behalf of Exco on 7 July 2008 by application to the former EPA to prepare a voluntary EIS under section 70 of the EP Act. The EPA approved the application to undertake a Voluntary EIS on 8 July 2008.

The EPA issued a notice of publication of the draft TOR to Exco on 6 August 2009. EPA placed a public notice on its website on 8 August 2008 and advertised in the Courier-Mail on 9 August 2008 and the Mount Isa North West Star on 11 August 2008. Submissions on the draft TOR closed on 23 September 2008.

Eleven submissions were received by DERM on the draft TOR within the comment period and one submission was also received after the comment period. These comments, together with one from the former EPA, were forwarded to Exco on 7 October 2008. DERM considered all comments received on the draft TOR and Exco's response prior to issuing the final TOR on 15 December 2008.

AARC on behalf of Exco submitted the draft EIS on 14 September 2009 to the now Department of Environment and Resource Management (DERM) for review prior to public notification. DERM compared the draft EIS to the final TOR. On 23 October 2009, DERM issued to Exco a notice of decision to proceed with the draft EIS. The public notification and submission period was set at 30 business days.

A public notice was placed on DERM's website on 26 October 2009 and advertised in the Mount Isa North West Star on 30 October 2009 and the Courier Mail on 31 October 2009. The draft EIS was available for public comment from 2 November 2009 to 14 December 2009. Exco also provided copies of the public notice of the draft EIS to affected and interested persons.

Seven submissions were received by DERM on the draft EIS within the submission period. The submissions were all from State and local government departments and agencies. All submissions were accepted in accordance with section 55 of the EP Act. The submissions, together with a submission from the DERM were forwarded to Exco on 13 January 2010 for consideration and response. Exco provided a response to submissions on 10 February 2010. Copies of the response to submissions were distributed for their review to those stakeholders who had made a submission on the draft EIS.

It was DERM's view that the Exco response to submissions did not adequately address the DERM submission on the draft EIS. Consequently, DERM wrote to Exco on 10 March 2010 requiring further information. To allow Exco to respond, DERM extended the s56 period to 9 April 2010. On 7 April 2010 Exco requested further time to respond to DERM's request. The period was extended to 14 May 2010. On 16 April 2010 and 24 April 2010, Exco provided the further information requested. In addition, DERM clarified its requirements additional to the EIS process on 19 April 2010.

DERM decided under s56A of the EP Act on 14 May 2010 that the submitted EIS should proceed under Division 5 (EIS assessment report) and Division 6 (Completion of process) of the EP Act. A notice of the decision to allow the submitted EIS to proceed was issued to Exco on 14 May 2010.

DERM, in the preparation of this EIS assessment report, considered submissions and comments from members of the advisory body (see section 1.3.2 for advisory body constituents) and other interested parties made at all stages of the EIS process. This EIS assessment report will be available on DERM's website (www.derm.qld.gov.au).

1.3.2 Consultation program

Public consultation

In addition to the statutory requirements for public notification of the TOR and draft EIS and identification of interested and affected parties, the proponent undertook community consultation with affected landowners and government agencies during the public submission period of the draft EIS. The proponent also circulated information on the Cloncurry Copper Project and the EIS process to the community.

Advisory Body

DERM invited the following organisations to assist in the assessment of the TOR and EIS by participating as members of the advisory body for the Cloncurry Copper Project:

- Department of Employment, Economic Development and Innovation (DEEDI)
- Department of Communities (DOC);
- Department of Community Safety (DCS);
- Queensland Treasury (QT);
- Queensland Police Service (QPS);
- Cloncurry Shire Council (CSC);
- Queensland Health (QH);
- Department of Transport and Main Roads (DTMR);

- Department of Infrastructure and Planning (DIP);
- Southern Gulf Catchments Limited (SGC); and
- Queensland Conservation Council (QCC).

An advisory body briefing was held in Brisbane on 10 November 2009 for the project during the EIS public submission period.

Public notification

In accordance with the statutory requirements, advertisements were placed in The Courier-Mail and the Mount Isa North West Star to notify the availability of the draft TOR and draft EIS for review and public comment as stated in Section 1.3.1 above. In addition, notices advising the availability of the draft TOR and the draft EIS for public comment were displayed on the DERM website.

The draft TOR and draft EIS were placed on public display at the following locations during their respective public comment and submission periods:

- DERM Website (draft TOR and IAS only);
- DERM Customer Service Centre, 160 Ann Street, Brisbane;
- DERM Mt Isa Office, cnr Camooweal and Mary Streets, Mt Isa;
- AustralAsian Resource Consultants, Suite 5B, 1 Swann Road, Taringa; and
- Cloncurry Municipal Library, 37-39 Scarr Street, Cloncurry.

1.3.3 Environment Protection and Biodiversity Conservation Act 1999

Exco and AARC determined that the Project would be unlikely to impact on matters of National Environmental Significance (as described in the *Environment Protection and Biodiversity Conservation Act 1999*) and therefore did not refer the project to the Commonwealth Department of Environment, Water, Heritage and the Arts. Consequently, the Queensland EIS process was not accredited for the assessment of the Project under Part 8 of the *Environment Protection and Biodiversity Conservation Act 1999*.

2 Matters considered in the EIS assessment report

Section 58 of the EP Act requires, when preparing this EIS assessment report, the consideration of the following matters:

(a) the final TOR for the EIS;

(b) the submitted EIS;

(c) all properly made submissions and any other submissions accepted by the chief executive;

(d) the standard criteria;

(e) another matter prescribed under a regulation.

These matters are addressed in the following subsections.

2.1 The final TOR

The final TOR document, issued on 15 December 2008, was considered when preparing this EIS assessment report. While the TOR were written to include all the major issues associated with the project that were required to be addressed in the EIS, they were not exhaustive, nor were they to be interpreted as excluding all other matters from consideration.

Where matters outside of those listed in the final TOR were addressed in the EIS, those matters have been considered when preparing this EIS assessment report.

2.2 The submitted EIS

The "submitted EIS" was considered when preparing this EIS assessment report. The "submitted EIS" comprised the:

(a) draft EIS that was publicly released on 26 August 2009;

(b) the response to submissions (supplementary report) received by the DERM on 10 February 2010 that was provided to relevant advisory body members; and

(c) further 'requested information' was received from Exco on 16 April 2010 and 27 April 2010.

2.3 Properly made submissions

The DERM received a total of seven submissions on the submitted EIS, all of which were accepted under section 55 of the EP Act. In addition, there has been correspondence from stakeholders regarding the proponent's response to submissions on the EIS and supplementary information. All submissions and other comments made by stakeholders on the EIS documents were considered when preparing this EIS assessment report. Submissions were received from the following stakeholders:

- Department of Employment, Economic Development and Innovation
- Department of Transport and Main Roads
- Department of Infrastructure and Planning
- Department of Infrastructure and Planning
- Department of Communities
- Department of Community Safety
- Queensland Police Service

- Department of Environment and Resource Management

2.4 The standard criteria

Section 58 of the EP Act requires that, among other matters, the standard criteria listed in Schedule 3 of the EP Act must be considered when preparing the EIS assessment report. The standard criteria are:

(a) the principles of ecologically sustainable development as set out in the 'National Strategy for Ecologically Sustainable Development'*; and*
(b) any applicable environmental protection policy; and
(c) any applicable Commonwealth, State or local government plans, standards, agreements or requirements; and
(d) any applicable environmental impact study, assessment or report; and
(e) the character, resilience and values of the receiving environment; and
(f) all submissions made by the applicant and submitters; and
(g) the best practice environmental management for activities under any relevant instrument, or proposed instrument, as follows—
(i) an environmental authority;
(ii) a transitional environmental program;
(iii) an environmental protection order;
(iv) a disposal permit;
(v) a development approval; and
(h) the financial implications of the requirements under an instrument, or proposed instrument, mentioned in paragraph (g) as they would relate to the type of activity or industry carried out, or proposed to be carried out, under the instrument; and
(i) the public interest; and
(j) any applicable site management plan; and
(k) any relevant integrated environmental management system or proposed integrated environmental management system; and
(l) any other matter prescribed under a regulation.

The DERM has considered the standard criteria when assessing the project.

2.5 Prescribed matters

In addition, section 58 of the EP Act requires that the following prescribed matters, under the Environmental Protection Regulation 2008, are considered when making an environmental management decision for this project:

- Section 51, matters to be considered for environmental management decisions;
- Section 52, conditions to be considered for environmental management decisions;
- Section 53, matters to be considered for decisions imposing monitoring conditions;
- Section 55, release of water or waste to land;
- Section 56, release of water, other than stormwater, to surface water; and
- Section 57, release of stormwater.

3 Adequacy of the EIS in addressing the TOR

The submitted EIS adequately addresses the matters described in the TOR. This section of the EIS assessment report discusses the main issues and associated commitments by the proponent, and makes recommendations about matters to be addressed in an amended EM plan that would need to be submitted for the project. Conditions for inclusion in an Environmental Authority have not been recommended. Conditions will be prepared for the project once the existing EM plan has been amended to include the recommendations of this assessment report and submitted to the administering authority.

The key matters addressed in this report concerning the project are: the project description; land; waste management; water resources; air; noise and vibration; nature conservation; transport and social. All other issues have been adequately addressed in the submitted EIS and will not be discussed further.

3.1.1 Project description

The submitted EIS adequately addressed the TOR in regard to project description. The submitted EIS comprised the following project description.

Ore processing options

Initially, the project had three options for the processing of mined ore.

- Option 1 - a 3 Million tonnes a year concentrating processing plant located on the Mount Margaret project area which would produce copper-gold concentrate;
- Option 2 - a 3 Million tonnes a year concentrating processing plant located on the Mount Margaret project area which would produce copper-gold concentrate and a magnetite concentrate; or
- Option 3 - hauling of ore off the Project site and delivery to the nearby Ernest Henry Mine (EHM) (owned by Xstrata) concentrator for processing. Under this option, no processing of ore would occur on the Project site.

In the submitted EIS, ore processing option 3 was inadequately described and the potential impacts associated with processing at EHM were not adequately addressed. A more detailed and illustrated assessment was requested for the processing option at EHM, including:

- quantified inputs and outputs for processing (e.g. chemical composition, particulates, metals, effluent temperature and pH);
- assessment of the potential impacts associated with processing, emissions and tailings management; and
- the measures to be implemented to mitigate all identified impacts during all stages of construction and operation of the project.

Subsequently, Exco confirmed that it is not seeking approval for the processing to be carried out on the EHM site. Exco has advised in correspondence during the EIS process that option 2 has been selected and the processing of ore will be undertaken on the mine site at Mount Margaret to produce both copper and magnetite concentrates. The processing of ore to concentrates at Mount Margaret is described in detail as well as the potential environmental impacts and mitigating strategies.

In the future Exco may wish to consider the option of processing ore through the Ernest Henry mine plant (option 3). However, this would be contingent on Xstrata Copper seeking and acquiring the statutory approvals for the processing of Cloncurry Copper Project ores through Ernest Henry mine plant. As the option of treating ore through Ernest Henry mine plant has not been adequately assessed though the EIS process, this option will be excluded from the EM plan and the Environmental Authority for the current Mining Lease Application.

Option 1, which proposed to processes ore on the Mount Margaret site, but does not include magnetite recovery, has been adequately addressed by the submitted EIS and can be undertaken by the proponent. Option 2 gives Exco flexibility in future processing on site and represents the greatest disturbance for the project. This assessment report has primarily addressed option 2 as the Exco has advised that the project involves both ore processing and magnetite recovery.

Transport options for concentrate and magnetite

Initially the submitted EIS considered the use of existing loading operations.

The following transport alternatives have been proposed and assessed for Copper/Gold concentrate:

- Copper/Gold Alternative 1 – Triple road trains will take copper/gold concentrates from the Mount Margaret project area to an existing storage facility in Cloncurry before being railed to Townsville and unloaded at existing facilities at Townsville's port.
- Copper/Gold Alternative 2 – Triple road trains will take copper/gold concentrates from the Mount Margaret project area to the Yurbi rail loading facility before being railed to Townsville and unloaded at existing facilities at Townsville's port.
- Copper/Gold Alternative 3 – Triple road trains will take the copper/gold concentrates to Mt Isa for smelting.

The submitted EIS identified two transport routes that were described and assessed for the magnetite concentrate distribution:

- Magnetite Alternative 1 – the product could be trucked to Cloncurry and transferred to rail for potential coal washing customers in the Bowen basin. The market for this product is limited to approximately 100,000 tonnes per annum.
- Magnetite Alternative 2 – the product may be trucked to Cloncurry and transferred to rail bound for Townsville and transfer to ship for overseas markets. This option offers the best outcome for the Project in terms of return on investment and presents the possibility of magnetite concentrate becoming a co-product of the mine rather than a by-product.

No information has been provided to demonstrate that the use of other mining infrastructure (from other mining operators) is feasible. Even though the supplementary EIS identified that the use of third party infrastructure is outside the boundaries of the EIS, the mining operation is contingent on the owner/operators of that infrastructure acquiring relevant approvals. DERM could not approve the use of other licensed sites without the required information which explains the feasibility of using the infrastructure. This includes all of the following options:

- Option 3 to process at Ernest Henry Mine thereby affecting the tailings storage facility, evaporation dam and process plant at the EHM site.
- Option 1 & 2 could both involve transportation and refining at other licensed operations (Yurbi rail link to transport concentrate to Townsville or the transport of copper concentrate to Mount Isa Mines for refining).

The submitted EIS has now resolved the options for the project. Exco has advised that concentrates produced by the Project will be transported by rail to Townsville and/or Mt Isa. The company's preference is for concentrates to be loaded onto rail cars at the International Energy Services bulk handling facility on the outskirts of Cloncurry.

Exco may, in the future, consider the option of loading concentrates onto rail at the Yurbi facility owned by BHP Billiton. However, this would be contingent on BHP Billiton seeking and acquiring the requisite approvals for the loading of Cloncurry Copper Project concentrates at Yurbi. This option was not assessed in the submitted EIS and the proposal of utilising loading facilities at Yurbi will be excluded from the EM plan and the Environmental Authority for the current Mining Lease Application.

Conclusions and recommendations

The submitted EIS has adequately assessed both ore processing options 1 and 2 and Exco have informed DERM that the project is likely to proceed with option 2 covering processing of ore and magnetite recovery on the mine site. The information required to adequately assess option 3 has not been provided and as advised by Exco is no longer considered at this stage of the approvals process.

The EM plan for the project is required to be amended to remove the ore processing option 3 and the use of the Yurbi facility to transport concentrate.

In addition, the tenures listed in the current EM plan need to be updated and correct at the time of EM plan submission.

3.1.2 Land

The submitted EIS adequately addressed the TOR in regard to land matters. However, there are some matters that require further detail. These matters are discussed further in the this section.

The submitted EIS made the following findings:

The current land use of the Project site is low intensity cattle grazing and mineral exploration across a combination of Land Suitability Classes 3, 4 and 5. On closure and decommissioning of the Project, it is proposed to return the majority of disturbed land to a condition similar to the pre-existing land use of low intensity grazing or another agreed beneficial use.

The following mining disturbances, of approximately 480 hectares, will remain at the end of mine life:

- The mining voids which would remain as either a stock watering source or would be bunded or fenced to exclude cattle and some native wildlife.
- Some roads which would remain as private access roads upon written agreement with the landholder.
- Some water storage dams and sediment control ponds may remain to control runoff and reduce sediment loads from the rehabilitated waste rock dumps. These dams maybe made available for stock watering upon written agreement with the landholder.
- Waste rock dumps which would be rehabilitated to a land use of native habitat. Grazing pressure on rehabilitated waste rock dumps could result in reduced vegetation cover and increased erosion.
- The TSF which would be rehabilitated to a land use of native habitat. Grazing pressure on the rehabilitated TSF could result in reduced vegetation cover and increased erosion.
- The water pipeline and power transmission line will be retained on mine closure as this infrastructure may be of beneficial use to the region or future mining operations.
- Some infrastructure may remain on site for use by the landholder (with written agreement).

The land surrounding the Project is covered by pastoral leases and mining exploration permits or mining leases. There is also no land adjacent to or in the vicinity of the Project, currently used for urban development, recreation or tourism. There are currently no existing or potential land uses that might be incompatible with the final land uses proposed for the Project site.

The construction and operational phases of the Project require the disturbance of approximately 953.7 hectares of low intensity grazing lands on the main mining leases and on the corridor mining leases and access road for Options 1 or 2.

Should additional land disturbance be required during the life of the Project, this will be detailed in the appropriate amendment to the Environmental Authority and Plan of Operations. Land disturbance on the Project will be a temporary impact only during the construction and operational phases (excluding mining voids which will remain after closure).

Land disturbances on the Project will be rehabilitated either progressively if possible, or on decommissioning to minimize potential environmental impacts from land disturbance. Impacts on the land will be temporary only. All disturbance areas will be rehabilitated to stable, self-sustaining landforms. Final voids will remain as stable landforms for stock watering, or will be fenced and or bunded to prevent livestock access. The conceptual planning has assumed final slope of each lift of the waste rock dump will be between the angle of repose and 15 degrees depending on the competency of the rock material.

The following mitigation measures shall be implemented to insure that land disturbance is minimised:

- The minimum amount of land for the safe working of the Project will be cleared at any one time for the development infrastructure to reduce the risk of dust emissions, soil erosion and impacts on flora and fauna;

- Mine infrastructure design will incorporate existing landforms to minimise impact on natural drainage patterns;
- The amount of land that will be disturbed and rehabilitated each year which will be outlined in the appropriate Plan of Operations for the Project and updated as necessary;
- Progressive rehabilitation will be carried out on available areas to decrease water erosion potential and limit dust emissions.;
- Soil erosion control strategies shall be implemented for all areas of disturbance;
- Waste rock dumps shall be graded back to a suitable slope for revegetation;
- The majority of the infrastructure from the Project will be on-sold and removed from site;
- Any infrastructure or roads to be left on site will be subject to suitable agreements being reached with the land holder; and
- Topsoil stripping will be conducted to ensure that the maximum volume of topsoil is recovered during land clearing and that it is stockpiled and utilised in rehabilitation in a manner to ensure its viability while preventing erosion and compaction. Methods of topsoil stripping and stockpiling on the Project are summarised below.

Prior to the development of any infrastructure on the Project, topsoil and vegetation will be removed from the footprint area and stockpiled. Large vegetation will be pushed first and windrowed alongside the area where topsoil will later be stockpiled. Stockpiled vegetation may be chipped or used whole in revegetation works at a later date.

Sediment control dams will remain on site after decommissioning of the mine, to ensure that run-off from the rehabilitated waste rock dumps will be captured, and any suspended sediments settled out. Groundwater monitoring bores will also remain post closure and groundwater analysis will take place during rehabilitation to ensure that no seepage is occurring to groundwater.

The geological conditions on the Project site are not of an age or type to expect significant fossil specimens to be uncovered during mining activities.

The preliminary rehabilitation success criteria for the Project have been developed with reference to Guideline 18: Rehabilitation Requirements for Mining Projects (EPA 2007). The preliminary rehabilitation completion criteria for land are as follows:

- Slopes of all constructed landforms will be 15 degrees or less;
- All constructed landforms will be safe and stable to minimise erosion;
- Levels of metals in surface soils on rehabilitated landforms will be similar to that of relevant analogue sites;
- Land suitability consistent with that proposed for the disturbance type in the EA;
- Tree density (Trees/ha), shrub density (shrubs/ha), herb/grass density (grasses/ha), groundcover (%) and species composition similar to relevant analogue sites; and
- Sulphate, pH and EC levels similar to that on relevant analogue sites.

Conclusions and recommendations

While the submitted EIS has adequately addressed the TOR, more detailed information on the planned rehabilitation and post closure plans will be required in the EM plan. This information would need to include:

- The EM plan should address rehabilitation based on the further assessment required for waste rock characterisation, discussed in the waste section of this report. The EM plan must address the method of disposal (co-disposal, blending, cell encapsulation). The EM plan must describe how the project will effectively manage the waste based on the results of the neutral mine drainage proposal and radioactive

mineral proposal, addressed in the waste section of this report, to minimise of the risk of poor quality leachate to groundwater and surface waters from the waste rock dumps.

- The EM plan should include detailed design drawings of the waste rock dumps. The design should show details such as: the height of the waste rock dump; the final landform design of the waste rock dump, which should be graded to encourage shedding of water; and the design and content of the capping layer.
- The proposed approach to rehabilitation of the tailings storage facility is a 'store and release' type cover. In isolation this is not an acceptable mitigation strategy. Capillary breaks should be employed with the use of a clay cap. The EM plan should also provide a comprehensive management strategy for the cover method chosen for the tailings storage facility.
- Details of rehabilitation success criteria and a monitoring strategy should be included in the EM plan. The success criteria and monitoring strategy should include a detailed description of the methods to be used for the rehabilitation of all mine affected areas (i.e. pits, pipelines, roads, plant, stockpiles, dams etc.). Key performance indicators should be provided.

In addition, further information is required regarding haul roads, including:

- EM plan should provide information on how dust will be managed along the haul roads between the Mount Margaret and Monokoff sites so that impacts to sensitive receptors and surroundings are prevented (i.e. speed limits, road watering etc).
- Background levels of contaminants in soil samples should be collected and reported in the EM plan to establish a baseline level. This will assist in dealing with future incidents or complaints regarding any contamination along the haul road.
- Additional water and stream sediment quality sampling locations for all road creek crossing should be developed and included to ensure impacts on aquatic values from road creek crossing are monitored.

Additional information on the geology of the site and its implications for is the design and layout should be provided in the EM plan including:

- The EM plan needs to clearly and accurately demonstrate where the faults are to ensure that any hazardous structures are not placed on them. The location of fault zones should be clearly identified with illustrations and overlayed on a site layout plan. Any design of changes to the site management due to faults should be described.
- Geological cross sections were provided for the Mount Margaret site; however they should be included in the discussion of geology in the EM plan. A cross section must be provided for the Monakoff site also.

3.1.3 Waste Management

The submitted EIS has inadequately addressed the TOR in regard to waste management.

While acid rock drainage has been adequately addressed in the submitted EIS documentation and recognising the investigations completed to date by the company, DERM is concerned that the potential for neutral mine drainage has not been adequately assessed. Additionally, the Department considers that the potential presence of radioactive minerals in the ore zone and waste materials (tailings and waste rock stockpiles) has not been fully addressed. These concerns were highlighted in the Department's submission on the EIS and subsequent correspondence dated 10 March 2010.

The submitted EIS made the following findings:

Waste rock characterisation methodology

The submitted EIS reported the characterisation of the waste rock from samples collected from the Mount Margaret and Monakoff project areas during two sampling programs in 2004 and 2008. A total of 242 samples were collected and analysed. The drill hole sites were selected along the strike of the ore body and from all lithologies to ensure samples were tested from all potential waste rock materials. Sample numbers and locations were selected based on the current mine design and an estimated yield of each lithology. The primary

objective of the waste rock characterisation study was to identify any characteristics of the waste rock that could have potential to cause detrimental effects on surface run-off or seepage water quality during the operational life of the mine and post-closure. Waste rock samples were sent to Australian Laboratory Services (ALS) for preliminary static waste rock sample analysis. All analysis was performed on dried and pulverised samples. A suite of 44 samples representing all lithologies and depths were selected for further testing including total metals and water soluble element testing. The following parameters were analysed:

- percentage total sulphur (LECO method);
- acid neutralising capacity (ANC) (kg H_2SO_4 a tonne);
- maximum potential acidity (MPA);
- net acid producing potential (NAPP) (kg H_2SO_4 a tonne);
- net acid generation (NAG) (kg H_2SO_4 a tonne);
- NAG pH (ph OX);
- fizz rating (2008 samples only);
- total metals analysis (2008 samples only) including arsenic, antimony, barium, beryllium, cadmium, chromium, cobalt, copper, lead, manganese, nickel, vanadium, zinc and mercury;
- water soluble elements testing (2008 samples only) including pH, Electrical Conductivity (EC), arsenic, antimony, barium, beryllium, cadmium, chromium, cobalt, copper, lead, manganese, nickel, vanadium, zinc and mercury;
- pH 1:5 soil/water leach (2004 samples only); and
- EC 1:5 soil/water leach (2004 samples only).

Static sample testing, kinetic NAG and kinetic leach column testing was also conducted on four composite waste rock samples. The composite samples included the following:

Mount Margaret potentially acid forming (PAF) material mixture:

- Black Shale; and
- Volcaniclastic material.

Mount Margaret PAF/ non acid forming (NAF) Material Mixture:

- Sandstone;
- Saprolite; and
- Mafic Volcanic material.

Mount Margaret NAF Material Mixture:

- Mix of all NAF lithologies from Mount Margaret.

Monakoff NAF Material Mixture:

- Mix of all NAF lithologies from Monakoff.

The submitted EIS reported that the laboratory kinetic testing was performed to confirm the findings of the composite static testings and yield further information on sample reactivity lag time, metal solubility and likely leachate production. Based on the results of the preliminary static sample analysis, certain samples were chosen for further testing including kinetic leach columns. Certain NAF samples were analysed for their erosion potential as these lithologies may be used to encapsulate PAF materials and therefore be exposed to erosional forces on the outside of the waste rock dumps. Testing included cation exchange capacity and exchangeable sodium percentage.

Waste Rock Characterisation Control Strategies

The submitted EIS reported that the total waste rock produced over the life of the project is estimated to be 118,354 kT and 94% of this material is estimated to be NAF, 5% will be UC and 2% will be PAF. Exco has committed to the following control strategies for the management of waste rock:

- Ongoing waste rock characterisation testing will be conducted over the life of the Project.
- As mining advances through the orebody, ongoing waste rock characterisation will aim to confirm the conclusions of this study. This testing will be done prior to development of new production areas so that PAF and NAF materials are understood and disposed of in a manner that effectively manages seepage and runoff.
- All PAF waste rock materials will be encapsulated within NAF materials. This will include at least a 1 m layer of well compacted NAF waste rock at the base of the dump. The top of the wast rock dump will be sealed with a compacted low permeability layer of suitable NAF waste rock or other material (0.5m depth) and then covered with at least 1 m of NAF waste rock as a store and release cover.
- PAF waste rock may be co-disposed of with NAF material within the core of dumps if necessary.
- PAF materials will be excluded from areas under final batter outer slopes.
- Geological logging of the waste being excavated to identify PAF material will be undertaken.
- Upon identification of PAF material, the trucks will be directed and tracked to the PAF dump site to insure encapsulation of the waste.
- The Mount Margaret waste rock lithological units of Sandstone, Saprolite and Mafic Volcanic which have been designated for blending with NAF materials within the waste rock dumps, should be excluded from disposal on the outside of the waste rock dumps due to potential for production of saline and sulphate runoff.
- Ore stockpiled on the surface for an extended period, over the November to April wet season, will be stored on a compacted pad of NAF waste rock with all drainage directed to a stormwater dam. Leachate in this pond will be reused in the processing plant if the quality does not meet surface water discharge limits.
- Regular surface water and groundwater sampling programs will occur downstream of waste rock dumps and ore stockpiles to detect any acidic, metalliferous or neutral mine drainage.
- If it becomes evident that the outer slopes of the waste rock dumps are eroding, the slopes will be reinforced with rock material during the operational phase.

Conclusions and recommendations:

DERM has identified two main issues that the proponent must address: neutral mine drainage; and radioactive minerals. Tailings storage has also been identified as an issue that requires further consideration. Details of DERM's requirements were provided to the proponent as part of it's response to the supplementary report and further clarified by correspondence dated 10 March 2010. These requirements are further discussed below.

Neutral mine drainage

DERM has assessed the waste rock characterisation and identified the following issues with the findings of the submitted EIS and the proposed mitigation measures:

- Deionised water was used in the analysis and is not representative of rainfall.
- The results using filtered samples cannot be compared against the Livestock drinking water quality guidelines (ANZECC & ARMCANZ 2000).
- Neutral mine drainage must be established over a variety of pH values and oxidising conditions.
- Batch mixing is not representative of field conditions.
- The analysis has not accounted for hydraulic influences, including water residence time.

- The analysis has not taken into account all metals, including selenium, strontium, uranium, rubidium, and lithium.
- The submitted EIS does not adequately address the potential leaching of a variety of contaminants under a representative range of physical and chemical conditions likely to be accounted at the site. Therefore, the proposed waste rock dump design has the potential to place high risk material (such as mineralised rock) on the outside of the dump. The placement of this material on the outside of the waste rock dump is a risk that has not been identified or assessed in the submitted EIS.

Consequently, the methodology for characterising the waste rock does not adequately represent field conditions, nor does it enable a complete assessment against guidelines values.

To address the DERM's concerns on neutral mine drainage, Exco Resources is required to develop and implement a neutral mine drainage proposal to assess: the potential for release of contaminants from waste rock stockpiles under neutral conditions; the possible impacts of such release; and the management systems required to avoid or minimise those impacts. DERM considers that the Global Acid Rock Drainage Guide (GARD guide) prepared by the International Network for Acid Prevention (INAP) provides appropriate direction for the management of drainage issues from mine waste rock.

DERM requires that the main factors influencing neutral mine drainage, described in the GARD guide, be addressed in the neutral mine drainage proposal. These factors include:

- geology and lithology characterisation;
- mineralogical assessment;
- short-term leach testing over a range of chemical and physical conditions;
- long-term leach testing over a range of chemical and physical conditions;
- whole rock analysis (tied to lithology, not composite samples from different lithological units);
- field performance testing (i.e. humidity cells, long-term columns, field tests, on-site monitoring);
- geochemical modelling;
- utilising hydrological and hydrogeological data to produce water balances; and
- geo-environmental models (detailed in section 4.4 of the GARD guide) to determine contaminant generation and environmental fate.

The proposal should address the potential for mine drainage to include a spectrum of other contaminants, including:

- Cations and anions (such as Ca^{2+}, Na^{+}, Mg^{2+}, K^{+}, SO_4^{2-}, etc) which may form salt encrustations and efflorescences by dessication from waste rock leachate;
- Metals (e.g. Cu, Ag, Cd, Zn, etc);
- Non-metals (e.g. Se, As, Cl, F, etc); and
- Rare Earth Elements (e.g. U, Th, Ra, V, etc).

In dealing with neutral mine drainage, the proposal should adopt the following process for characterising waste rock to identify potential environmental issues:

1. Determine the contaminants present (that is, those elements which may be released from waste rock under a range of conditions and be taken up in leachate emanating from a waste rock stockpile);
2. Determine where those contaminants are contained (usually based on geological units);
3. Determine what physical and chemicals conditions will mobilise the contaminants; and
4. Determine where the mobilised contaminants will go and the potential environmental impacts.

To implement this process, it is recommended that short term testing (such as sequential static leach testing) be undertaken to determine how contaminants will be mobilised. To do this, a variety of pH conditions will need to be simulated (from alkaline to highly acidic). DERM requires that this information be presented in the revised EM plan.

In order to test the hydrological influences of contaminant mobilisation, long term testing (such as long term column leach testing) should be included in the proposal, to be carried out during and following the approval and planning stages of the mine. While long term column leach testing should be developed to cover a variety of pH conditions, it should also be designed to compare reduction / oxidation and hydrological influences. This can be done in several ways, but is most commonly achieved through replicating the column leach methodology for both saturated (constant water head), and unsaturated (falling water head) conditions.

Radioactive mineral assessment

The Cloncurry Region is naturally high in mineralised uranium and other radioactive elements. The Exco proposal refers to potential recovery of uranium elements should there be a change in government polity The submitted EIS provides no assessment of the potential impacts on water, ecological and air values from radioactive elements that may be extracted with the ore or waste rock.

The EM plan is required to include an assessment of the potential impacts on water, ecological and air values from extracting, processing and disposing of radioactive elements, and should propose appropriate mitigation measures for all potential impacts.

To address the potential presence of radioactive (or radiogenic) minerals, Exco resources is required to prepare a radioactive mineral assessment proposal that includes:

1. Tests for all potentially radioactive elements by taking statistically valid samples from each lithological unit and analysing for all elements that are potentially radioactive; and
2. From review of the data provided by these tests, if specific lithologies or areas of the mine contain elevated elements with the potential to be radioactive, then further isotopic studies are required to determine the radioactive or radiogenic nature of these elements, including the nature of any decay products and the potential for impacts on the environment.

The investigations for neutral mine drainage and radioactive minerals should consider surface and groundwater hydrology, climatic conditions, topography and environmental values.

Exco Resources should note that where the results of the proposals for neutral mine drainage and radioactive mineral assessment identify an increased risk of potential environmental harm; changes in mine management will be required, which could include:

- revision of the mine site design (including waste rock dumps and tailings storage facility);
- selectively handle waste rock with modified procedures;
- modification of surface and drainage water management and monitoring (refer to the section on water resources for further information on this aspect); and
- making any other changes to the monitoring, handling or disposal of waste rock relevant to management of radioactive materials.

Tailings storage facilities

While the tailings storage facility could be implemented as proposed, further detail is required in the EM plan. In the finalisation of the tailings storage facility, further investigation of tailings storage facilities should consider the following:

- Storage efficiency wherein the amount of waste stored per square meter of disturbed ground is as large as is practically possible.
- Clean and dirty waters should not be allowed to mix.
- Water should be removed from tailings as soon as possible to aid in consolidation and dessication.

- All problematic materials should be contained within a single storage facility wherever possible. Tailings and PAF rock waste should be integrated into a single facility.
- Percolation of water and oxygen (air) through problematic wastes should be prevented to the maximum amount possible. The low permeability of tailings could be used to restrict percolation through PAF waste rock by good design of a facility. The decommissioned land form should prevent infiltration into problematic waste.
- During operation of the mine, all seepage and leachate should be collected and used in the process circuit water wherever possible (This may involve the incorporation of seepage and leachate collection/ management systems beneath the problematic waste storage facility before production starts.)
- After decommissioning there should be no need for ongoing collection of seepage or leachate.

The submitted EIS had no consideration for integrating the tailings storage facility into a waste rock dump. In the finalisation of the tailings storage facility, the EM plan should include the consideration of an integrated waste storage facility for tailings and waste rock.

As well as the environmental risk reduction achieved, significant economic benefits have been achieved by mines that have adopted the use of integrated waste management facilities. Some of the benefit areas include:

- Selective placement of waste rock to form tailings containment "cells" involves a minor cost when compared to "cut and fill" construction.
- Problematic waste rock can be used as construction material within tailings containment areas, particularly for access berms for tailings discharge spigots and decant pumps.
- Problematic waste rock cover requirements (area and integrity) are minimised.
- Decommissioning can be facilitated by placement of benign waste rock for capping of problematic waste.

Summary

To meet the requirements of this section of the EIS assessment report and allow an Environmental Authority to be issued, Exco is required to address the following issues, as detailed above, to DERM's satisfaction in the revised EM plan:

1. Prepare a neutral mine drainage proposal and report the results of short term testing (such as sequential static leach testing) required in this proposal;
2. Prepare a radioactive mineral assessment proposal;
3. Modify the mining operation according to the outcomes of the proposals to the satisfaction of DERM; and
4. Provide additional information on the tailings storage facility.

3.1.4 Water resources

The submitted EIS adequately addressed the TOR in regard to site water management.

The submitted EIS proposed mitigation measures for potential surface water quality impacts from mining activities. These measures where designed to manage the contamination of surface water from:

- Run off from stockpiles of waste rock, ore, and concentrate;
- Overflows from process water ponds, storm ponds, and the TSF;
- Workshops and hydrocarbon/chemical storage areas; and
- Grey water and sewage treatment plant effluent.

Other potential impacts of the project, identified in the submitted EIS, include increases or decreases in the water flow volumes in drainage lines following rainfall events as a result of altering the catchment areas of the drainage lines on site.

The management of site water is dependant on the proposals Exco is required to develop to assess the potential impacts from neutral mine drainage and radioactive minerals. These proposals are likely to identify additional contaminants in some rock types that are not reported in the submitted EIS. In accordance with the recommendation of the waste section the site water management plan may require changes to manage the potential impacts from neutral mine drainage and radioactive minerals.

The submitted EIS described a water management approach that did not capture all of the potentially contaminated wastewater from the mine site. However, subsequent to the supplementary EIS Exco provided a revised water management strategy following concerns raised by DERM regarding waste rock characterisation and the potential for contaminants to enter the environment from waste rock dumps. DERM requested a water management strategy that captured all site water potentially affected by mining activities to prevent the discharge of contaminants with the environment. The revised water management strategy is DERM's current preferred approach for the site.

EIS proposal - surface water runoff

The submitted EIS reports that for surface water management purposes, the surface runoff generated in the Cloncurry Copper Project mine site is divided into three types based on water quality:

- 'Clean' – surface runoff from areas of the Project where water quality is unaffected by mining operations. Clean water includes runoff from undisturbed areas.
- 'Uncontaminated site water' - Site water runoff from benign bare earth surfaces, with the principle water quality characteristic being suspended solids. The management objective for this stream is for release to the receiving environment via appropriate erosion and sediment control measures and effective hydraulic controls. This water will be derived from waste rock dumps containing NAF waste and general infrastructure areas where practicable.
- "Contaminated site water' - Site water (stormwater runoff, discharges or spills) from potentially contaminated surfaces, such as areas where ore is stockpiled and crushed, process plant areas, the ROM Pad, mine pits and waste rock dumps containing PAF waste. The principle water quality characteristics for these sources are dissolved solutes/contaminants as well as suspended solids. The management objective for this stream will be capture and containment for reuse within the process, preventing the release of this water for all but extreme rainfall events.

The submitted EIS reported that the objective for site water management is to minimise the catchment areas from which site water is generated, as well as maximising the containment of potentially contaminated site water at its source for direct reuse purposes.

The principles for the construction and mining phases of the Cloncurry Copper Project to manage surface water are as follows:

- Separation of 'clean water', 'uncontaminated site water' and 'contaminated site water' runoff;
- Minimise the area of disturbance, thus minimising the volume of site water or contaminated site water runoff;
- Divert all uncontaminated site water to sediment ponds / traps prior to discharge from the site; and
- Contain all contaminated site water on site in stormwater dams. Where possible, contaminated site water will be recycled to the process circuit.

Rainfall records from 1889 to 2008 were compiled and a Rainfall Probability Analysis undertaken.

From this, it was determined that total annual rainfall for the area will likely fall within the range of 200 mm to 700 mm, and the probability of annual rainfall of greater than 800 mm is around 5%. The probability of rainfall greater than 1,000 mm is around 1%. The probability plot for total annual rain days is well distributed, with the 95th percentile rain day total being around 40 days and the 5th percentile being around 100 days. For a marginal increase in rainfall probability below an AEP of 10%, a significant increase in rainfall occurs. Therefore, to capture or contain the extreme rainfall events expected for the area, a substantial increase in storage capacity will not be required.

The submitted EIS included water balance modelling that was repeated based on a daily rainfall record that has been extended to include 2009. It is emphasised that this water balance modelling is based on an extended (mine life) sequence, with short term duration events not impacting substantially on the output. To this end, the results as presented do not change the required capacities of site water management storages.

To provide context to this model outcome, an analysis has been undertaken by AARC to assess the significance of the rainfall event that was experienced during January and February 2009. This analysis comprised a ranking of all 2 month (equivalent to 60 day) duration rainfall period from the available record. In effect, a window of 60 days duration was passed across the daily rainfall record on a 1-day timestep to compile a list of 60-day rainfall totals. These totals were ranked with the following observations made:

- The wettest period on record was during 1974, with 2 month rainfall totals occurring during this period ranging from 869 to 957 mm;
- The next wettest period was during 1991, with 2 month rainfall totals ranging from 852 to 866 mm; and
- The January/February 2009 rainfall period was third wettest on record with a maximum 2 month duration total of 846 mm.

The design objectives adopted for the current site water management, as presented in the submitted EIS are:

- Runoff or seepage from areas containing potentially acid forming (PAF) waste is treated as "potentially contaminated site water", with a requirement for capture and containment of this water.
- Runoff or seepage from areas containing non-acid forming (NAF) waste is regarded as uncontaminated, with release to the environment via a dedicated sediment and erosion control system.

The submitted EIS reported that the proposed water management features of the project include the following:

- E1 (Mt Margaret) project site - site water dam capturing stormwater and or seepage from the northern portion of the eastern waste rock dump, as well as from other active areas of the site. (Note that stormwater and or seepage from the northern waste rock dump, and the southern portion of the eastern waste rock dump would report to the environment).

  The site water dam has been sized as a low hazard facility (based on a 1 in 10 year exceedance probability for containment), with a minimum capacity of 800 mega litres.

- Monakoff project site - site water dam capturing stormwater and or seepage from the south eastern portion of the western waste rock dump. (Note that stormwater and or seepage from the remainder of the dump would report to the environment).

  The Site Water Dam has been sized as a Low Hazard facility (based on a 1 in 10 year exceedance probability), with a minimum containment capacity of 375ML.

Surface water flows have been separated into clean water and dirty water. In addition the submitted EIS now also addresses other issues raised in submissions on the EIS including:

- The locations of sediment dams that are proposed as part of the clean water management system. Clean water flows off the NAF waste rock dump areas pass through sediment dams prior to being discharged to the environment.
- The Monakoff surface water structures and flows are shown at a more detailed scale than described in the draft EIS i.e. one figure for Monakoff East and one figure for Monakoff West.
- The contour lines have been continued under the waste rock dumps along with the existing drainage lines.
- The PAF encapsulation area as cross hatched on the Mount Margaret Eastern Waste Rock Dump.
- The drainage diversions have been designed so that they terminate downstream at the same creek line which has been diverted. The drainage characteristics of the region are essentially overland flow, via shallow braids, which in areas may not be continuous.
- The drainage diversions at Mount Margaret have been moved back off the toe of the waste rock dumps.

- In regards to the footprint of the Site Water Dam at Mount Margaret, impinging on the Eastern Waste Rock Dump. Encroachment at full supply level will occur indicating that a bench will be formed to prevent backwater entry into the dump. Note also, that the capacity of this pond will rarely be reached, and when it is, the period of ponding against the separation bench will be limited (restricted to weeks) as water is recovered as a priority to restore the capacity of the dam as soon as possible.
- Regarding surface water flows around the TSF. Stormwater reports as overland flow, at relatively shallow depth at Mount Margaret. Diversion bunds and the TSF embankments essentially provide a flood levee to "massage flow" around the site. A rise in "flood" level may occur where a flow restriction exists (e.g. between the TSF and diversion bund), with the diversion bund height selected to prevent overtopping into the site. At this site specifically, the catchment will be very small with much of the area to the west of the TSF diverted around the site to the west, therefore flow in this area will be minimized.

As detailed in the submitted EIS documentation, the Monakoff western waste rock dump will only contain PAF materials in the south eastern section. Only NAF materials will be disposed of in the western and northern portion of this dump and will be drained via sediment dams and erosion control systems. No runoff from the waste rock dump will drain directly off site.

Also as detailed in the submitted EIS documentation the Monakoff eastern waste rock dump will only contain NAF material and will be drained via sediment dams and sediment control systems. No runoff from the waste rock dump will drain directly off site.

Placement of waste rock dumps over drainage lines:

- Only minor first order tributaries (approximately 5m wide and very shallow <1m) will be diverted, photos of these drainage lines are included in Stream Morphology and Ecology Assessment report (Appendix K of the draft EIS).
- Due to the topography of the sites the waste rock dumps can not be redesigned to avoid the minor drainage lines altogether. The waste rock dumps have already been designed to avoid drainage lines where possible.
- Several of the open cut pits also intersect these minor drainage lines. Drainage diversions are required to protect these pits as well as divert clean water away from the waste rock dumps.

Alternative water management strategy

Exco provided an "alternate" water management strategy following DERM's identification of issues regarding the potential risk of neutral mine drainage and radioactive (or radiogenic) minerals which is likely to identify additional contaminants that will be required to be managed. The alternative site water management plan treats all stormwater runoff and seepage from waste dumps as contaminated. This plan now shows that all runoff and seepage site water can be captured on site.

Based on this management approach, precautionary requirements would involve capture and containment of this site water. The principal water management features of this plan are:

- The E1 (Mt Margaret) project site, site water dam capturing stormwater and or seepage from all site areas except the northern portion of the eastern waste rock dump. This dam has been sized as a Low Hazard facility (based on a 1 in 10 year exceedance probability), with a minimum containment capacity of 780ML. The Low Hazard site water dam would be formed similarly to the site water dam under the current concept.

  Site water storage capturing stormwater and or seepage form the northern portion of the eastern waste rock dump (containing PAF waste). This dam has been sized as a High Hazard facility (based on a 1 in 100 year exceedance probability for containment), with a minimum capacity of 450ML. The current proposal for the High Hazard Site Water Dam under the alternative concept is to form the storage by excavation, with a shallow embankment to formalise an emergency spillway.

- Monakoff project site, site water dam capturing stormwater and seepage from all site areas except the south eastern portion of the western waste rock dump. This dam has been sized as a Low Hazard facility (based on a 1 in 10 year exceedance probability), with a minimum containment capacity of 180ML.

  The Low Hazard Site Water Dam would be formed similarly to the site water dam for the Monakoff site under the current concept. Site water storage capturing stormwater and seepage from the south eastern

portion of the western waste rock dump (containing PAF waste). This storage has been sized as a High Hazard facility (Based on a 1 in 100 year exceedance probability for containment), with a minimum capacity of 280ML.

The current proposal for the High Hazard site water dam under the alternative concept is to duplicate the Low Hazard storage, with an embankment to be shared. A bunded corridor is also proposed to channel discharge from the PAF cell to the pond.

- Monakoff East project site - Site Water Dam capturing stormwater/seepage from all site areas. This dam has been sized as a Low Hazard facility (based on a 1 in 10 year exceedance probability), with a containment capacity of 75ML.

  This dam would be formed by excavation adjacent to the waste dump, with a shallow embankment to formalise an emergency spillway.

Groundwater

The submitted EIS identified that groundwater bores in the Project region have the following economic, hydrological and environmental values:

- Bores are used in the region for stock-watering;
- Groundwater may contribute to the flow of local watercourses in the wet season, particularly at the Mount Margaret project area; and
- Groundwater – surface water exchange.

The submitted EIS identified the potential threats to groundwater quality from the pits and voids could include the following:

- Groundwater contamination from chemical and hydrocarbon spills, waste rock dumps, ore stockpiles, stormwater/process water dams and the tailings storage facility;
- Dewatering during mining may impact on groundwater levels and result in reduction in available groundwater resource for stock-watering; and
- Contaminated groundwater discharge may impact on surface water.

The pits created by open cut mining will remain as voids when mining at the Monakoff and Mount Margaret project areas is complete. Post mining, dewatering will cease and the final voids will gradually fill with water until an equilibrium condition establishes. The potential sources of water that may contribute to filling the final void are:

- In flow from the Proterozoic and Mesozoic aquifer where relevant; and
- Direct rainfall.

A safety bund will be constructed around the top of all final voids to divert, and manage, uncontrolled catchment flows into the pit. This will be part of the post-mining pit water quality management strategy for the sites.

The submitted EIS identified that the final voids at both the Monakoff and Monakoff East pits will always be a sink to groundwater flow and should never over top or discharge water from the pit to the regional aquifer. The stabilised pit levels will remain below surrounding Proterozoic aquifer levels (RL180m) and the lower pit crest level (RL200m and RL195m respectively). This results in long term dewatering of the Proterozoic aquifer.

The submitted EIS identified that the final void left by the Monakoff pit is expected to initially rise relatively quickly within the first five years after the mining operation ceases. This is due to the relatively small void volume at the base of the pit. Groundwater will stabilise within the pit after approximately 25 years post mining, at around RL153m. Groundwater levels in the eastern pit at Monakoff east will rise up to around RL143m during the first 2 years, but then stabilise around RL141m after about 30 years post mining.

The final voids at each of the Mount Margaret project pits will always be a sink to groundwater flow and should never over-top or discharge water from the pit to the regional aquifer. The stabilised pit levels will remain below the:

- Average level of the base of the Mesozoic aquifer (between mine RL970m and RL958m - RL116m and RL104m AHD) for each of the pits;
- Surrounding Proterozoic aquifer levels (mine RL975m or RL120m AHD); and
- Lower pit crest levels (mine RL1000m or RL146m AHD).

Dewatering

The submitted EIS identified that long term dewatering of the Proterozoic aquifer is likely to regionally impact groundwater hosted in the Mesozoic aquifer. This has been demonstrated by the pumping test on the Proterozoic aquifer at the Mount Margaret Project, and has also occurred from dewatering at Ernest Henry mine. An assessment of the regional drawdown on both aquifers, from the dewatering of the Mount Margaret Project ore bodies, has been made using the regional numerical groundwater model. The model simulated groundwater conditions from dewatering the pits at Mount Margaret, as well as taking into account the cumulative impact of EHM dewatering. Compartmentalisation of the region surrounding the Mount Margaret Project area (inferred from the regional and local faulting) shows predicted drawdown within the Mesozoic and Proterozoic aquifers being confined to within this faulting region, and not extending beyond the flow barriers.

Based on available registered bore details, there are no stock watering bores located within this compartmentalised region and hence it is expected there would be no impact on stock bores located beyond the extents of the region due to mine dewatering. However, should the model boundary conditions adopted for this region prove to be incorrect, once dewatering commences further evaluation of the faults and flow barriers should occur. This will determine the Project's contribution to drawdown from dewatering to the already existing drawdown from EHM. Mitigation measures for drawdown impacts on stock bores will include:

- Deepening any affected stock bores;
- Drilling and construction of a new stock bores;
- Piping water to the affected landholder; or
- Cartage of water to the affected landholder.

If the Project is found to contribute to the impact on existing stock bores, Exco will make up any lost water supply to those existing stock bores, with agreements put in place prior to commencement of mining with those landholders identified as likely to be impacted from dewatering in accordance with the provisions of the *Mineral Resources Act 1989*.

The submitted EIS identified that groundwater contamination can largely be precluded if the source of contaminants at the surface is minimised or eliminated.

The following hydrogeological mitigation measures will be implemented at the Project:

- Chemical storage and handling areas will be bunded to contain accidental spills;
- Bulk petroleum products will be loaded and unloaded in a designated area;
- A formal network of groundwater monitoring bores will be installed and these will be monitored on a regular basis;
- Minimal use of groundwater where practicable;
- All contaminated water storages will be designed with appropriate seepage prevention mechanisms such as low permeability liners;
- PAF waste rock will be encapsulated to prevent water infiltration and contaminated leachate; and
- Progressive rehabilitation will be conducted to minimise potential sources of contaminants.

Groundwater monitoring

The submitted EIS reported the proposed groundwater monitoring program is based on the installed monitoring bores in the Proterozoic and Mesozoic aquifers. In addition to these established monitoring bore locations, monitoring bores will also be installed around the proposed tailings storage facilities and waste rock dumps to monitor potential for impact from these structures on the Mesozoic aquifer. Additional monitoring bores will be confirmed prior to their installation.

These bores will make up the monitoring bore network. The monitoring program will continue to gauge the impacts of mining activities on groundwater resources, and on other users of groundwater, in terms of quality and quantity. The groundwater monitoring program will provide an on-going assessment of the impact of the proposed mine, and a warning system if adverse impacts on the groundwater regime begin to occur, so that remedial action can be taken.

The data from the monitoring program will be reviewed quarterly and the results held on site. After three years of monitoring, a review will be undertaken to assess whether the frequency of monitoring should be changed to bi-annually or annually.

Conclusions and recommendations

The submitted EIS documentation has adequately addressed the TOR. Exco have demonstrated that the site water management approaches can adequately capture the potential contaminants on site. If required, Exco will capture all water on the site to prevent the release of contaminants to the environment. The proposals to address neutral mine drainage and radioactive minerals will determine the level of containment required for the site. In addition, a number of minor issues have been identified and must be addressed in the revised EM plan as discussed below.

Surface water management

Currently, Exco has two alternate strategies for water management on site. The final approach to be implemented on site will primarily be dependant on the outcomes of proposals required to assess the potential impacts of neutral mine drainage and radioactive (or radiogenic) minerals, as required in the waste section recommendations of this report. The submitted EIS water management proposal that includes runoff from waste rock dump to the environment can only be employed where the neutral mine drainage and radioactive (or radiogenic) minerals assessment determines no risk to the receiving environment. DERM considers this outcome unlikely. Therefore, it is likely that the project will have to employ the alternative water management strategy of capturing all runoff from waste rock dumps. The EM plan should be amended to include both water management strategies and clearly state when each strategy would apply consistent with the recommendations of this assessment report.

In addition, the EM plan is required to identify if the waste rock dumps will be designed to shed runoff towards the pit at end of mine and modelling should be provided to identify the expected quality of pit waters.

The submitted EIS illustrates the location of creeks which run through the middle of proposed waste rock dumps and the pit. This can generate issues relating to waste rock dump stability, water infiltration and seepage. Even though diversion channels have been constructed around the waste rock dumps, there is the potential for shallow aquifer pathways for seepage and infiltration. The EM plan is required to address this matter in more detail to identify how this will be managed and monitored.

The project is in the head waters of many of the creeks which may be impacted on by the project. It is critical that reference data be collected before mining commences to develop a comprehensive baseline data set that can be used to set water quality objectives and further inform the water management plan. An assessment of creeks which could be used as reference sites (in accordance with ANZECC 2000 reference site requirements) for comparison when developing water quality objectives should also be included.

Groundwater

Additional groundwater monitoring locations should be proposed. Many of the bores are located around the pits. More bores are required around the waste rock dumps, the tailings storage facility and other hazardous structures to monitor for potential impacts impacts. Bores at different depths (shallow and deep) should be considered. Monitoring of the Mesozoic aquifers should be include to confirm the assumptions made

concerning groundwater flow, and the assumption that the Mesozoic aquifers will act in the same way as the Proterozoic aquifers even though the groundwater balance and flow paths will be altered significantly.

Additional EM plan requirements

The EM plan must detail the following:

- Detailed design of the alternate water management systems on the mine site.
- The hazardous dams located against waste rock dumps have not been fully described and assessed to demonstrate the appropriateness of the design. Sufficient information should be provided to demonstrate that the risks associated with the proposed hazardous dams are avoided or minimised to an acceptable level.
- The potential contaminants from neutral mine drainage will report to low hazard dams. However, the waste rock characterisation required to determine the potential contaminants that may result from neutral mine drainage has not yet been completed and results may require more stringent engineering criteria.
- Stormwater flow appears to be in the opposite of contours presented in the plan. The EM plan should clarify the stormwater flow contours.
- Sediment basins and rock lined channels on waste rock dumps are not appropriate. This approach has resulted in problems on other mine sites involving breaks in the capping layer of the waste rock dump. The EM plan must include an acceptable approach in consultation with DERM.
- The design of diversion bunds should be provided.
- Runoff from waste rock dumps containing PAF material appears to report to dams at mine closure. The runoff should be directed to the pits at mine closure.
- A site water balance model incorporating water quality is required to demonstrate that the water quality limits proposed in the EM plan can be achieved.
- A methodology for deriving contaminant triggers and limits for surface water, groundwater and sediments should be consistent with ANZECC & ARMCANZ (2000) Guidelines and the *Queensland Water Quality Guidelines* (2009). In the absence of sufficient reference data, the only alternative is to set interim limits for slightly too moderately disturbed freshwater ecosystems and the default aquatic ecosystem guidelines of the ANZECC & ARMCANZ (2000) Guidelines and the *Queensland Water Quality Guidelines* (2009).
- Additional monitoring locations to monitor the potential impacts from the haul road at all creek crossings should be included in the EM plan.
- An additional water quality sampling site down stream of the dam on the Monakoff (West) project area should be nominated and monitored.
- More monitoring bores are required around the waste rock dumps, tailings storage faclity and other hazardous structures to detect potential impacts. Bores at different depths (shallow and deep) should be considered. A summary of each bore and its monitoring purpose (i.e. reference, downs gradient of the potential impact to be monitored etc). Reference bores must be included.
- The EM plan provide more details on the assessment of cumulative impacts of the project and Ernest Henry mine on the local groundwater and how the company will manage a situation involving groundwater contamination or drawn down.
- The list of parameters for environmental monitoring (surface water, groundwater, sediments, and end of pipe, on site containments) should be consistent with the additional assessment required to address neutral mine drainage and radioactive (or radiogenic) minerals identified in the previous section.
- The EM plan should provide illustrations and details of the geological and hydrological setting of the site in conjunction with the location of planned facilities and water quantity and quality monitoring locations.

3.1.5 Air

The submitted EIS adequately addressed the TOR in regard to air management.

The proponent adequately addressed air issues during the EIS process, including dust emissions, greenhouse gas emissions and odour.

The major air quality issues and impacts identified in the submitted EIS associated with the open cut mining and ore handling activities relevant to the Project include:

- Potential for elevated ground-level concentrations of dust and dust deposition downwind of blasting activities;
- Wheel generated dust from travelling on unsealed roads;
- Dust emissions associated with extracting and transporting large quantities of waste rock and ore and wind erosion of cleared areas and stockpiles;
- Dust emissions associated with the crushing and screening processes at the processing plant; and
- Greenhouse gas emissions from fuel and electricity usage.

From a regional air-shed perspective, impacts are not anticipated to be significant apart from dust. Unlike an urban air-shed, regional air quality is not significantly affected by anthropogenic emissions such as nitrogen, carbon monoxide, sulphur dioxide and fine particles.

The initial period of mining will include the extraction of rock covering the ore bodies and will result in the highest total mining extraction and rate of material removed. Therefore, the predicted dust emissions for the Project are based on this mining period, to allow an assessment of the maximum air pollution impact to sensitive receivers, per dust generating activity.

The submitted EIS had not sufficiently addressed the potential impacts from contaminants in dust generated from the site identified by DERM on the submitted EIS. The contaminants include copper and arsenic. There are examples of mining in the North West metals province where copper has contaminated soil in undisturbed areas surrounding mining activities. The contamination has resulted in environmental harm to vegetation. Subsequently, DERM required Exco to address these issues. Exco reported that the arsenic pollutant impacts from the project were assessed against Environmental Protection (Air) Policy 2008 air quality objectives and compliance with arsenic as PM10 concentration goal is achieved when the proposed dust mitigation measures are in place as per the submitted EIS.

Exco used the DERM's *Draft Guidelines for the Assessment & Management of Contaminated Land in Queensland*, Appendix 9 - Investigation of Threshold Levels as a source of copper contamination guidelines for the assessment. This guideline sets an Environmental Investigation Level of 60mg/kg for copper in soil and a Health-based Investigation Level (commercial/industrial sites) of 5,000mg/kg for copper in soil. This guideline also states that background copper levels in soil can range from 1 - 190 mg/kg.

In conducting the additional air assessment, DERM recommended that expanded dust suppression techniques be implemented for the Project in addition to the road watering dust control strategy, which was recommended by Exco in the submitted EIS. These expanded dust suppression techniques have been taken into account in the copper deposition estimations in this assessment, and will be implemented by Exco as additional control strategies for the Project. These additional dust suppression techniques include water sprays on:

- Trucks dumping into the primary crusher;
- Crushing and screening; and
- Miscellaneous transfer and conveying.

Exco has estimated that the copper concentration in soil for all processing options from the Project will not exceed the 5,000 mg/kg copper in soil concentration limit.

Predictions of the copper in soil concentration exceeded the 60 mg/kg limit at a distance of 350m to 400m (374m based on linear interpolation) from the boundary of the main plant and stockpile area at Mount Margaret. All other areas of the project are predicted not to exceed the 60 mg/kg copper in soil concentration limit.

The area surrounding the main plant and stockpile area of 150m – 400m may need to be deemed potentially contaminated and the EM plan must include further monitoring during operations to assess the actual levels of copper contamination in the soil due to the mining operations. Should this investigation find copper contamination above the Environmental Investigation Level of 60mg/kg, then a contaminated soil remediation plan for the Project will be required. It should be noted that this remediation option should be allowed for in the Financial Assurance calculations for the Project.

Conclusions and recommendations:

Dust control

Effective dust mitigation procedures need to be implemented at major dust sources particularly where ore is being loaded, unloaded and processed. The submitted EIS dust mitigation and control measures are not explicit on this issue for the control of fugitive dust. The submitted EIS has recommended additional dust control strategies including water sprays in dumping into the primary crusher, crushing and screening and various transfer and conveying operations. This is an appropriate response and must be included in the EM plan. The EM plan should also include a review of this management measure in practice to the determine effectiveness and coverage of applied strategies.

Copper and Arsnic in soil

The submitted EIS proposed Cu 5000mg/kg criteria is the *National Environmental Protection (Assessment of Site Contamination Measure) Measure, November 1999* (NEPM) human health based Health Investigation Level (HIL) for commercial industrial land uses. This level is applicable to the described mining areas for the protection of human health for people exposed on the site and are based on a soil ingestion rate of 100mg/day. Inadequate management of dust emissions and occupational health and safety measures may increase the ingestion rate.

Similarly the Arsenic level in soil in these areas should not exceed 500mg/kg.

The operational areas prone to copper soil contamination should be tested on an annual basis and levels that exceed the relevant HIL should be appropriately managed to minimise exposure. These areas should also be designed to prevent transport of contaminated soil by water or wind action to waterways and undisturbed areas surrounding the operations. The EM plan should be revised to address this issue.

At the completion of mine life, these areas impacted by Copper and Arsenic need to be investigated and remediated to lower the Copper and Arsenic levels in soil to agreed remediation criteria either by excavation and burial in a managed area or by capping the affected areas with clean fill. The remediated areas will subsequently need to be revegetated and rehabilitated as part of closure. The EM plan should be revised to address this issue.

Cu and As levels in undisturbed areas adjacent to mining activities

Ecological soil criteria have more relevance in this setting requiring the appropriate use of NEPM Ecological Investigation Levels (EILs). The submitted EIS modelling has indicated that elevated levels of contaminants of concern will accrue in these otherwise undisturbed areas over mine life depleting with distance from the mining and processing areas which is consistent with other similar sites.

The EM should include monitoring of these potentially affected areas at yearly intervals (on a 50m- 100m grid) to:-

- determine the effectiveness of dust control measures against NEPM criteria;
- assess any ecological impactl; and
- evaluate areas and causes of any excess Cu deposition.

Sampling should preferably be done on the top 50mm of soil as the majority of the impact will be at and near the surface. While the current Copper EIL is 60mg/kg, recent work by CSIRO on the ecotoxicity of various metals and metalloids has determined that Copper levels of 200mg/kg are appropriate for investigation level purposes for open space land uses and soils with a cation exchange capacity, CEC ($cmol_c/kg$) of 10-30. The 200mg/kg value may be added to natural background for the undisturbed area to determine the final EIL value.

Similarly the level of Arsenic should not exceed 100mg/kg based on more recent CSIRO studies.

It is likely that the Coper level up to the 500m contour measured from the contaminant source will exceed this value over mine life if dust mitigation measures are ineffective and may extend further. It is economically and environmentally more effective to limit emissions rather than have large areas of surrounding land subject to remediation and rehabilitation at the end of mine life. It may be relevant during the mine life to undertake a site specific ecological risk assessment of the undisturbed area according to NEPM guidelines to gain a scientific understanding of the ecotoxicity of the form of Copper in soil and the particular environment and to further refine relevant site soil criteria.

3.1.6 Noise and vibration

The submitted EIS adequately addressed the TOR in regard to site noise management.

The potential sources of noise from the Project, which may impact on the surrounding sensitive receptors, could include noise from:

- Light and heavy vehicles on the Project site and accessing the Project site;
- Hauling and dumping operations;
- Blasting;
- Crushing; and
- Ore processing.

Noise measured at location L1 (EHM Mining Camp) and L4 (Cloncurry Copper Project Mining Camp) are predicted to meet the *EcoAccess Guidelines - Planning For Noise Control* (QEPA 2004), DERM Background Plus criteria and *Ecoaccess Guideline - Assessment of Low Frequency Noise* (QEPA 2002) as well as sleep disturbance requirements.

Location L2 (Dryburgh Homestead) is predicted to meet the Planning For Noise Control criteria (QEPA 2004), DERM Background Plus criteria and "Assessment of Low Frequency Noise" as well as sleep disturbance requirements. Location L3 is predicted to meet the low frequency noise criterion (QEPA 2002) as well as maximum noise level (L_{max} of 52 dB(A)) requirements of the sleep disturbance criteria.

Location L3 is predicted to exceed the Planning For Noise Control criteria (QEPA 2004) for evening and night time but meet the DERM Background Plus criteria and continuous sleep disturbance limit of L_{eq} 37 dB(A).

The daytime and all neutral meteorological cases meet the Planning for Noise Control criteria (QEPA 2004). The evening and night time predictions exceed the Planning For Noise Control limit by 1 to 3 dB(A) for the adverse meteorology case only. However, the adverse evening and night time cases meet the DERM Background Plus criteria.

Recommendation

Based on the submitted EIS results and the proposed limits, the following measures should be included in the EM plan:

- Once the mine is operating, conduct noise monitoring at Location L3 to demonstrate acceptable noise exposure; and
- Air-blast noise measurements should be conducted during the initial blasting operations to assist with the optimisation of the blast parameters. Maximum Instantaneous Charge (MIC) and stemming height together with other blast parameters should be reviewed to ensure the desired air blast limits are met.

3.1.7 Nature conservation

The submitted EIS adequately addressed the TOR in regard to site nature conservation. The submitted EIS has made the following findings.

One Regional Ecosystem observed throughout the Project areas (1.3.7a – River Red Gum Riparian Woodland) is listed as 'Endangered' under the DERM Biodiversity Status due to severe degradation and high grazing pressure. This riparian community was observed on the proposed haul road corridor at creek-crossings associated with Courtenay Creek. The overall condition of this community at the creek-crossings is reduced by cattle grazing and weed invasion. Based on proposed disturbance plans for the haul road, additional clearing of Regional Ecosystem 1.3.7a will be required. Regional Ecosystem 1.3.6a (Ghost Gum/ Western Bloodwood Woodland) and Regional Ecosystem 1.3.4 (Gidgee Woodland) are listed as being 'Of Concern' under the DERM Biodiversity Status, due to high grazing pressure and weed invasion. Based on proposed disturbance plans for the Project, limited clearing of these Regional Ecosystems is required. Provided mitigation strategies are implemented it is unlikely these communities will be significantly impacted at a regional scale.

No individual species of conservation significance were identified on the Project, despite targeted surveys being undertaken in all habitat types.

One weed species declared under the *Land Protection (Pest and Stock Route Management) Act 2002*, Parkinsonia (*Parkinsonia aculeata*), was recorded during the survey. Parkinsonia was recorded on the haul road corridor, notably on alluvial plains associated with watercourses.

Five species that are not listed as declared weeds however are non-native were also recorded during the course of the surveys, including Mimosa Bush (*Acacia farnesiana*), Noogoora Bur (*Xanthium strumarium*), Buffel Grass, *Pennisetum pennisetiforme* and *Corchorus olitorius Pennisetum pennisetiforme,* Buffel Grass, and Mimosa Bush were found to be particularly abundant throughout the Monakoff project area.

The following potential impacts on nature conservation values may occur from the Project site:

- Land clearing and mining activities (noise and blasting) on the Monakoff project area may reduce the available habitat for native species of fauna, particularly reptiles and bats inhabiting rocky outcrops;
- Vegetation clearing associated with the haul road may increase soil erosion which may adversely affect riverine habitats associated with Courtenay Creek and associated tributaries;
- The spread of declared weed species Parkinsonia, other noted weeds Mimosa, Noogoora Burr, Buffel Grass, Corchorus olitorius and Currant Bush may occur on the Project areas due to mining operations; and
- Vegetation clearing of the River Red Gum Riparian Community (RE 1.3.7), which is listed as 'Endangered' under the DERM Biodiversity Status, at the Courtenay Creek haul road crossing.

The Purple-necked Rock-wallaby species is listed as Vulnerable under the *Nature Conservation Act 1992* and was observed during both the dry and wet season surveys on the Monakoff project area.

- Impacts on the Purple-neck Rock-wallabies may include:
  - The proposed development of the Monakoff East pit will necessitate clearing of native vegetation and rocky boulders at Rocky Outcrop Site 1. This may equate to a loss of residential and foraging habitat near the rocky outcrop, leading to the loss of holding capacity for the area;
  - Rock-wallaby movement and dispersal may be restricted by the proposed haul road, in particular between Sites 2, 3 and 7;
  - The affects of increased noise and vibration on Rock-wallabies is unknown, and impossible to quantify prior to construction activities. All rocky outcrop sites occur within the 500m blast exclusion zone which surrounds the proposed open cut pits.
  - Although blasting only lasts for a few seconds each day, this may induce an added stress to the Rock-wallabies;

- Pest species are known to increase around human habitation. The chances of higher predation may increase when the mine is in operation. Dingos, Red Foxes, and Feral Cats (*Felis catus*) are of particular concern;
- Increased water availability and greater abundance of fodder may increase the number of competing macropods and other herbivorous species (e.g. European Rabbit); and
- Additional roadways may result in an increase of Rock-wallaby injuries or death.

Mitigation strategies aimed at reducing or eliminating impacts from the Project on the Purple-necked Rock-wallaby population should include:

- Creation of a pest control program that will limit predation on Purple-necked Rock-wallabies;
- Using wildlife reflectors on roads near the Monakoff Project area to deter animals while vehicles are passing;
- Educating site personnel on the conservation significance of Purple-necked Rock-wallabies;
- Stockpiling boulders cleared from the disturbance footprint of the mining activities at Monakoff for future use in augmenting Rock-wallaby habitat, if further study proves the Rock-wallabies are not relocating to alternative sites; and
- Continued monitoring of Rock-wallaby populations on site for a minimum of three years after the commencement of mining at Monakoff.

Strategies to minimise impacts on the River Red Gum Riparian Woodland (RE 1.3.7a – listed as 'Endangered' under DERM Biodiversity Status), Gidgee Woodland (1.3.4 - listed as being 'Of Concern') and Ghost Gum/ Western Bloodwood Woodland (1.3.6a - listed as being 'Of Concern' should include, but are not limited to:

- Retention of large trees as close as feasible to haul road and disturbance areas;
- Aligning of access roads with existing tracks and established fence-lines so as to minimise additional vegetation clearing;
- Positioning creek-crossings at localities of existing crossings or areas of narrowest riparian vegetation or with less dense clusters of mature and canopy species, particularly River Red Gum (*Eucalyptus camaldulensis*); and
- Encourage natural regeneration of native shrubs by removing weeds, which will aid in keeping canopy at a lower height.

Conclusions and recommendations:

Purple-necked Rock-wallaby

The proposal by Exco to monitor the impacts of blasting on the Purple-necked Rock-wallaby seems to be aimed more at documenting impacts on the species and is not linked to mitigation measures. The EM Plan needs to include a commitment by Exco to implement actions when monitoring impacts In addition, the use of photo monitoring should be included in the EM plan, to provide a more comprehensive monitoring program, and be completed with crack and movement monitoring points/pins at the entrance to know den sites. The initial monitoring should be undertaken before blasting commences and then after the first sequence of blasting, once the blast area is safe. The next phase of monitoring should be after one month and then at six monthly intervals. If the purple-necked rock-wallaby are displaced the EM plan should alternative den habitat to be provided in the vicinity.

The revised monitoring program would allow an accurate determination of habitat disturbance. The initial monitoring should be undertaken before blasting commences and then after the first sequence of blasting, once the blast area is safe. The next phase of monitoring should be after one month and then at six monthly intervals. If the purple-necked rock-wallaby are displaced the EM plan should commit Exco to provide alternative den habit in the vicinity.

The objective of this strategy would enable the purple-necked rock-wallaby's ongoing use of food resources by maintaining secure den sites, minimising impacts on the population.

Flora

The report identifies a range of possible impacts to flora but provides no detail on these. This impact assessment is generally useful but should be linked to specific values with detailed explanation and maps. The EM plan should include a detailed description of impacts, such as the actual areas of regional ecosystems to be cleared and the mitigation measures to be implemented.

3.1.8 Transport

The submitted EIS has adequately addressed the TOR for transport.

The Department of Transport and Main Roads has identified the following recommendations that are required to be implemented for the project.

The submitted EIS describes a number of transport scenarios for hauling copper concentrate and magnetite to different locations for processing or further haulage by rail. To ensure the road transport impacts and requirements of the transport option are fully assessed, Exco is required to address:

- update the road impact assessment (RIA) for traffic generated by the project to include the final details of all project traffic impacts on the safety and efficiency of state-controlled roads, in accordance with Guidelines for Assessment of Road impacts of Development (2006) and in consultation with the Manager of DTMR North West Regional Office. The RIA must be submitted to the Manager DTMR North West Regional Office for review and approval. This finalised advice about mineral haulage would be part of the proponent's compliance with "notifiable road-use" requirements under Part 7A of the *Mineral Resources Act 1989*.

- prepare a road-use management plan (RMP) for all use of state-controlled roads for each phase of the project. The RMP will detail traffic information on which impact mitigation strategies were based such as volumes, proposed transport routes and haulage scheduling, details of any over-dimension/mass loads proposed, road safety management, required road infrastructure maintenance and/or upgrades to mitigate road impacts, any necessary requirements about access/connection to public roads, dust control, spill management and so on. For example, queuing of haul vehicles on Flinders Hwy near Station St should be safely regulated. DTMR must approve the RMP prior to commencement of construction under sections33 and 50 of the *Transport Infrastructure Act (Qld) 1994* to enter and conduct works on the State controlled road network.

- enter into a road infrastructure agreement with DTMR to formalise contributions towards any necessary road maintenance and infrastructure upgrades identified in the finalised RMP to ameliorate any significant adverse impacts of road use by the project; and

- as part of the RMP, the proponent must provide details of traffic management measures during construction of the Fisher's Creek access and any other works required in state-controlled road reserves, for prior approval by DTMR before commencing construction under sections33 and 50 of the *Transport Infrastructure Act (Qld) 1994* to enter and conduct works on the State controlled road network.

Access via Fisher's Creek Road will be a single point of access from the Flinders Hwy for light vehicles only. It shall be upgraded to a sealed rural property access standard at 90 degrees with speed advisory and vehicle limit signs, in accordance with Chapter 13, DTMR Road Planning & Design Manual. No other access will be permitted in the vicinity.

Prior to construction of any transmission crossings of State-controlled roads e.g. the Burke Developmental Road (Cloncurry – Normanton), the proponent shall consult with the Manager DTMR North West Regional Office about structure locations in or near the road reserve and line clearances and ensure there is no increase in road safety risk or obstruction to over-sized loads.

3.1.9 Social

The submitted EIS adequately addressed the TOR in regard to social impacts.

In the submitted EIS, the proponent is committed to protecting the local community from the impact of the Project. In order to satisfy this commitment, Exco will establish an Environmental and Community Department within the company consisting of an environmental and community relations superintendent, two environmental officers and up to five additional support staff. A principal role of the department will be to monitor the impact the project has on the community and community response to the project. The department will coordinate community surveys to gauge the community's opinion of the project. These community response surveys will allow the company to assess and evaluate the effects of the project from a subjective community stand point.

The environmental and community representatives of the company will take part in community meetings and forums where they can listen to and subsequently address community complaints and concerns.

A mailing address, email and phone number will be allocated to community complaints and concerns and will be managed by the department. All concerns and complaints will be promptly addressed.

A Community Complaints Register will be utilised to record all complaints that the Project may receive from the community, through any medium, and will also be managed by the department. The complaints register will ensure that all complaints are responded to promptly and tracked until resolution. The complaints register will also be used as a historical data tool for future project developments, allowing the company to take into account past complaints in the design stage of future project developments.

Conclusions and recommendations:

The Department of Infrastructure and Planning has advised that the submitted EIS has adequately met the TOR. The Department has one recommendation that should be implemented, as follows:

The Community Safety Plan, identified the submitted EIS, must be implemented at the construction phase of the project. Currently the submitted EIS identifies that it would commence at operations. The Community Safety Plan should also continue through operations and closure. The Community Safety Plan should be developed through incorporating concerns and strategies raised through the Community Engagement Strategy process currently in place.

3.1.10 Other Matters

Other matters that need to be addressed in the EM plan are detailed below:

Sewage treatment

- The EM plan states that sewage effluent will be discharged to tailings storage facility; this is not considered best practice (it adds to the water content to the tailings and the treated water cannot be reused for other purposes) and is not preferred. An alternative sewage effluent discharge proposal must be presented in the EM plan.
- The EM plan states that treated sewage and wastewater will be used for subsurface irrigation to water the gardens and lawns at the accommodation camp. The EM plan must provide the specific irrigation details (i.e. quantity, quality, location, soil loading and management).

Rubbish disposal (general waste)

- The submitted EIS addressed the concerns raised by DERM on the draft EIS. The EM plan must be revised to be consistent with commitments made in the supplementary EIS.
- The EM plan is also required to identify whether a groundwater bore will be required near the landfill to monitor for leachate seepage.

Heavy Vehicle Workshop

- The EM plan must address how contaminated waters from wash downs areas will be managed (e.g. identify whether an oil water separator will be installed). The management of control strategies including any oil water separator(s) that prevent a release of contaminants to the environment must be described in the EM plan.

Wash Bay

- Additional information should be provided to explain how the wash bay will be operated and the management of contaminated wash down water.
- The EM plan only identifies that a wash down bay will be provided before the entry to the heavy vehicle workshop for cleaning. The company should include using a wash down facility for all haul trucks leaving the site or travelling between the pit and process site. A wash down facility should be provided at both the Mount Margaret site and at the Monakoff site to ensure the contamination along the haul road is reduced.

Explosive box management:

- The EM plan should identify the management procedure for explosive boxes. The company should seek advice from Queensland Mines and Energy on the appropriated type of disposal. Please note previous advise from Queensland Mines and Energy has been that disposal to the onsite landfill is not acceptable. Explosive box waste management requires additional management measures that are not employed in a general landfill.

4 Recommendations for conditions for any approval

No conditions have been recommended for the project. The EM Plan mentioned below will be required to be amended in accordance with the recommendations of this assessment report before conditions can be proposed. Specific environmental authority conditions will be developed through the EM plan stage of the approvals process.

5 Adequacy of the EM plan for the project

A draft EM plan was included with the draft EIS released for public notification. The draft EM plan was subsequently amended in the Supplementary Report. The EM plan is considered inadequate for the purposes of meeting statutory requirements. As mentioned in section 3 above the EM plan must be amended to include all the recommendations in this assessment report to progress the approvals process. DERM may raise further concerns on the project where additional information identifies unacceptable potential impacts to the environment or areas where statutory requirements will not be met.

6 Suitability of the project

DERM has considered the final TOR, the submitted EIS, all submissions on the submitted EIS and the standard criteria. The submitted EIS and supplementary information have not identified impacts of sufficient magnitude to prevent the project from proceeding. Therefore, the project is considered suitable to proceed to the next stage of the approval process. However, the recommendations of this EIS assessment report should be fully implemented.

Approved by

Stuart Cameron	28 June 2010
Signature	Date

Stuart Cameron
Director, Environmental Impact Assessments
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