

Assessment Report under the Environmental Protection Act 1994

Rocklands Group Copper Project
proposed by Cudeco Limited

July 2011

Prepared by:

Environmental Impact Assessments, Environment and Natural Resource Regulation

Department of Environment and Resource Management

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Published by the Queensland Government, July 2011

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July 2011

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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 Rocklands Group Copper Project (called in this report the Rocklands Copper Project) proposed by Cudoco Limited (Cudoco). The Department of Environment and Resource Management (DERM), formerly the Environmental Protection Agency (EPA), coordinated the EIS process as the administering authority of the EP Act. This assessment report has been prepared pursuant to sections 58 and 59 of the EP Act.

The objective of this assessment report is to:

- address the adequacy of the environmental impact statement and the environmental management plan
- summarise key issues associated with the potential adverse and beneficial environmental, economic and social impacts of the Rocklands Copper Project and the management, monitoring, planning and other measures proposed to minimise any adverse environmental impacts of the project
- 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 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 addresses the adequacy of the EIS in addressing the final terms of reference (TOR) and the suitability of the draft environmental management plan (EM plan). It also discusses in some detail those issues of particular concern that are either not fully resolved or that require specific conditions to be included in project approvals.

The giving of this EIS assessment report to the proponent completes the EIS process under Chapter 3 of the EP Act.

2 Description of the project

The Rocklands Copper Project would be located 90 kilometres (km) east of Mt Isa and 15 km west of Cloncurry in North-West Queensland. The proponent has applied for mining leases (ML) that have been given the following identifying numbers: 90177, 90188 and 90219. The mine is expected to operate for up to 10 years, with the possibility of extension subject to the results of ongoing exploration activities.

The majority of project operations including the mining pits, mineral processing plant, WRDs, Morris Creek diversion, site offices and maintenance workshops would be located on ML90177. A tailings storage facility (TSF) and a diversion of Marathon Creek would be located about 3 km to the east of ML90177 on ML90188. An infrastructure corridor linking the other two mining tenements would be covered by ML90219. The infrastructure corridor would include a tailings slurry pipeline, return water pipeline and light vehicle access road.

The project would involve the development of a greenfield, open-cut, mine with three pits to be known as the Las Minerale, Southern Rocklands and Southern Rocklands Extended pits. The total area of disturbance would be approximately 480 hectares (ha). The depth of the mining pits would range from 70 metres (m) to 210 m.

The mining pits would first be dewatered using diesel and/or electrically operated bore pumps. Dewatered groundwater would be piped to an off-stream Water Storage Facility and would be used for dust suppression and process water in an on-site mineral processing plant.

The operation would be conducted using conventional drilling and blasting techniques, and diesel powered trucks and excavators to extract up to 3 million tonnes per year (Mt/y) of ore. The ore would primarily yield copper and cobalt, but also some gold. The pits would initially mine supergene native copper and sulfide ores, and then primary sulfide ores at greater depth. The operation would produce up to 420,000 t/y of native copper metal and copper concentrate filter cake.

Ore from each of the pits would be transported by truck via haul roads and stockpiled at an on-site, run-of-mine pad. From there, it would be crushed, ground and separated at the mineral processing plant to produce native copper metal, and copper sulfide, cobaltic-pyrite and magnetite concentrate filter cakes. Tailings waste from the processing plant would be mixed with water to create a flowable slurry that would be moved by pipeline about 3 km to the east to a TSF located on ML90188. Supernatant water from the TSF would be reclaimed using a decant tower and submersible pump and would be piped back to a process water pond for recycling through the processing plant.

Native copper metal and concentrate filter cakes from the processing plant would be trucked by triple road train along Corella Park Road and the Burke Development Road and then along a purpose built, heavy vehicle haul road to the existing rail siding in Cloncurry, from where it would be railed to the Port at Townsville for export. In some instances, some product may be trucked via a southern access route along the Barkly Highway directly to Mt Isa. Alternatively, final product would be trucked by triple road train along the same route to Cloncurry and then via a bypass haul road through Cloncurry to a 900 ha, multi-user, multi-purpose rail load-out facility. The alternative facility is proposed to be located about 10 km east of Cloncurry close to the current Townsville/Mt Isa/Duchess rail line network and the Flinders Highway. Approval of the alternative facility would be subject to separate assessment and approval process under the *Sustainable Planning Act 2009*.

3 The EIS process

3.1 Timeline of the EIS process

The EIS for the Rocklands Copper Project was conducted under Chapter 3 of the EP Act. On 27 October 2006, Cudeco applied to undertake a Voluntary EIS. DERM approved the application on 13 November 2006. Cudeco submitted a draft terms of reference (TOR) and Initial Advice Statement for the Rocklands Copper Project on 9 January 2007. However, DERM requested amendments to the draft TOR and a revised document was received on 31 January 2007, which initiated the statutory timeframes for the EIS process.

DERM issued a notice of publication of the draft TOR to Cudeco on 8 February 2007. DERM placed a public notice on the DERM's website and in the Mt Isa North West Star on 9 February 2007, and in the Courier-Mail on 10 February 2007. The draft TOR was available for public comment from 12 February 2007 until 23 March 2007. Cudeco issued copies of the TOR notice to affected and interested persons.

Ten stakeholders provided comments to DERM on the draft TOR within the public comment period. These comments, together with those provided by DERM, were forwarded to Cudeco on 5 April 2007.

DERM received a response from Cudeco on 9 May 2007. DERM considered all comments received on the draft TOR and Cudeco's response prior to issuing the final TOR on 6 June 2007.

The EP Act requires that the EIS should be submitted within 2 years from when the final TOR are given to the proponent, unless the chief executive decides on a longer time. In June 2009, Cudeco requested an extension of time to submit the EIS, and an extension was granted until 30 November 2009. Cudeco submitted the EIS on 9 November 2009 to DERM for review prior to public notification. DERM compared the draft EIS to the final TOR and found that the EIS did not address the final TOR in an acceptable form. DERM issued Cudeco notices on 7 December 2009, 3 February, 19 February, 25 March, 7 April, 16 April and on 30 April 2010 extending the decision period on the EIS to allow for changes to be made to the submitted EIS.

On 25 May 2010, Cudeco submitted a revised EIS to DERM.

On 28 May 2010, DERM issued to Cudeco a notice of decision to proceed with the EIS under s49(5) of the EP Act. The submission period was set at 30 business days.

A public notice was placed on DERM's website on 11 June 2010 and advertised in the North West Star on 11 June and in The Courier Mail on 12 June 2010. The EIS was available for public submissions from 15 June 2010 to 26 July 2010. Cudeco issued copies of the EIS notice to affected and interested persons.

DERM received ten submissions on the EIS within the submission period. These included nine submissions from state government departments and one from a non-government organisation. These submissions, together with a submission from DERM, were forwarded to Cudeco on 10 August 2010. Cudeco's response to submissions was due by 14 September 2010.

Cudeco requested and was granted an extension to the period in which they were required to provide a response to submissions and Supplementary EIS until 1 October 2010. Cudeco's response to submissions was received on 21 September 2010. However, it did not meet the statutory requirements of the EP Act. Specifically, Cudeco's response did not include any amendments of the submitted EIS because of the submissions, nor an EIS amendment notice, as required by section 56 of the EP Act. Consequently, Cudeco requested and was granted another extension until 1 November and a further extension until 29 November 2010. In the meantime DERM had a meeting with Cudeco on 8 November to discuss the proposed response to a number of key outstanding issues including creek diversions, waste rock characterisation and final landform design. Shortly after the meeting Cudeco requested and was granted another extension until 28 February 2011. Subsequently, Cudeco requested and was granted three additional extensions until 31 March, 29 April and 6 May 2011 respectively. Cudeco's response to submissions and Supplementary EIS was received by DERM on 3 May 2011. The Supplementary EIS included an amended environmental management plan (EM plan). Copies of the response to the submissions and Supplementary EIS were sent to the respondents for comment on 6 May 2011.

DERM received three submissions from State government departments on the proponent's response to submissions and Supplementary EIS. The submissions were forwarded to Cudeco on 2 June 2011 for consideration.

DERM decided under s56A of the EP Act on 31 May 2011 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 Cudeco on 15 June 2011. However, the submitted EM plan did not meet the statutory requirements under s203 of the EP Act, so the notice included an attachment that described issues with the EM plan that needed to be addressed. Cudeco submitted an Addendum to the Supplementary EIS in response to the matters still needed to be addressed in the EM plan that was received by DERM on 30 June 2011. DERM assessed the Addendum and found that it adequately addressed many of the outstanding issues in the EM plan. DERM would expect Cudeco to amend the EM plan to include the relevant information from the Addendum. However, there are still a number of outstanding issues that were not adequately addressed by the Addendum that are outlined in section 5 of this report. DERM would expect Cudeco to consider the outstanding issues outlined in section 5 and make additional amendments to the EM plan, prior to submitting the amended EM plan for assessment.

When preparing this EIS assessment report, DERM considered submissions and comments from stakeholders 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).

3.2 Approvals

The following approvals outlined in Table 1 are required for the Rocklands Copper Project.

Table 1 - Project approvals

Approval	Legislation (Administering Authority)
Environmental authority (mining activities)	<i>Environmental Protection Act 1994</i> (Department of Environment and Resource Management)
Mining Leases (ML 90177 and ML90188 for mining and ML90219 for infrastructure)	<i>Mineral Resources Act 1989</i> (Mines and Energy, Department of Employment, Economic Development and Innovation)
Cultural Heritage Management Plan for land within the boundaries of ML90177, ML90188 and ML90129	<i>Aboriginal Cultural Heritage Act 2003</i> (Department of Environment and Resource Management)
Development approval (Operational works to construct pit dewatering bores)	<i>Sustainable Planning Act 2009</i> (Department of Environment and Resource Management)
Water licence (Interfering with the flow of water in a watercourse by diverting the course of flow in Morris Creek)	<i>Water Act 2000</i> (Department of Environment and Resource Management)
Development approval (Operational works in a watercourse by diverting the course of flow in Morris Creek)	<i>Sustainable Planning Act 2009</i> (Department of Environment and Resource Management)
Water licence (Interfering with flow by impounding water by constructing a Water Harvesting Facility on the Morris Creek diversion alignment)	<i>Water Act 2000</i> (Department of Environment and Resource Management)
Written permission for the release of unallocated water from the general or strategic reserve under the Water Resource (Gulf) Plan 2007	Water Resource (Gulf) Plan 2007 (Department of Environment and Resource Management)
Water licence (Taking water by installing a watercourse pump adjacent to the Water Harvesting Facility)	<i>Water Act 2000</i> (Department of Environment and Resource Management)
Development approval (Operational works in a watercourse by installing a watercourse pump)	<i>Sustainable Planning Act 2009</i> (Department of Environment and Resource Management)

Development approval (Operational works for a refrerrable dam by constructing a Water Storage Facility)	<i>Sustainable Planning Act 2009</i> (Department of Environment and Resource Management)
Permit for works in a road reserve to upgrade the Burke Developmental Road (89A)/Corella Park Road intersection	<i>Transport Infrastructure Act 1994</i> (Department of Transport and Main Roads)
Permit for works in a rail reserve to upgrade the rail level crossing ID4037 located at Aerodrome Road/Sir Hudson Fysh Drive	<i>Transport Infrastructure Act 1994</i> (Department of Transport and Main Roads)
Permit for excess mass or over-dimensional loads movements on state-controlled roads	<i>Transport Operations (Road Use Management) Act 1995</i> (Department of Transport and Main Roads)

3.2.1 Consultation program

3.2.1.1 Public consultation

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

3.2.1.2 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 project:

- Cloncurry Shire Council
- Construction, Forestry, Mining and Energy Union
- Department of Communities
- Department of Community Safety
- Department of Education and Training
- Department of Emergency Services
- Department of Housing
- Department of Infrastructure and Planning
- Department of Local Government, Planning, Sport and Recreation
- Department of Main Roads
- Department of Mines and Energy
- Department of Natural Resources and Water
- Department of Primary Industries and Fisheries
- Environmental Protection Agency
- North Queensland Conservation Council
- Queensland Health
- Queensland Police Service
- Queensland Transport
- Southern Gulf Catchments Group
- Sunwater and
- Wildlife Preservation Society.

However, on 26 March 2009 the names of several of those departments changed (see Public Service Departmental Arrangements Notice (No.2) 2009). Table 2 summarises the changes that occurred to Queensland Government departments referred to in this report.

Table 2 - Changes to Queensland government departments

Previous department/s	New department (as of 26 March 2009)
Department of Primary Industries and Fisheries Department of Mines and Energy Department of Tourism, Regional Development and Industry Department of Employment and Industrial Relations	Department of Employment, Economic Development and Innovation (DEEDI)
Environmental Protection Agency Department of Natural Resources and Water	Department of Environment and Resource Management (DERM)
Department of Local Government, Sport and Recreation	Department of Local Government and Planning (DLGP)
Department of Main Roads Queensland Transport	Department of Transport and Main Roads (DTMR)
Department of Communities Department of Housing Disability Services Queensland, Department of Child Safety	Department of Communities (DoC)
Department of Emergency Services	Department of Community Safety (DCS)

3.2.1.3 Public notification

In accordance with the statutory requirements, advertisements were placed in the Courier-Mail and the North West Star to notify the availability of the draft TOR and EIS for review and public comment as stated in section 3.1. In addition, notices advising the availability of the draft TOR and the EIS for public comment were displayed on the DERM website.

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

- DERM website
- DERM Customer Referral Centre, Level 3, 400 George Street, Brisbane
- DERM Mt Isa Office, Cnr Camooweal and Mary Streets, Mt Isa
- Cloncurry Library and
- Cudeco Limited, Unit 34, Brickworks Annexe, 19 Brolga Avenue, Southport.

Copies of the EIS were available for purchase from Cudeco.

3.2.1.4 Site visit

A site visit and presentation on the project for the advisory body took place on 8 July 2010. The proponent escorted members of the advisory body around key features of the project site.

Also an advisory body meeting and project presentation was held in Brisbane on 13 July 2010.

3.3 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 (including the proponent's responses to submissions, Supplementary EIS, Addendum to the Supplementary EIS and amended EM plan)
- c. all properly made submissions and any other submissions accepted by the chief executive;
- d. the standard criteria and
- e. another matter prescribed under a regulation.

These matters are addressed in the following subsections.

3.3.1 The final TOR

The final TOR document, issued on 6 June 2007, was considered when preparing this EIS assessment report. While the TOR was 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. The TOR stated that if significant matters arose during the course of preparation of the EIS that were not incorporated in the TOR (e.g. currently unforeseen issues that emerge as important or significant from environmental studies) then these issues should also be fully addressed in the EIS.

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.

3.3.2 The submitted EIS

The “submitted EIS” was considered when preparing this EIS assessment report. The “submitted EIS” comprised the following:

- i. The EIS that was publicly released on 15 June 2010
- ii. The proponent’s response to submissions report (Response to Public Submissions, amended EM plan & Supplementary EIS) received by DERM on 3 May 2011 that was provided to relevant advisory body members and
- iii. The proponent’s Addendum to the Supplementary EIS received by DERM on 30 June 2011.

3.3.3 Properly made submissions

DERM received ten properly made submissions on the submitted EIS. Those submissions were received from the following stakeholders:

- Department of Communities
- Department of Community Safety
- Department of Employment, Economic Development and Innovation
- Department of Infrastructure and Planning (3 submissions)
- Department of Transport and Main Roads
- Queensland Health
- Queensland Police Service and
- Southern Gulf Catchments.

DERM provided its own submission on the EIS to the proponent.

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.

3.3.4 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
- b. any applicable environmental protection policy
- c. any applicable Commonwealth, State or local government plans, standards, agreements or requirements
- d. any applicable environmental impact study, assessment or report
- e. the character, resilience and values of the receiving environment

- f. all submissions made by the applicant and submitters
- g. the best practice environmental management for activities under any relevant instrument, or proposed instrument, as follows—
 - i. an environmental authority
 - ii. an environmental management program
 - iii. an environmental protection order and
 - iv. a disposal permit
- f. 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
- g. the public interest
- h. any applicable site management plan
- i. any relevant integrated environmental management system or proposed integrated environmental management system and
- j. any other matter prescribed under a regulation.

3.4 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
- Section 57, release of stormwater
- Section 60, activity involving storing or moving bulk material
- Section 62, activity involving acid-producing rock and
- Section 64, activity involving indirect release of contaminants to groundwater.

3.5 Environment Protection and Biodiversity Conservation Act 1999

Cudeco determined that the Rocklands Copper Project would be unlikely to impact on Matters of National Environmental Significance and did not refer the project to the Commonwealth Department of Sustainability, Environment, Water, Population and Communities (formerly the Commonwealth Department of Environment and Water Resources at the time the EIS process started).

4 Adequacy of the EIS in addressing the TOR

The submitted EIS adequately addressed the TOR. This section of the EIS assessment report discusses the main issues and associated commitments by the proponent, and makes recommendations about conditions to be included in approvals for the project.

4.1 Introduction

The EIS provided an adequate introduction to the project, its objectives and scope. It adequately identified the necessary approvals and outlined the assessment and approval processes. The EIS process and approvals required for the project have been outlined in sections 3.1 and 3.2 respectively of this report

4.2 Project need and alternatives

The EIS adequately described the need for the project, and briefly outlined the social, economic and environmental benefits and costs, which were addressed in more detail in later sections of the EIS. This section of the EIS noted that open pit mining is the best alternative for development of the resource, as underground mining of this particular deposit is unlikely to be suitable due to the style, grade and proximity to the surface of the mineralisation.

4.3 Description of the project

The EIS adequately described the location, scope and phases of the project. A description of the project has been provided in section 2 of this report.

4.4 Climate

The EIS adequately described the local climate with regard to how the climate could affect the potential for environmental impacts and the management of operations at the site.

The project proposal is located in the Savannah country of the Southern Gulf of Carpentaria catchment. The climate is mostly hot and dry, with a wet season between December and March. The median rainfall is 474 mm and most of the annual rainfall occurs between January and March, often associated with cyclonic events. On average, the annual rainfall falls for just 37 days. The mean monthly maximum temperature for the area ranges from 25.5 °C in July to 38 °C in December, while the mean monthly minimum temperature ranges from 10.5 °C in July to 24.5 °C in January. The winds are predominantly from the east and south-east during the cooler months, tending a little more from the north-east during the summer months, which means that the Chumvale Homestead and Cloncurry township are upwind of the mine site for most of the year.

4.5 Land and Waste

The EIS was generally adequate with respect to the TOR for describing those aspects of the site related to the existing and proposed qualities and characteristics of land and the management of wastes that would be generated on-site. However, kinetic column leach testing of the waste rock and tailings was not completed in time for the results to be assessed as part of the EIS process. Furthermore, the homogeneity and representativeness of the static tailings characterisation was not shown to be adequate for mine planning, or for the purposes of the EIS. Also, the waste rock disposal options have not been adequately described in sufficient detail within the EM plan for DERM to be able to prepare specific draft environmental authority conditions for waste rock disposal and management. These issues, together with the key qualities and characteristics of land and the waste management measures proposed at the project site are discussed in the relevant subsections below.

4.5.1 Land contamination

Cudeco conducted a preliminary site investigation for contaminated land based on a review of metal concentrations in topsoil across the site and field inspections to identify any measurable signs of existing soil contamination. The concentration of boron, copper, manganese and zinc in topsoil was compared to the Environmental Investigation Levels (EIL) of the Draft Guidelines for the Assessment and Management of Contaminated Land in Queensland (EPA, 1998). All soil metal concentrations were below the listed EILs. Table 3 provides a summary of the metal concentrations in the soil profile across the site and the associated EILs.

Table 3 - Metal concentrations in soils (mg/kg)

Metal	Max conc (0-10cm)	Max conc (10-20cm)	Max conc (40-50cm)	Guideline (EIL)
Boron	5.1	5.2	6.2	—
Copper	24	26	16	60
Manganese	45	44	33	500
Zinc	1	0.46	0.12	200

Metalliferous mining may result in contamination and eventually pollution of soil in undisturbed areas of the mine site, mainly due to air borne deposition of dust from mining and ore processing. Dust generation tends to create a halo of contamination around metalliferous mining sites which can damage shallow rooted plants and affect species reliant on vegetation. There could also be some soil contamination and eventually pollution accumulating around the interconnecting haul roads in the undisturbed surrounds.

Based on the results of the preliminary site investigation natural background soil copper levels are about 25mg/kg. However, the cumulative effect of continuous mining and ore processing over a number of years could result in levels around these areas reaching a couple of orders of magnitude above background, decreasing with distance from operations.

Prior to making an application for surrender or approval for progressive rehabilitation Cudeco would be required to undertake a contaminated land assessment / investigation of the areas of the project potentially affected by soil contamination in accordance with DERM's Guidelines for the Assessment & Management of Contaminated Land in Queensland. Details about the land assessment/investigation requirements are outlined in the recommended draft environmental authority conditions contained in Schedule C of Appendix 1 of this report.

4.5.2 Characterisation of waste rock

In the version of the EIS that was available for public submissions, Cudeco presented static acid based accounting (ABA) analysis from a first phase preliminary screening assessment for 32 samples of waste rock to represent the major lithologies and oxidation types identified during the exploration drilling program. The EIS that was available for public submissions also included ABA information from a second phase assessment for 124 samples of waste rock selected to cover the main lithologies that would be mined as waste and to cover the range of sulfur grades identified in the exploration drilling sulfur assay database. This resulted in a total of 156 ABA samples analysed at the EIS stage. DERM considered the sampling intensity for waste rock characterisation to be below that required by the TOR. The Technical Guidelines for the Environmental Management and Exploration of Mining in Queensland (DME, 1995) (DME Technical Guidelines), which is the lead reference document for determining sampling intensity in the TOR, recommends a significantly greater number of samples to be undertaken to accurately characterise the nature, distribution and variability of critical parameters in each waste rock lithology.

DERM's comments on the EIS requested Cudeco to conduct additional ABA sampling consistent with the requirements of the DME Technical Guidelines and this requirement was reiterated to Cudeco at a meeting on 8 November 2010. At a meeting on 14 December 2010, Cudeco advised DERM that a third stage of

additional ABA sampling to meet the DME Technical Guidelines requirements was being undertaken and the results would be included in the Supplementary EIS.

Additional ABA sampling and analysis was undertaken and presented in the Supplementary EIS. A summary of waste rock characterisation and ABA work undertaken for the project at the EIS and Supplementary EIS stages is outlined in Table 4.

Table 4 - Waste rock characterisation summary

Lithology	Waste Volume (Mt)	Waste Percent (%)	No. of ABA samples (EIS)	DME Technical Guideline requirements	No. of additional samples required	No. of additional samples analysed (Supplementary EIS)
Dolerite	46.1Mt	62%	92	163	71	75
Sediment	13.2Mt	17.8%	30	89	59	58
Breccia	3.5Mt	4.7%	10	47	37	40
Calcareous	6.4Mt	8.6%	7	56	49	33
Quartz sediment	0.6Mt	0.8%	11	20	9	19
Meta sediment	2.5Mt	3.3%	6	40	34	7
Cover #	1.5Mt	2%	-	-	-	-
Other *	0.3Mt	0.4%	-	-	-	-
Total	74.1Mt	99.6%	156	415	259	232

Cover material has a very low sulphur grade deemed too low to generate significant acid and no detailed testing of this material was conducted.

* Minor lithology not subject to detailed testing but conservatively assumed to contain 25% potentially acid forming or uncertain material and will be selectively handled.

The information in Table 4 identifies that for the Supplementary EIS stage Cudoco has obtained and analysed a significant number of additional ABA samples which is proportional to the estimated tonnages of each waste rock lithology and is consistent with the requirements of the DME Technical Guidelines.

Based on the geochemical assessment, it has been estimated that the maximum volume of potential acid forming (PAF) waste rock will be approximately 5.4 million tonnes, equivalent to 7.3% of the total waste rock to be generated by the project. PAF waste will be selectively mined and encapsulated in the south-eastern portion of the Western WRD inside the natural catchment of the Las Minerale residual void, but outside of any remnant drainage flow paths behind the Morris Creek diversion dam. PAF waste rock that can not be accommodated in the Western WRD will be backfilled in the Southern Rocklands Extended or Las Minerale residual voids subject to evaluation of the final mining schedule and reserve calculations that would be undertaken after the EIS process has been completed. If Cudoco determines it unfeasible to dispose of PAF waste rock in the Southern Rocklands Extended or Las Minerale residual voids, additional PAF waste rock not able to fit within the south-eastern portion of the Western WRD would be placed in another cell of the Western WRD behind the Morris Creek diversion dam. The PAF material would be placed on a layer of benign, non-acid forming (NAF) waste rock to minimise contact with any seepage through or under the diversion dam wall. Any seepage from the PAF material encapsulated within the Western WRD would drain into the natural catchment of the Las Minerale residual void. As discussed in Section 4.6.2 of this report, the Las Minerale residual void would act as a ground water sink, reducing the potential for contaminated water flowing into deeper aquifers related to the fractured ore zone.

The version of the EIS that was available for public submissions did not include an adequate assessment of potential neutral, saline or metalliferous mine drainage from the WRDs. Only a limited number of multi-element samples were analysed for the first and second phase assessment and the metal assays analysed were not full metal suites. Also, the analysis used high limits of detection which is not considered suitable for the purposes of the EIS for identifying the potential leachate quality from the WRDs. Furthermore, paste electrical conductivity (EC) was only tested on waste rock proposed for the outer batters of the WRDs.

DERM's comments on the EIS requested Cudeco to undertake a detailed geochemical assessment of the potential for neutral, saline and metalliferous mine drainage from the WRDs. At a meeting on 8 November 2010, Cudeco was requested to consider how metals and salts will behave under a variety of potential field conditions, including varying reduction-oxidation potential and pH ranges under acidic, neutral and alkaline conditions. At a meeting on 14 December 2010, Cudeco advised that the level of analysis proposed for the third phase assessment would include paste EC, paste pH and detailed multi-element suites using appropriate detection limits, and the results would be included in the Supplementary EIS.

The Supplementary EIS provided the results for 356 samples tested for paste EC to determine the likely salinity of any waste rock seepage, and paste pH to determine the likely pH of any waste rock seepage. The results of the paste pH testing indicate that WRD seepage would likely be slightly alkaline with a pH of around 8.0, which is similar to the pH of background surface water quality data. The results of the paste EC testing indicate that WRD seepage would likely be two to three times greater than the EC of background surface water quality data. The significance of the EC result is discussed in the distilled water extract testing results further down in this section.

An additional 234 samples were tested for multi-element suites to determine any elemental enrichment within the waste rock. The results of the multi-element sampling indicate that:

- Arsenic and selenium were the most pervasively enriched elements within the samples
- The average arsenic concentration within all samples was 67 parts per million (ppm) with values as high as 1379 ppm
- The average selenium concentration was 1.2 ppm with values as high as 9.4 ppm
- Boron, bismuth, cadmium, cobalt, copper, molybdenum, lead and antimony were variably enriched but at least one sample contained high levels of these elements and
- Uranium was not pervasively enriched, but was found in concentrations of up to 27 ppm, well below the level at which its toxicity could potentially cause health concerns.

A review of the paste pH from the samples indicated that the very high alkalinity in the majority of samples would negate the modification to the pH used in the extraction fluid. Based on consultation with several independent geochemists, DERM's request to conduct testing under acidic, neutral and alkaline conditions was not undertaken. DERM accepts that the proponent has obtained independent advice stating that additional testing under a variety of pH ranges is not applicable.

Distilled water extract testing was undertaken on ninety four samples to determine the readily soluble elements within the waste rock. The number of samples tested for each lithology was proportional to the estimated waste rock tonnages and the samples were selected to cover a range of sulfur grades at various depths in order to be representative of the waste rock to be mined at the project site. The results indicated that the weighted average water quality calculated for all the NAF waste was found to meet the ANZECC & ARMCANZ Guidelines 2000 (ANZECC Guidelines) 95th percentile aquatic ecosystem guideline trigger values for all parameters, except pH, EC, aluminium and copper. However, pH and aluminium and copper concentrations were calculated to be below the ANZECC Guidelines 90th percentile concentrations measured in surface water at the site. Similar to the results of the paste EC testing, the EC identified by the distilled water extract testing is likely to be 2.2 times the ANZECC Guidelines 90th percentile EC values measured in surface water at the site. However, estimates of the leachate dilution in water storages prior to release off-site, indicates that EC would likely be within the ANZECC Guidelines 95th percentile aquatic ecosystem guideline trigger value.

Kinetic column leach testing was deferred until completion of the third stage of static testing so that ABA results could be used to better select kinetic samples. Prior to the commencement of mining, Cudeco will complete 16 kinetic tests on various waste rock types. It is expected that some columns may need to be operated for extended periods of time in excess of twelve months. Cudeco expect that the kinetic testing will provide the following results:

- water quality data for comparison with distilled water extract test results
- data on lag time to acidification of PAF waste
- data on relative reaction rates of sulfide and carbonate minerals in the waste rock and

- more reliable data about acid formation potential of waste rock and tonnage of PAF waste rock material requiring in-pit disposal or encapsulation in surface WRDs.

The kinetic leach test results will assist in fine tuning the operational decision-making regarding the handling of waste rock during the early stages of mining, including the length of time that PAF cells should be left open prior to laying the cell dividers and sealing the PAF waste. The kinetic results will also allow pit void water quality and long term leachate generation from the non encapsulated waste rock to be predicted, to assist with mine decommissioning and closure planning. Cudeco also proposes to undertake ongoing kinetic column leach testing as various waste rock types are encountered throughout the life of the mine to provide more detailed geochemical waste rock information to assist further with mine decommissioning and closure planning. Cudeco has developed a calcite/sulfur balance block model for the mining pits and intends to continually update the model as new kinetic column leach testing results become available.

Cudeco proposes to selectively handle all waste material classified as potentially acid forming or uncertain. Areas of PAF waste rock in the pits requiring selective handling will be demarcated by surveyors prior to mining. A colour coding traffic light system, effectively implemented at many mine sites, is proposed on all trucks and excavators handling waste rock to ensure that ore, PAF and NAF material is transported to the appropriate location.

4.5.3 Characterisation of tailings

In the version of the EIS that was available for public submissions, Cudeco presented geochemical testing information based on two samples – 1 sample from the supergene tailings and 1 sample from the primary tailings. The results of the analysis showed that the supergene tailings sample had a very low sulfur content and associated sulfide content of 0.01%, with a calculated maximum potential acidity of 0.3kg H₂SO₄/t. The primary tailings sample had a moderate total sulfur content and associated sulfide content of 0.67%, with a calculated maximum potential acidity of 20.6kg H₂SO₄/t. The acid neutralising capacity (ANC) of the carbonates and other non carbonate minerals in the two samples was analysed. The results of the analysis showed that both samples have a moderate to high carbonate content. The supergene tailings had an ANC of 108kg H₂SO₄/t, and the primary tailings had an ANC of 261kg H₂SO₄/t. The net acid generation (NAG) test indicated that neither tailings sample would produce measurable acid with a NAGpH for the supergene of 8.9 and a NAGpH for the primary tailings of 9.0.

Due to the grain size distribution of the tailings, it is likely that a large portion of the acid neutralising capacity will be available for reaction. The basic nature of the tailings (pH around 9) is likely to increase the risk of some metals or metalloids and salts being mobilised within tailings water. Particularly, pH values above 8.5 significantly increase the potential for arsenic mobilisation, and geochemical results show arsenic is enriched within the ore body. Furthermore, results show potentially high levels of selenium in tailings water. Selenium can also have varying mobility depending on a variety of factors including reduction-oxidation potential, pH, soil type and microbial action.

Consequently, tailings liquor may become hazardous at some point during the mining operation. Cudeco proposes to reclaim tailings liquor from the TSF using a decant tower and submersible pump and return the water via a pipeline to the process water dam for recycling through the processing plant. The process water dam will be classified as a regulated dam having a high hazard category under the DME Technical Guidelines and will be conditioned accordingly in the environmental authority.

The basic pH and high carbonate percentage could result in various salts being dissolved in tailings pore water. The physical nature of these tailings makes soil-water potential forces, such as capillary rise, a key issue. As a result, there is potential that evaporation will result in salting of the tailings surface in areas where tailings pore water is near the surface, and capillary rise brings more salts to the surface. Closure and rehabilitation techniques will need to consider prevention of salt rise, as this salt rise has the potential to desiccate clay barriers and impact on plant growth. Cudeco proposes to conduct detailed modelling and in-situ decommissioning and rehabilitation trials of the TSF in consultation with the administering authority during the operational phase of the project. The outcomes of this process would guide Cudeco with regard to the preferred strategy for final TSF decommissioning and rehabilitation. It will be necessary for the draft environmental authority to include conditions that require Cudeco to undertake long-term kinetic column leach testing throughout the operation to determine reduction-oxidation influences of water quality, soil-

water interactions, and the influence of basic pH ranges. The results of these tests would be used to guide decisions regarding TSF decommissioning and rehabilitation. The draft environmental authority will also need to include conditions requiring Cudeco to commence rehabilitation trials of the various cover systems as soon as possible. The trials will need to consider how salting due to capillary rise would be mitigated.

Despite evaporation due to capillary rise, the physical nature of the tailings will likely result in high water retention within the tailings in the TSF. While in the short term, the limited geochemical testing indicates that the tailings are at low risk of producing acid waters, the soil-water interactions over time will potentially deteriorate water quality. There is a potential that seepage from the TSF will be of poor quality after site closure. Consequently, it will be necessary for the draft environmental authority to include conditions that require Cudeco to proactively manage tailings throughout the operational life of the mining operation.

The ABA assessment of the tailings presented in the EIS did not adequately demonstrate that the sampling intensity of two samples was homogenous and adequately characterised the tailings. DERM's submission on the EIS requested Cudeco to undertake a detailed assessment of the physical and chemical characteristics of tailings material. The need for Cudeco to demonstrate that the sampling intensity is homogenous and representative was reiterated by DERM at a meeting with Cudeco on 8 November 2010.

Further information about the homogeneity and representativeness of tailings sampling was not provided in the Supplementary EIS. To address DERM's concerns about the homogeneity and representativeness of the tailings sampling it will be necessary for the environmental authority to include conditions that require Cudeco to undertake ongoing ABA sampling of the tailings to allow statistically valid tailings characterisation. The results of these tests would be used to guide decisions regarding TSF decommissioning and rehabilitation.

4.5.4 Waste rock dump designs and locations

In the version of the EIS that was available for public submissions, Cudeco proposed to construct a series of above ground WRDs to dispose of the waste rock. These surface dumps are known as the Northern WRD located to the east of the Las Minerale pit, the Eastern WRD located to the east of the processing plant, the Western WRD located to the east of the Morris Creek diversion dam and the Southern WRD located to the east of the Southern Rocklands pit. Based on the limited amount of waste rock characterisation completed at the time, the EIS estimated that there would be 14.4 million tonnes of PAF waste rock material requiring special handling and disposal. Due to the significant quantity, PAF material was proposed to be encapsulated in designated cells within the Southern and Western WRDs. Any leachate from the proposed PAF cell in the Western WRD would drain into the Las Minerale residual void and would be prevented from flowing off-site. However, the Southern WRD is located outside the natural catchment of the Las Minerale residual void and Cudeco proposed in the EIS a complex drainage diversion system to direct leachate back into the catchment of the Las Minerale residual void.

DERM's submission on the EIS requested Cudeco to reconsider PAF disposal options so that PAF waste would be disposed within the natural catchment of the Las Minerale residual void without the requirement for any engineered drainage diversion systems. This issue was reiterated by DERM at a meeting with Cudeco on 8 November 2010. At a meeting on 10 March 2011, Cudeco advised DERM that based on new information obtained from the results of significant additional waste rock characterisation (discussed in section 4.5.2 of this report) the tonnage of PAF waste rock had been revised and is now estimated to be only 5.4 million tonnes. This significant reduction in the expected volume of PAF waste rock allowed Cudeco to revise the WRD designs so that all the PAF waste rock could be placed within the Western WRD. DERM advised Cudeco that it would not be desirable to dispose PAF waste in the part of the Western WRD that would be on top of the old Morris Creek channel behind the Morris Creek diversion dam because seepage through, or under, the dam wall could penetrate the WRD and interact with PAF waste that may result in acid leachate exiting the downstream side of the WRD.

DERM also advised that PAF waste should not be placed in the western portion of the Western WRD that would be outside the natural catchment of the Las Minerale residual void because leachate could potentially enter Morris Creek and pass down the diversion channel. Cudeco advised that revised PAF disposal options and WRD designs to meet these requirements would be included in the Supplementary EIS. However, the revised WRD designs provided in the Supplementary EIS and amended EM plan did propose that PAF waste

would be placed in the western portion of the Western WRD. To address the potential for leachate to enter Morris Creek, Cudenco proposed that a layer of benign NAF waste rock would be constructed and engineered so that any leachate generated by the overlying encapsulated PAF waste would be directed back into the natural catchment of the Las Minerale residual void. DERM did not consider this to be an adequate solution. At a meeting held on 2 June 2011, the following PAF disposal locations were agreed with Cudenco in order of preference:

1. PAF cell encapsulation within the south-eastern portion of the Western WRD that would lie in the natural catchment of the Las Minerale residual void, but outside the old Morris Creek channel downstream of the Morris Creek diversion dam.
2. In-pit PAF disposal within the Southern Rocklands Extended residual void subject to evaluation of the final mining schedule and reserve calculations.
3. If in-pit PAF disposal is not achievable, an additional PAF cell would be encapsulated within the northern portion of the Western WRD on top of the old Morris Creek channel downstream of the Morris Creek diversion dam. The additional PAF cell would be placed on a basal layer of benign non-acid forming (NAF) waste rock to prevent any seepage through, or under, the Morris Creek diversion dam from interacting with the PAF waste.

On 30 June 2011 Cudenco submitted an Addendum to the Supplementary EIS that included revised preliminary design drawings showing the preferred option of PAF disposal in the south-eastern portion of the Western WRD. However, there was insufficient detail about the alternative options for in-pit PAF disposal or the additional PAF cell in the northern portion of the Western WRD for DERM to be able to develop specific conditions about waste rock disposal and management. It is understood that in-pit PAF disposal would be subject to evaluation of the final mining schedule and reserve calculations and that this information will not be available to include in the amended EM plan. However, details and plans describing the design and management of the additional PAF cell in the northern portion of the Western WRD will need to be provided by Cudenco in an amended EM plan. DERM will have to assess the amended EM plan and determine it to be satisfactory, prior to developing specific conditions for the draft environmental authority. This issue is discussed in further detail in section 5 of this report.

4.5.5 Recommended EP Act land and waste conditions

The conditions relating to the management of land and waste that are recommended to be included in the draft environmental authority are outlined in Schedule C of Appendix 1.

In addition to the conditions outlined in Appendix 1 it is recommended that draft environmental authority conditions are developed about the requirements for ongoing characterisation and selective handling of waste rock, noting that there should be specific requirements for completing kinetic testing and the results used to finalise waste rock dump designs.

It is also recommended that draft environmental authority conditions are developed about the requirements for ongoing ABA sampling and characterisation of the tailings and long-term kinetic column leach testing and for the statistically valid results to be used to assist with TSF closure planning. Additional conditions should also be included about the requirement to commence rehabilitation trials of the potential tailings capping systems as soon as possible that consider how capillary and salt rise would be mitigated.

Specific conditions for the draft environmental authority will be developed by DERM once the revised PAF disposal locations and WRD designs have been provided in an amended EM plan and the EM plan has been assessed and determined to be adequate. DERM's assessment of the amended EM plan will be completed by the responsible delegate of the chief executive after the EIS process has been finalised.

4.6 Water resources

The EIS was generally adequate with respect to the TOR for describing the surface water and groundwater resources of the site and proposing management and mitigation measures to minimise the impacts on said water resources. However, the proposed Backflow Prevention Dam associated with the Morris Creek

diversion design requires some revisions. The Backflow Prevention Dam, together with the issues associated with the management of surface and groundwater resources are discussed in the relevant sub-sections below.

4.6.1 Groundwater

The project area occurs in the Quamby-Malbon Zone of the Eastern Succession of the highly mineralised Proterozoic, Mt Isa Inlier. The Rocklands Copper Project is located within the major north Duck Creek Anticline. Groundwater flow is in a north-easterly direction across the main tenement (ML90177) and in an easterly direction across the eastern tenement (ML90188). The mining pits will need dewatering due to the inflow of groundwater from two aquifers identified in the area. The first aquifer is located at the interface between the weathered and the fresh rock, and is formed in the weathered material comprising the interface. It appears to extend over the entire site and follows the surface of the fresh rock. The second aquifer is within fresh bedrock, in faults and fractures. The water-bearing structures in the second aquifer are associated with major faults and fracture zones and sympathetic minor fractures and joints striking west-north-west, north-north-east and north. This aquifer possibly displays a double porosity where the main porosity is associated with the major faults in the area, and the minor porosity with smaller fractures, faults and joints.

The two aquifer systems are interconnected through the surface expression of the major fault systems and via connections into the fractured rock aquifer through the various major and minor fracture and joint sets. However, where these are absent there is no connection between the two aquifers. Recharge to the aquifers from precipitation is intermittent, generally low in volume, and limited to times of heavy rainfall.

Cudeco proposes to dewater the Las Minerale, Southern Rocklands and Southern Rocklands Extended pits to facilitate mining. The dewatered water is proposed to be pumped to the Water Storage Facility and used for dust suppression and ore processing at the mineral processing plant. The proposed mining pits are located within the Water Resource (Gulf) Plan 2007 area, but outside of a groundwater management area. In this area a water licence under the *Water Act 2000* is not required to extract groundwater. However, as identified in section 3.2 of this report, Cudeco would be required to obtain a development approval for operational works to construct dewatering bores under the *Sustainable Planning Act 2009*, prior to the commencement of any dewatering activities on the project site.

There are 15 private bores identified within 13 km of the main tenement, ML90177. These include two production wells supplying the Chumvale Homestead, and a number of stock watering bores on the property pumped by either windmills or solar pumps.

Test pumping found the drawdown cone of depression around the pumping bore to be relatively steep, with 9.59 m of drawdown at 3.5 m from the pumping bore and 0.7 m drawdown at 105 m from the pumping bore. The recovery in boreholes due to pumping was slow and incomplete. The nearest stock watering bore to the mining pits is more than 1 km to the south, and the production wells supplying the Chumvale Homestead are more than 3 km to the east from the nearest mining pit. The drawdown cone of depression around the test pumping reduced significantly with distance and the impacts of pit dewatering on bore water levels and yield are not expected to be significant. Any impact on water levels should be detected through the groundwater monitoring program that will be included as a condition of the environmental authority.

The EIS identified that there is the potential for contamination of the shallow aquifer and of the deeper aquifer where interconnectivity between the two aquifers exists. Potential contaminant sources include: fuel or chemical spills; infiltration of process water; mine affected water from disturbed areas; sewage water; tailings from leaks in the tailings pipeline; and leachate from WRDs and the TSF containing elevated concentrations of total dissolved solids, sulfate, metals and low or high pH. However, the proponent proposes a range of commitments to minimise potential groundwater contamination, including:

- Fuel or chemical spills will be immediately cleaned up and contaminated areas will be remediated in accordance with relevant guidelines and standards
- Fuel and chemical storages will be installed and operated according to Australian Standards
- Sewerage systems will be maintained and monitored on a regular basis
- Tailings and decant return water pipelines will be placed in a fully bunded corridor and will include an automated shutdown system and sumps to minimise and contain spillage in the event of a pipeline failure

- The TSF will be designed and maintained in accordance with current best practice standards to minimise the risk of leaks or overtopping
- Potentially acid forming material will be encapsulated in specific areas of the WRDs to minimise contaminated leachate and possible contamination of groundwater
- Any leachate from the WRDs will be collected in drains and directed into the 200 m deep Las Minerale residual void
- Monitoring of groundwater levels and quality around infrastructure areas, mining pits and WRDs will establish background water quality and determine any change in quality as a result of mining operations and
- Monitoring of groundwater quality at the TSF will detect any seepage of tailings leachate.

The above measures are considered adequate to prevent contamination of the groundwater aquifers.

The proposed groundwater monitoring program is also considered adequate for detecting any unforeseen impact due to mining on the groundwater aquifers associated with the nearby Chumvale Homestead production bores or operating stock bores.

4.6.2 Void water balance

The void water balance was calculated using 103 years of continuous daily rainfall records obtained from the Bureau of Meteorology, Cloncurry McIllwrath station located approximately 17km from the project site. The rate of evaporation from a water body is influenced by the salinity of the water, with higher salinity levels leading to a reduction in evaporation rates. The likely salinity from each source of water with the potential to report to the residual voids was calculated. The data was input to an Initial Loss/Continuing Loss model commonly used by the Bureau of Meteorology for long term water balance simulations. The model was run for 170 years (103 years of data, plus the first 67 years repeated).

The water level in the Las Minerale pit was predicted to stabilise after the first 25 years at a volume of 7.5 million metres cubed (Mm^3) and fluctuate with climatic variations over the next 145 years from 7.1 Mm^3 to 9.3 Mm^3 . The maximum predicted volume of 9.3 Mm^3 is 48 percent of total pit capacity, and the pit water level would be at 171.0 m RL, or 41m below the pit crest. The existing groundwater level is generally within 10m to 20m of the surface. Consequently, ground water will flow into the pit which will act as a ground water sink, reducing the potential for contaminated water from flowing into deeper aquifers related to the fractured ore zone.

The water level in the Southern Rocklands pit was predicted to stabilise after the first 22 years at a volume of 4.0 Mm^3 and fluctuate with climatic variations over the next 148 years from 3.25 Mm^3 to 4.65 Mm^3 . The maximum predicted pit volume of 4.65 Mm^3 is 41 percent of total pit capacity, and the pit water level would be at 183.0 m RL, or 41 m below the pit crest. The existing groundwater level is generally within 10 m to 15 m of the surface. Consequently, ground water will flow into the pit which will act as a ground water sink, reducing the potential for contaminated water from flowing into deeper aquifers related to the fractured ore zone.

The water level in the Southern Rocklands Extended pit was predicted to stabilise after the first 13 years due to the relatively small volume capacity at a volume of 0.38 Mm^3 and fluctuate with climatic variations over the next 157 years from 0.257 Mm^3 to 0.485 Mm^3 . The maximum predicted pit volume of 0.485 Mm^3 is 69 percent of total pit capacity, and the pit water level would be at 208.0 m RL, or 8 m below the pit crest. The maximum water level is approximately the same level as the existing groundwater level. Therefore, the Southern Rocklands Extended pit would act as a containment for most of the time. Should the water level exceed the standing groundwater table, the groundwater will flow from the Southern Rocklands Extended pit into the Southern Rocklands and Las Minerale pits which would be pulling the local groundwater toward them. Consequently, the potential for contaminated water flowing into deeper aquifers related to the sheared ore zone is considered low.

4.6.3 Recommended EP Act groundwater conditions

The recommended EP Act groundwater conditions for the draft environmental authority are outlined in Schedule G of Appendix 1.

4.6.4 Surface water

The northern part of the main mining tenement (ML90177) drains north into Tommy Creek and eventually into the Corrella River. However, the majority of ML90177 is drained by Morris Creek and a tributary known locally as Breccia Creek. Morris Creek flows through the middle of ML90177 from west to east and then flows into Butchers Creek east of the proposed lease boundary. Butchers Creek eventually joins the Cloncurry River about 15 km downstream of the project site. The Cloncurry River is a major tributary of the Flinders River catchment.

Morris Creek has a catchment of approximately 3589 ha (~36km²). It is an ephemeral stream which flows for short durations during intensive rainfall, which generally occurs in the wet season between December and March. Morris Creek has good riparian vegetation cover along its banks. Cudeco propose to divert Morris Creek to the north around the mining pits into Breccia Creek. Morris Creek is a watercourse as defined under the *Water Act 2000* and the diversion would require a water licence under the *Water Act 2000* and a development approval for operational works under the *Sustainable Planning Act 2009* prior to the commencement of any diversion works. Sections 3.2 and 6.2 of this report provide further information about the relevant approvals and conditioning requirements.

Cudeco propose to build a Water Harvesting Facility across the Morris Creek diversion at approximately chainage 3350 m. The Water Harvesting Facility would consist of an earthen dam with a 1-in-100 year Average Recurrence Interval (ARI) spillway and a capacity of 98,000m³ up to the spillway invert. The Water Harvesting Facility would require water licences under the *Water Act 2000* and development approvals for operational works under the *Sustainable Planning Act 2009*. The Water Harvesting Facility would also require permission to take unallocated water from the general or strategic reserve under the Water Resource (Gulf) Plan 2007. For that purpose, Cudeco would be required to write to DERM seeking consideration as a project of regional significance under s27 of the Water Resource (Gulf) Plan 2007. Information provided in the EIS indicates that the Rocklands Copper Project is likely to meet the requirements for a project of regional significance.

An additional water storage, to be known as the Water Storage Facility, would be constructed in the headwaters of Breccia Creek. The Water Storage Facility is proposed to be a fully bunded, off-stream water storage dam with no external catchment. It would contain rainfall runoff falling directly on the facility, dewatered pit water and water pumped from the Water Harvesting Facility. The Water Storage Facility would have a maximum storage capacity of 3.8 gigalitres and an area of approximately 45.3 ha. The embankment would have a maximum height of 8 m. The Water Storage Facility would require a development approval for operational works for a referable dam under the *Sustainable Planning Act 2009*.

The eastern mining tenement (ML90188), located about 4km to the east of the main mining tenement, is drained by Marathon Creek, which flows into the Cloncurry River about 10 km downstream. Cudeco propose to divert Marathon Creek to allow construction of the TSF. Marathon Creek is not a watercourse as defined in the *Water Act 2000* and neither a water licence nor a development approval would be required for the diversion works on Marathon Creek. However, the proposed design of the Marathon Creek diversion has been considered during the EIS process and is discussed in section 4.6.7 of this report. Downstream environmental values along Morris and Marathon Creeks include modified aquatic ecosystems, stock watering and recreational uses, including fishing and swimming in the Cloncurry River.

Limited surface water quality information is available from the site due to the ephemeral nature of the tributaries and the short duration of stream flows. The limited data available indicates that the water quality at the Rocklands Copper Project is typical of streams that are slightly disturbed and suitable for agricultural purposes. Electrical conductivity is typically below 500 µS/cm during flows and increases as pools form and evaporation occurs. Surface waters are generally slightly alkaline. Metal concentrations are typically low and only copper has been recorded above the 90th percentile trigger values for freshwater ecosystems in the ANZECC Guidelines. This may be considered normal for the Mt Isa Inlier region, and reflects the

mineralised nature of the soils where there is significant outcropping and subsequent weathering of copper deposits. Sediment sampling found that background levels of both copper and nickel were above the default low trigger limits in the ANZECC Guidelines.

4.6.5 Surface water contamination

The EIS identified potential impacts on surface water resources due to the Rocklands Copper Project, including run off from contaminated areas such as ore stockpiles, WRDs, TSF, process water and stormwater dams, workshops, hydrocarbon and chemical storage areas and sewage treatment plants.

In order for these potential impacts to be satisfactorily mitigated, the proponent will need to meet their EM plan commitments for managing surface water contamination, including:

- maintaining and monitoring sewerage systems on a regular basis
- installing and operating chemical storage areas in accordance with relevant Australian Standards
- bunding the tailings and decant return water pipelines and installing an automated shutdown system and sumps
- encapsulating potential acid forming (PAF) waste rock material in specified areas of the WRDs
- directing run off from disturbed areas to sediment settling ponds prior to discharge to natural waterways
- conducting downstream water quality monitoring during flow and discharge events to ensure compliance with discharge limits
- conducting annual sediment monitoring to ensure compliance with sediment limits and
- developing and implementing sediment and erosion control plans during operations.

4.6.6 Morris Creek diversion

Cudoco proposes to divert Morris Creek to allow the Las Minerale mining pit to be excavated without risk of flooding from the natural creek flows of Morris Creek which pass directly over the optimum pit configuration on ML90177.

The version of the EIS that was available for public submissions proposed an engineered diversion dam in the bed of Morris Creek near the upstream (western) extent of ML90177. The diversion dam would be constructed to a height equivalent to RL 229.0 m, which was calculated to be 0.5 m above the probable maximum flood (PMF) level. The Western Waste Rock Dump (WRD) would be constructed to an adequate height abutting the downstream side of the diversion dam to provide additional height, reinforcement and stability. The diversion dam would direct water from Morris Creek northward into an excavated 2 km long, trapezoidal diversion channel around the Las Minerale pit and associated infrastructure. The diversion channel would discharge into a tributary of Morris Creek known locally as Breccia Creek. Breccia Creek enters the natural Morris Creek channel 2 km further downstream of the point of discharge of the diversion, near the eastern boundary of ML90177. The diversion channel would have sufficient capacity to retain 1 in 100 year ARI flows within its banks. The diversion would be excavated predominantly through high strength, slightly weathered, dolerite rock. An earthen side bund was proposed along the western bank of the diversion channel between chainages 950 m and 1300 m to maintain 1 in 100 year ARI flood protection along the low point of the diversion.

The Morris Creek diversion channel is proposed to be a permanent structure and would be retained after mine closure to prevent surface flows of Morris Creek from entering the Las Minerale residual void, thereby maintaining creek flows downstream of the mine for the benefit of other downstream water users.

During the EIS submission period, DERM identified a number of issues with the proposed Morris Creek diversion system, including:

- the entrance to the diversion channel being 2 m higher than the bed of Morris Creek, which would result in the residual ponding of water and the inability to pass low flows down Morris Creek
- trapezoidal channel designs without allowance for habitat zones

- blocking of the Morris Creek diversion channel from the additional bed load and silt load entering at the valley crossing between chainages 950 m and 1300 m
- high batters on the Morris Creek diversion channel without any berms or benches increasing the potential for erosion and blockages in the bed of the diversion
- possible overtopping of the Morris Creek diversion channel over the side bund between chainages 950 m and 1300 m
- changes in hydrology as a result of diverting flows from the Morris Creek catchment into a much smaller sub-catchment of Breccia Creek and
- inconsistencies with the natural surface levels, bed levels, depths of flow, and flow profiles for the Morris Creek diversion channel, and between the point of discharge of the diversion channel into Breccia Creek to the downstream junction with Morris Creek.

Those issues were discussed at a meeting with Cudeco held on 8 November 2010. During the meeting it was recognised that there were two key design features that needed to be incorporated in order that the permanent diversion of Morris Creek would function effectively in the long term and minimise potential environmental harm. These design features were:

- protecting the Las Minerale pit from flooding and discharging potentially contaminated water into the natural creek system and
- designing a diversion that would replicate the natural stream and be free draining.

In regard to protecting the Las Minerale pit from flooding, DERM identified that the diversion dam embankment would be classified as a regulated dam and would have a high hazard category under the DME Technical Guidelines. DERM requested that the diversion dam be designed with a low permeability core, to give a permeability of not greater than 1.0×10^{-8} m/second, to prevent seepage passing through or under the dam and moving downstream through the Western WRD and into the Las Minerale pit.

Due to the potential during large rainfall events for the Morris Creek diversion channel to overtop at the low point between chainages 950 m and 1300 m and flood the Las Minerale pit, DERM requested that the diversion channel be wide and deep enough to contain flows within the cut section, up to the PMF level so that all diverted flows would be contained within bed and banks cut into in-situ material.

DERM advised Cudeco that a trapezoidal channel would not adequately replicate the natural watercourse, and the channel design should be modified to incorporate a low flow channel plus a bench that would promote stability and biodiversity establishment, and enable effective rehabilitation. DERM also required that the entrance to the diversion channel should be at approximately the same height as the bed of Morris Creek so that low flows are not retained and no residual ponding occurs.

Cudeco agreed to consider these issues and submit a revised creek diversion proposal in the Supplementary EIS.

DERM met with Cudeco on 14 December 2010 to discuss the revised designs for the Morris Creek diversion system. The revised designs replaced the previously proposed trapezoidal channel with a low flow channel and benches cut into natural ground. The new design would contain flows up to the PMF level from the start of the diversion all the way along to chainage 2000 m. High flood flows downstream of chainage 2000 m would overtop the banks of the diversion and spread out over the floodplain, but would be prevented from entering the Las Minerale pit by natural highpoints in the landscape. The earthen side bund previously proposed between chainages 950 m and 1300 m would be replaced by a side embankment levee with a low permeability core, to give a permeability of not greater than 1.0×10^{-8} m/second, constructed up to 0.5 m above PMF level.

The new design has an entrance 2 m lower than previously proposed, which would allow free drainage and prevent residual ponding. It also has a low flow channel and benches that would allow flows through the diversion similar to those that would be expected in the natural watercourse.

At the meeting Cudeco confirmed that prior to operations commencing, the diversion channel would be excavated as far as the proposed Water Harvesting Facility on Breccia Creek, about 1 km upstream of its confluence with the downstream, undiverted part of Morris Creek. During project operations any floods

would pass over the spillway of the Water Harvesting Facility. Prior to mine closure, the Water Harvesting Facility would be removed and the remaining 1 km length of the diversion channel would be excavated down to the re-entry point into natural Morris Creek. The final, permanent Morris Creek diversion would have a total length of 4.3 km with a bed slope of 1 in 500.

The revised design of the Morris Creek diversion proposed by Cudeco satisfied most of DERM's concerns. However, the revised design raised a new issue at the downstream end of the diversion where it would re-enter the natural Morris Creek near the eastern MLA boundary. DERM identified the potential for flood waters during large rainfall events to accumulate at the confluence of Breccia Creek and Morris Creek and back up the old Morris Creek channel, thereby flooding the Las Minerale pit from the downstream side. As a result, DERM requested Cudeco to design a Backflow Prevention Dam up to PMF level along the western boundary of the Northern WRD to prevent any excess backflow during large rainfall events from flooding the Las Minerale pit. Cudeco agreed to provide a design for the Backflow Prevention Dam.

Revised designs for the Morris Creek diversion and Backflow Prevention Dam were provided in the Supplementary EIS dated 3 May 2011 and in the Addendum to the Supplementary EIS dated 30 June 2011. The Morris Creek diversion will be engineered to include the following key design principles:

- A diversion dam to 0.5m above PMF level with a low permeability core, to give a permeability of not greater than 1.0×10^{-8} m/second, to be constructed at the commencement of operations.
- A diversion channel able to contain flows up to the PMF level between chainages 0 m to 2000 m to prevent flood flows from overtopping the diversion and filling the Las Minerale pit.
- A side embankment levee with a low permeability core, to give a permeability of not greater than 1.0×10^{-8} m/second, constructed between chainages 950 m and 1300 m to maintain PMF level within the channel at the low point of the diversion and prevent flows during large flow events from potentially overtopping the diversion and filling the Las Minerale pit.
- A revised channel entrance 2m lower than originally proposed so the diversion would be free draining.
- A diversion design incorporating a low flow channel and benches to replicate the natural stream, improve stability and promote riparian vegetation establishment.
- A Water Harvesting Facility consisting of an earthen bund with a 1 in 100 year ARI spillway located at approximately chainage 3350 m along the Morris Creek diversion channel.
- A Backflow Prevention Dam constructed to 1 m above the PMF level, consisting of low permeability clay material, to give a permeability of not greater than 1.0×10^{-8} m/second, located along the northern and eastern sides of the Northern WRD to prevent any flood waters during large rainfall events from backing up the old Morris Creek channel and entering the Las Minerale pit from the downstream side. The dam would have a 300 mm HDPE pipe running under the dam wall from the upstream toe through to the downstream toe of the embankment to pass infiltrating rainfall within the catchment of the Northern WRD back into the natural Morris Creek channel further downstream.
- An ancillary, "small backflow dam" located along the western toe of the Northern WRD at the upstream end of the buried section of the old Morris Creek channel to prevent infiltrating rainfall in the Northern WRD from flowing into the Las Minerale pit and allowing any accumulated rainfall to pass through the HDPE pipe underneath the Backflow Prevention Dam.

The above design principles adequately address DERM's general requirements for the Morris Creek diversion proposal, except for the Backflow Prevention Dam. The clay construction material and the proportions proposed for the Backflow Prevention Dam are quite suitable. However, there appears to be a strong possibility that the upstream inlet to the HDPE pipe would become clogged over time, either before or after closure, so that the water collected there would become trapped and accumulate under the Northern WRD by virtue of the "small backflow dam" at the upstream end of the buried section of Morris Creek.

If the Backflow Prevention Dam is proposed to be constructed on the northern and eastern sides of the Northern WRD, then the catchment under the Northern WRD should be considered as part of the catchment reporting to the Las Minerale pit. Consequently, the "small backflow dam" proposed along the western toe of the Northern WRD should not be constructed. Instead, a free draining channel should be constructed to drain

water from underneath the Northern WRD back into the Las Minerale pit. The water balance for the pit and the final void should be re-calculated to include the catchment under the Northern WRD.

Alternatively, the Backflow Prevention Dam proposed on the northern and eastern sides of the Northern WRD should not be constructed. Rather a Backflow Prevention Dam should be positioned where previously recommended by DERM in the section 56A Notice to Proceed that was issued to Cudeco on 15 June 2011. That is, a Backflow Prevention Dam should be positioned on the western side (i.e. the upstream side) of the Northern WRD and should be constructed of the same low permeability clay, of the same proportions, and to the same height (i.e. 1 m above the PMF level) as the Backflow Prevention Dam shown in Section A in Figures A and B in the Addendum to the Supplementary EIS.

The revised information about the Backflow Prevention Dam design will need to be provided in an amended EM plan that would be assessed by DERM after the EIS process has been completed. Details of these requirements are discussed in section 5 of this report.

As identified in Section 3.2 of this report, Cudeco will be required to obtain water licences under the *Water Act 2000* and associated development approvals under the *Sustainable Planning Act 2009* prior to constructing the Morris Creek diversion channel and the Water Harvesting Facility. Section 6.2 of this report provides further information about the conditioning requirements for the relevant approvals.

4.6.7 Marathon Creek diversion

In the EIS that was available for public submissions, Cudeco proposed to divert Marathon Creek near its headwaters to allow construction of the TSF on ML90188. The Marathon Creek diversion was proposed to consist of an excavated trapezoidal channel, 2 km long, commencing at the south-western corner of the TSF and diverting flows to the south of the TSF and then in a northerly direction along the eastern boundary of the TSF and reconnecting downstream with the natural Marathon Creek near the mid point of the eastern boundary of the TSF. The channel would contain 1 in 200 year flood flows. The diversion channel was proposed to be a permanent structure that would be retained after mine closure to minimise erosion of the TSF embankment from surface water flows.

DERM raised concerns about the potential for large flows to overtop the banks of the diversion channel and flood up against the toe of the TSF embankment resulting in potential erosion and stability impacts. At a meeting with Cudeco on 8 November 2010 DERM reiterated the need for Cudeco to review the design of the Marathon Creek diversion to determine whether the channel could include a low flow channel and benches and be cut wide enough and deep enough to contain flows up to the PMF level from the commencement of operations. This design was seen to help reduce the potential impact of large floods on the nearby TSF embankment.

DERM met with Cudeco on 14 December 2010 to discuss the revised designs for the Marathon Creek diversion. The new designs replaced the previously proposed trapezoidal channel with a low flow channel and benches to replicate the natural stream conditions and allow for riparian vegetation establishment. However, Cudeco determined that the natural land surface in the area is so flat that it would not be possible to construct the diversion to fully contain PMF flows within the bed and banks of the excavated channel. To compensate for this, Cudeco proposed to ensure that the TSF embankment was constructed with rock armour to provide a high factor of safety for additional erosion protection.

In the Supplementary EIS, Cudeco proposed a diversion design that would be capable of passing low flows without floodwaters flowing against the toe of the TSF embankment. This would be achieved by filling the areas between the diversion channel and the TSF embankment with fill at 1 in 150 slope towards the channel. Cudeco estimated that flow velocities under normal operating conditions would be less than 1 m per second and minimal erosion of the diversion channel was anticipated.

Under PMF conditions, water is expected to build up against the toe of the TSF embankment up to a maximum depth of 2.5m. However, the toe of the TSF embankment would be armoured with rock fill and due to the very flat slope of the diversion channel and surrounding topography flow velocities are estimated to be low. Consequently, Cudeco determined that no erosion issues are expected along the diversion or TSF embankment.

The above design principles meet DERM's requirements for the Marathon Creek diversion.

4.6.8 Recommended EP Act surface water conditions

The recommended EP Act surface water and groundwater conditions for the draft environmental authority are outlined in Schedule G of Appendix 1.

4.7 Air

The EIS adequately addressed the TOR with respect to air quality, including dust emissions and greenhouse gas emissions.

The proposed project would be situated in a sparsely populated rural area and low intensity cattle grazing is the main land use. Chumvale Homestead, which is the closest place of habitation or work, is located 2.6 km from the processing plant and at least 3.7 km from the mining pits. The major air quality issues associated with the proposed open-cut mining and ore processing activities would include air emissions and/or odours associated with:

- Operating mining vehicles and heavy earthmoving equipment when clearing vegetation, stripping topsoil, blasting overburden waste rock and ore and extracting, transporting and stockpiling large quantities of waste rock and ore
- Operating diesel generators associated with pit dewatering and on-site power generation
- Crushing and milling ore and waste rock at the mineral processing plant and
- Operating an on-site sewage treatment plant.

Air quality modelling was undertaken using the AUSPLUME V 6.0 model. The modelling scenario calculated input dust loads from the mining pits, earthmoving equipment and the mineral processing plant. The potential impacts of the Rocklands Copper Project on the air environment include a moderate increase from $26\mu\text{g}/\text{m}^3$ to $40\mu\text{g}/\text{m}^3$ in the predicted maximum 24-hour PM_{10} level at the Chumvale Homestead. The predicted PM_{10} level is below the Environmental Protection (Air) Policy 2008 (EPP(Air)) air quality objective of $50\mu\text{g}/\text{m}^3$. Average total suspended particulates¹ are predicted to be $41\mu\text{g}/\text{m}^3$, which is below the EPP(Air) air quality objective of $90\mu\text{g}/\text{m}^3$.

The objectives of the EPP(Air) are to:

- Ensure that the local ambient air quality is maintained and that emissions including odour do not impact on sensitive receptors and
- Minimise the release of greenhouse gas emissions.

Mitigation measures proposed to manage potential impacts of the Rocklands Copper Project on the air environment include:

- limiting areas of disturbance
- progressive rehabilitation and revegetation of disturbed areas
- site traffic control including speed limits for mine vehicles on unsealed roads
- regularly servicing and maintaining vehicles and machinery to reduce gaseous fumes and emissions
- watering stockpiles and internal unsealed roads to reduce dust generation
- disposing general waste at the Cloncurry landfill to reduce potential odours from a landfill on the project site
- regularly maintaining sewerage treatment facilities to ensure optimal operating standards and
- maintaining a complaints register to record, investigate and implement measures to address genuine air quality issues.

The above mitigation measures are considered adequate to manage the air impacts of the project.

The direct and indirect greenhouse gas emissions from the project would include:

- fuel (diesel) consumption in heavy earthmoving equipment, power generation and light vehicles

¹ Total suspended particulates means particles in the air environment with an equivalent aerodynamic diameter of not more than 50 microns.

- combustion in explosives used for blasting overburden waste rock and
- electricity consumption at offices, workshops, the mineral processing plant and machinery.

The following greenhouse gas abatement strategies would be implemented into the project:

- Waste reduction through product reuse and recycling to reduce the volume of waste disposed in landfill and eventually converted to greenhouse gas methane and
- Regular maintenance of vehicles and equipment to minimise unnecessary emissions.

The above strategies are in accordance with the Greenhouse Challenge Plus initiative and are considered adequate to greenhouse gas abatement strategies.

4.7.1 Recommended EP Act air conditions

The recommended EP Act air conditions for the draft environmental authority are outlined in Schedule B of Appendix 1.

4.8 Noise and vibration

The EIS adequately addressed the TOR with respect to noise matters.

The proposed project would be situated in a sparsely populated rural area and low intensity cattle grazing is the main land use. Chumvale Homestead, which is the closest place of habitation or work, is located 2.6 km from the processing plant and at least 3.7 km from the mining pits.

The major noise issues associated with the proposed open-cut mining and ore processing activities would include noise emissions associated with:

- Operating mining vehicles and heavy earthmoving equipment when clearing vegetation, stripping topsoil, blasting overburden waste rock and ore and extracting, transporting and stockpiling large quantities of waste rock and ore
- Crushing and milling waste rock and ore at the mineral processing plant and
- Transporting ore products off-site.

Noise modelling was undertaken using the Soundpan digital terrain noise model computer program.

The predicted day time and night time $L_{Aeq,adj,T}^2$ noise levels are 28.9 dB(A)³ and 27.9 dB(A) respectively for the Rocklands Copper Project at the Chumvale Homestead, which is the closest sensitive receptor. The threshold limits for day time and night time $L_{Aeq,adj,T}$ noise levels specified in the Planning for Noise Control Guideline are 35dB(A) and 28dB(A) respectively. Therefore, the predicted day time and night time noise levels are below the threshold levels.

The predicted day time and night time dB(Linear)⁴ noise levels at the Chumvale Homestead are 40.3 dB(Linear) and 37.7 dB(Linear) respectively. The threshold low frequency noise limits for day and night time dB (Linear) noise levels to avoid complaints about low frequency noise specified in the Assessment of Low Frequency Noise Guideline is 50 dB(Linear). The Assessment of Low Frequency Noise Guideline also specifies that the dB(Linear) measurement would be acceptable with regard to low frequency noise if it does not exceed the dB(A) measurement by more than 15 dB. The difference between the day and night time dB(Linear) and dB(A) noise levels is 11.4 dB and 9.8 dB respectively and the day time and night time dB(Linear) noise levels are less than 50 dB(Linear). Consequently, low frequency noise is not expected to result in an annoyance at the Chumvale Homestead.

Blasting and vibration impact levels at Chumvale Homestead are required to comply with the relevant criteria in the EPP (Noise) – Schedule 2 – Reasonable Noise Levels – For blasting and vibration. These

² $L_{Aeq,adj,T}$ means an A-weighted sound pressure level of a continuous steady sound, adjusted for tonal character, that within a measuring period (T) has the same mean square sound pressure as a sound level that varies with time.

³ dB(A) means decibels measured on the 'A' frequency weighting network. The 'A' frequency weighting network means the frequency weighting described under AS IEC 61672.1 – 2004 (Electroacoustics–Sound level metres, Part 1–specifications) for frequency weighting 'A'.

⁴ dB(Linear) means the noise level measured using the linear frequency weighting network. The linear frequency weighting network means the frequency weighting described under AS IEC 61672.1 – 2004 (Electroacoustics–Sound level metres, Part 1–specifications) for linear Z frequency weighting.

criteria have been applied to the recommended environmental authority conditions for air which are outlined in Schedule F of Appendix 1.

The objectives of the EPP (Noise) are to ensure that the local ambient noise level is maintained and that noise emissions do not impact on sensitive places.

To mitigate the potential noise impacts, the proponent has made commitments in the EIS, including:

- Maintain all plant and equipment in good working order to ensure compliance with the noise criteria
- Strategic placement of the WRDs between the Chumvale Homestead and the plant site and mining pits and
- Maintain a liaison program with the Chumvale Homestead landholders.

These measures are considered adequate to manage noise emissions from the project.

4.8.1 Recommended EP Act noise conditions

The recommended EP Act noise conditions for the draft environmental authority are outlined in Schedule F of Appendix 1.

4.9 Nature conservation

4.9.1 Impacts on vegetation communities

The EIS identified potential impacts on vegetation communities, including:

- clearing of riparian vegetation along Morris Creek for excavating the Las Minerale pit and constructing the WRDs
- clearing of vegetation for the construction of the Morris Creek diversion
- clearing and waterlogging of vegetation associated with the construction of the Water Harvesting Facility and Water Storage Facility and
- clearing of non-remnant vegetation for the construction of a 2 km long tailings pipeline and light vehicle access corridor.

The majority of vegetation clearing would occur in the Cloncurry Box/Western Bloodwood Woodland (Regional Ecosystem (RE) 1.11.3a, RE 1.11.3b and RE 1.11.3x1) which covers 95% of the project site and is listed as least concern under the *Vegetation Management Act 1999* and as no concern at present under DERM's Biodiversity status.

Five hectares of Gidgee Open Woodland (RE 1.3.4), on the smaller tributary of Breccia Creek would be cleared or inundated by construction of the Water Harvesting Facility. That regional ecosystem is listed as least concern under the *Vegetation Management Act 1999* and as of concern under DERM's Biodiversity status. Targeted searches for species of conservation significance determined that the Gidgee Open Woodland on the project site contained no rare or threatened plants. Large stands of the Gidgee Open Woodland are abundant in the greater region, and despite its of concern listing, it is unlikely that disturbance of this community within the project site would have significant impacts on a broad scale.

Nine hectares of River Red Gum Riparian Woodland (RE 1.3.7a), which is listed as endangered under DERM's Biodiversity Status, would be cleared from the riparian areas of Morris Creek during excavation of the Las Minerale pit and construction of the WRDs and the associated infrastructure. The diversion of Morris Creek would also impact on any uncleared River Red Gum Riparian Woodland remaining along the old Morris Creek channel, as the community is dependant on water being present in the upper sediments associated with watercourses. Targeted searches for species of conservation significance determined that the River Red Gum Riparian Woodland on the project site contained no rare or threatened plant species, and it is unlikely that the minor impact to this community on the project site would constitute a significant impact on a broad scale.

4.9.2 Impacts on significant individual species of flora and fauna

Troughton's sheath-tailed bat (*Taphozous troughton*)

The Troughton's sheath-tailed bat (*Taphozous troughton*) is listed as endangered under the Nature Conservation Wildlife Regulation 2006 (NCWR). Although the exact species of *Taphozous* was not able to be ascertained from the bat calls recorded during the wet season survey, only two species of this genus are known to occur in the region, including the Troughton's sheath-tailed bat. The Troughton's sheath-tailed bat requires suitable nesting and roosting sites, including thick foliage, loose exfoliating bark, rock caves or cavities. There are many suitable nesting and roosting sites available within the project area and a relatively small number of these would be directly impacted by project activities. Furthermore, the Troughton's sheath-tailed bat was previously thought to be restricted to the Mt Isa/Cloncurry region. However, recent taxonomic research has shown that bats in eastern Queensland previously identified as common sheath-tailed bats are actually Troughton's sheath-tailed bats. Consequently, given the significant number of nesting and roosting sites that would not be impacted by the project and the wider distribution of the species than previously thought, impacts on the species are expected to be minimal and a targeted survey was not deemed to be necessary.

Purple-necked rock-wallaby (*Petrogale purpureicollis*)

The purple-necked rock-wallaby was observed during the wet season survey and is listed as vulnerable under the NCWR. Five individuals of the purple-necked rock-wallabies were observed at an isolated rocky outcrop in the central region of ML90177. Rock wallabies were also recorded at 5 locations within, and immediately adjacent to, ML90188 which is designated for the construction of the TSF and Marathon Creek diversion. Scats were observed at almost all areas of rock boulders on ML90188, including, though to a lesser extent, small boulder fields on the flats that are isolated from extensive rock outcrops. The potential impacts on rock wallabies would be likely to result from loss of access to some foraging habitat and some small, isolated boulder fields that provide intermittent shelter. Although there would be some disturbance created by vehicle tracks and by the Marathon Creek diversion on ML90188, no areas that are important as day-time shelters or breeding areas would be lost. It is not anticipated that construction of the TSF would create habitat islands from which any individuals would need to be rescued or relocated.

Indeed, relocation of any individuals is not recommended due to the poor outcomes of such activities elsewhere. Experience has shown that translocations attempting to resolve animal conflicts with human activities generally fail. It is not anticipated that the voluntary movement of individuals of the species to and from the areas of highest habitat quality within the project site would be precluded by project activities, and any forcible removal of individuals would be likely to result in them subsequently returning to their former habitat. The species is known to be highly tolerant of human activities once the initial disturbance has been completed. Nature conservation control strategies in the EM plan include having a fauna spotter present to ensure that the movement of purple-necked rock-wallabies are not constrained prior to commencement of construction activities, which is consistent with the recommendations of the biodiversity assessment included in the EIS for the project. This would allow any rock-wallabies that chose to move away to do so prior to construction activities. Any such individuals are likely to return subsequent to the initial disturbance. This voluntary and unassisted relocation would be least stressful to the animals. However, it would increase foraging pressure in undisturbed areas of the project site and on areas outside of the project site. This would likely result in an increase of aggressive interaction with those individuals already using the surrounding areas. However, this impact is expected to be relatively short-lived as individuals return once the initial disturbance has been completed. Other relevant control strategies in the EM plan include fencing off the TSF in circumstances where the water quality does not meet acceptable drinking water standards, and using native species endemic to the area during rehabilitation to encourage the return of native fauna.

Birds

Several birds of conservation significance are known to occur within the Cloncurry region. However, none of these species were observed during the dry and wet season surveys on the project site. The following bird species require special mention:

- The grey falcon (*Falco hypoleucos*) is listed as near threatened under the NCWR. The location of the project site is at the northern limit of this species' distribution. There are no records of the species from the

immediate area. Individuals may overfly the project site intermittently, but they are likely to be transient and project activities are expected to have limited impact on the species.

- The Carpentarian grasswren (*Amytornis dorotheae*) is listed as near threatened under the NCWR. The location of the project site is at the eastern limit of this species distribution. There are no records of the species in the immediate area. Furthermore, limited habitat exists on the project site for this species so it is unlikely the species inhabits the project site.
- The black-chinned honeyeater (*Melithreptus gularis*) is listed as near threatened under the NCWR. This species has been observed in the broader Cloncurry area. Habitat at the project site is suitable for this species. Given the wide distribution of these habitats throughout the broader region, it is unlikely that project activities will remove a significant amount of regional habitat for this species.
- The night parrot (*Pezoporus occidentalis*) is listed as Endangered under the NCWR. This species is possibly the most poorly studied and infrequently observed bird species in Australia. While it may occur, it is extremely difficult to ascertain the likelihood of occurrence or impacts. Given the wide availability of habitat within the wider region, it is unlikely that project activities would significantly impact on this species, if it does exist on the project site.

EPBC Act

The project has not been referred to the Commonwealth Department of Sustainability, Environment, Water, Population and Communities and has not been declared a controlled action under the EPBC Act. However, an assessment of potential impacts on matters of national environmental significance was included in the EIS for the Rocklands Copper Project. A number of EPBC Act listed threatened bird species and migratory species were found to occur, or have the potential to occur from database searches based on the vegetation communities present on-site. Those species are listed in Table 5. However, Cudeco determined that any such populations would be unlikely to constitute an ‘ecologically significant proportion’ of the total populations of the species, and the project site does not constitute the limit of the species’ ranges. Consequently, Cudeco determined that the project site would not constitute ‘important habitat’ for threatened species or migratory species.

Table 5 - EPBC Act threatened bird species and migratory species found or likely to occur on-site

Scientific Name	Common Name	Conservation Significance (EPBC Act)	Likelihood of Occurrence
<i>Apus pacificus</i>	Fork-tailed Swift	Migratory	Expected to occur
<i>Ardea modesta</i>	Eastern Great Egret	Migratory	May occur sporadically
<i>Ardea ibis</i>	Cattle Egret	Migratory	May occur sporadically
<i>Haliaeetus leucogaster</i>	White-bellied Sea-Eagle	Migratory	May occur as a fly-over
<i>Charadrius veredus</i>	Oriental Plover	Migratory	May occur sporadically
<i>Glareola maldivarum</i>	Oriental Pratincole	Migratory	May occur very sporadically
<i>Merops ornatus</i>	Rainbow Bee-eater	Migratory	Known to occur
<i>Erythrura gouldiae</i>	Gouldian Finch	Endangered & Migratory	May occur sporadically
<i>Pezoporus occidentalis</i>	Night Parrot	Engangered	May occur
<i>Apus pacificus</i>	Fork-tailed Swift	Migratory	Known to occur

4.9.3 Aquatic ecology

An aquatic ecology survey was not undertaken for the version of the EIS that was available for public submissions. The TOR required the proponent to undertake a survey of aquatic ecology to determine the downstream aquatic environmental values and ascertain whether there are any sensitive species that could be potentially affected by mine site discharges. This would have allowed the surface water discharge limits to be adjusted if necessary to take account of any sensitive aquatic species.

A survey of aquatic ecology was subsequently undertaken and the report was included by Cudeco in the Supplementary EIS. The survey was undertaken in Morris, Marathon and Butchers Creeks during the middle of the 2010/2011 wet season and the survey commenced as soon as possible after the first notable rainfall event in January 2011. Even so, none of the streams were flowing and remnant pools were rapidly drying when surveyed. Records for the area indicate that flows in the low order streams draining the project generally occur for less than 20 days per year.

The survey results indicate that of the 20 species of fish recorded in the area, only the spangled perch was found during the survey. Juvenile spangled perch were found at all survey sites but are unlikely to survive due to the very short persistence of flows and pools. It is likely that spangled perch would access the proposed Morris Creek diversion. As happens now in Morris Creek, these fish would become trapped in drying pools and die. Cudeco determined that Morris, Marathon and Butchers Creeks have no value as fish habitat.

Freshwater crabs were found in the creeks in small numbers, and are capable of surviving the dry periods by burrowing into the substrate. Both the spangled perch and freshwater crab are widespread and common in northern Australia and are not listed under any State or Federal legislation. Consequently, the report concluded that the surveyed creeks would make a negligible contribution to the aquatic fauna values of the Cloncurry River catchment and the project activities, including the diversion of Morris Creek and construction of the Water Harvesting Facility, would not affect the aquatic biodiversity in the Cloncurry River.

4.9.4 Mitigation measures

Cudeco has provided adequate commitments in the EM plan to avoid and mitigate potential impacts of the mining project on flora and fauna, including:

- Areas to be cleared will be conspicuously delineated prior to clearing
- Prior to fencing off operational areas such as the TSF site, a fauna spotter will be used to ensure that native species, including the purple-necked rock-wallaby, are not within the fenced areas
- The staff induction program will include awareness sessions about species of conservation significance on the project site
- Native flora species endemic to the area will be used in rehabilitation works. In particular, species will be used that will encourage the return of native fauna species, such as nectar producing species and
- Any infrastructure, such as the TSF, residual voids and other water storage facilities, where water quality does not meet acceptable standards will be fenced off to prevent access by terrestrial native fauna.

4.9.5 Recommended EP Act nature conservation conditions

The conditions relating to nature conservation that are recommended to be included in the draft environmental authority are outlined in Schedules C and G of Appendix 1.

4.10 Cultural heritage

The EIS has adequately addressed the TOR with respect to both Indigenous cultural heritage and non-indigenous cultural heritage issues for ML90177 and ML90188. However, ML90219 (the infrastructure lease linking the other two mining lease areas together) was not surveyed for non-indigenous historical cultural heritage significance during the EIS process, nor has DERM been advised whether ML90219 has been included in a Cultural Heritage Management Plan (CHMP) approved under the *Aboriginal Cultural Heritage Act 2003*. These issues, together with a summary of the assessment of indigenous and non-indigenous cultural heritage are discussed below.

4.10.1 Indigenous cultural heritage

A Cultural Heritage and Access Agreement over the approximately 20 km² area comprising ML90177 and ML90188 was negotiated between Cudeco and the Mitakoodi & Mayi and Kalkadoon Claimants on behalf of

the Mitakoodi & Mayi and Kalkadoon People for the exploration phase of the Rocklands Copper Project. Both ML90177 and ML90188 have been subject to systematic indigenous cultural heritage clearing, protection and management programs since a CHMP was signed by both Indigenous Claimants in accordance with the *Aboriginal Cultural Heritage Act 2003* in late 2005. All cultural heritage finds were recorded, reported in detail, salvaged where necessary and signed off by the Archaeology consultant. The strategies for identifying and protecting any future finds of significance and for protecting salvaged items are agreed and outlined in the CHMP.

DERM has not been advised whether the CHMP signed by the Mitakoodi & Mayi and Kalkadoon Peoples includes the area of land covered by ML90219 (the infrastructure lease linking the other two mining leases to one another). Cudeco will need to ensure that a CHMP covering the area of ML90219 has been approved under the *Aboriginal Cultural Heritage Act 2003* and this requirement is further discussed in section 6.2 of this report. The requirement for a signed CHMP covering ML90129 would also be a pre-requisite of being granted the tenure for ML90219 by the Queensland Department of Employment, Economic Development and Innovation (DEEDI) under the *Mineral Resources Act 1989*.

4.10.2 Non-indigenous cultural heritage

The wider area around Cloncurry was originally explored by Europeans in January 1861 when the Burke and Wills' expedition passed through the surrounding ranges on their journey to the Gulf of Carpentaria. It was during this expedition that Burke named the Cloncurry River. Permanent settlement of Cloncurry was initiated by Ernest Henry in 1867 when he discovered and named the Great Australian copper mine. Henry also staked out the Crusader and Dobbyn mines at Mt Cuthbert near the banks of the Leichhardt River to the north-west and later established the Mount Oxide and Argylla copper mines. The first store in Cloncurry was opened in 1876, followed by a hotel, a hospital and a school in the late 1870s-early 1880s. Mining slowed in the late 1880s due to high transport costs associated with the areas' isolation. A mining resurgence occurred in the early 1900s due to the rising price of copper, new copper discoveries and an inflow of British investment. The State decided to extend the railway from Richmond to Cloncurry and the first train pulled into Cloncurry in December 1908. Copper mining saw its boom era from 1910 to 1920. However, at the end of the First World War copper prices plummeted.

Early explorers and first settlers observed that the region offered the prospect of substantial grazing lands and since then the pastoral industry has been Cloncurry's lifeblood. Cloncurry pastoralists had to cope with drought and floods and the seven years from 1895 to 1902 were particularly brutal due to the Great Drought. Fortunately, the discovery and development of artesian bores and water supplies during the early 1900s offset much of the devastation of drought. Although the pastoral industry took a back seat during the mineral boom between 1910 and 1920, during the 1930s prices for wool and beef recovered and there was strong demand throughout the Second World War years. The Cloncurry pastoral industry continued to do well in the 1940s and 1950s as a result of favourable world markets and local domestic demand. However, in the late 1960s international demand for wool was low and domestic demand for beef was high and graziers across the district began to favour cattle over sheep. Expansion of the cattle industry continued through the early 1970s aided by improved transportation methods for getting stock to market.

The Rocklands Copper Project area has been the scene of sporadic events of copper mining and prospecting since the early 1900s. Further interest in the Morris Creek area occurred between 1912 and 1915 when a series of new mining leases were issued. In 1960 there was a renewed interest in the mineral potential of the project area with a number of new mining leases established in and around the project area. In 1965 the Carpentaria Exploration Company started the Wilgar limestone mine on the project site. However, due to the limited market for the product at the time the company forfeited the mine to the crown.

Today the project site occupies land which is part of the Chumvale Pastoral Holdings.

A search of the heritage registers did not identify any items of historic cultural heritage within, or in close proximity to the project site.

An archaeological field survey was undertaken on ML90177 and ML90188 on 19 and 20 March 2010. Nine areas of non-indigenous historic heritage interest were identified during the assessment. Eight of the nine areas are related to historic mine workings and associated infrastructure. The ninth area is the Old Mt Isa to

Cloncurry Road (known today as Corella Park Road) and is one of the early stock routes in north-west Queensland. However, none of the nine areas demonstrate rare or uncommon aspects of local or State history, nor a high degree of creative ingenuity or technical achievement. Furthermore, none of the areas meet the criteria in the *Queensland Heritage Act 1992* for being of either State or local heritage significance. Based on the literature review and field survey, no State or locally significant non-indigenous historical cultural heritage items or places are likely to be impacted by the project.

The archaeological field survey did not incorporate ML90219 which is the infrastructure lease linking the two other mining leases together. However, Cudeco still has a responsibility under the *Queensland Heritage Act 1992* to identify any significant non-indigenous historical cultural heritage items or places on ML90219 and ensure that any significant values are not impacted or are appropriately managed.

4.10.3 Recommended EP Act cultural heritage conditions

There are no cultural heritage conditions recommended to be included in the draft environmental authority.

4.11 Social

The majority of social issues for the project have been adequately addressed in the EIS. However, there are a number of social aspects of the project requiring further consideration and negotiation. DEEDI is the lead agency for social impact assessment and management of social issues associated with large scale resource projects in Queensland. The Department of Local Government and Planning (DLGP) also provides assistance with the assessment and management of social issues.

4.11.1 Local Industry Participation Plan (LIPP)

The Queensland Government's Local Industry Participation Plan (LIPP) developed as a requirement of the Local Industry Policy (October 2010) is an overview document developed by the project proponent outlining its objectives on how it intends to provide full, fair and reasonable opportunity for capable and competitive local industry to tender for work on the project. Cudeco included a LIPP in the Addendum to the Supplementary EIS for the Rocklands Copper Project. DEEDI has identified some additional requirements, including a new LIPP template, under the Local Industry Policy and the *Queensland Participation Policy Act 2011* that are available via the following link: www.industry.qld.gov.au/key-industries/208.htm. DEEDI has requested that the proponent consider the information in the link and revise the LIPP accordingly. DEEDI has asked for Cudeco to work closely with that department's Local Industry Policy unit.

4.11.2 North West Regional Plan

The North West Regional Plan (NWRP) is a statutory planning instrument that came into force in August 2010 and provides a consistent land use planning framework for major mining and processing industries in the North West Region for the next 20 years. The NWRP includes various strategies to ensure that mining and processing industries support and strengthen the local economy of the towns and cities where the mining activities take place. The Department of Local Government and Planning (DLGP) has requested that Cudeco more rigorously consider Objective 3.2 "Social planning and social infrastructure", Objective 5.4 "Employment, Skills Development and Staff Retention" and Objective 5.6 "Mining and Mineral Processing" of the NWRP during the development of the Rocklands Copper Project.

Local and regional recruitment and training (Objectives 5.4 and 5.6 of the NWRP)

The NWRP strongly supports strategies that would strengthen local and indigenous employment as sought under the *Employment, skill development and staff retention strategy 5.4B*: "Encourage employers to consider local employment options for major projects"; and the *Mining and mineral processing strategy 5.6F*: "Encourage Indigenous employment initiatives in the mineral, energy and extractive resource industries". In order to help achieve these outcomes, DLGP has requested that Cudeco ensure that sufficient opportunity will be made available to enable local people, including indigenous people, to benefit from direct employment and that the fly-in, fly-out workforce would be minimised and only occur when necessary.

The NWRP recognises that the region is experiencing skills shortages and staff retention issues. An appropriately skilled workforce is critical in supporting the region’s economic growth and social wellbeing. This is consistent with the NWRP’s *Employment, skills development and staff retention strategy 5.4A*: “Encourage initiatives to attract and retain a skilled workforce, especially in areas of high demand or skills shortage”.

Strategy 5.4C encourages “collaboration between government and industry to provide innovative professional development and training opportunities”. If Cudeco is intending to engage with government by using State Government initiatives such as “Skilling Queenslanders for Work”, there should be further details of the nature and level of engagement.

DLGP has requested Cudeco to develop and give further details of specific initiatives, incentives and strategies to support local employment in Cloncurry, and skills development and staff retention of the workforce including:

- Initiatives to enable and encourage residents already living in Cloncurry to take up employment, including the type of initiative, frequency (one off or periodic) and length of each initiative
- Initiatives to encourage residents outside of Cloncurry, but within the north west region to take up employment, including the type of initiative, frequency (one off or periodic) and length of each initiative
- Initiatives to encourage indigenous employment, including the type of initiative, frequency (one-off or periodic), length etc, as well as the number of scholarships and proposed criteria for contracting and
- Training initiatives proposed to be implemented for the Rocklands Copper Project workforce in accordance with the State Government initiative, “Skilling Queenslanders for Work” including the frequency (i.e. one off or periodic) and length of each training initiative.

Investment that contributes to the local and regional economy (Objective 5.4)

The NWRP recognises the economic and social benefits derived from the mining industry to the communities of the North West Region. Objective 5.4 notes that an appropriately skilled workforce is critical in supporting the region’s economic growth and social wellbeing. Retention strategies are necessary to counter skills shortages and ensure appropriate skill and industry development in the region. The NWRP strongly supports development and social investment initiatives from mining industries in local communities as sought under the *Employment, skill development and staff retention strategy, 5.4D*: “Encourage opportunities for the establishment of specialised skills development, education, training and employment programs to meet the requirements of the region’s existing and emerging industries”. Objective 5.6A seeks to “Encourage collaborative responses by government, resource companies and the community to the social, economic and environmental pressures associated with large-scale mining and energy resource projects.” Strategies 3.2C and 3.2D specifically encourage communities to collaboratively participate in community planning and developing social capacity as well as supporting partnerships between governments and private organisations to identify and provide essential community facilities.

Objective 3.1 “Education and learning” seeks to encourage and support a regional culture of lifelong learning and education. Strategy 3.1B seeks to investigate opportunities to increase and extend higher level education and training options across the region, through a range of delivery modes, in accordance with the intent of the regional activity centres network.

DLGP has requested Cudeco to provide information about specific social development initiatives and/or investment from the project that would contribute to Cloncurry’s local economy on a permanent basis, such as:

- investment in education and training facilities
- the provision of graduate and capacity building programs and
- other social infrastructure that assists individuals, families or groups to maximise their potential for personal development, such as investment in childcare and aged care facilities which support people entering/re-entering the workforce.

Housing (Objective 5.6)

The EIS estimates that 70 new house and land packages are due to come on to the market and that Cudeco already have development approval to build 48 new house and land packages. However, it is unclear whether the 70 new house and land packages include the 48 already approved. Further clarification is also required regarding the anticipated number of local employees, regional employees and fly-in-fly-out (FIFO) employees for the construction and operation workforces to determine whether the number of new house and land packages proposed to be developed by Cudeco would be adequate to cater for the project without having a detrimental impact on the availability of open market housing in Cloncurry. It is also unclear whether the house and land packages will be constructed in time and managed by Cudeco to meet the accommodation needs of the Rocklands Copper Project workforce, or whether they will be managed by external providers to fill latent local accommodation needs in the Cloncurry township. To meet the requirements of the North West Regional Plan, DLGP has requested that Cudeco provide additional information about the housing proposal including:

- A timeframe for when the 70 new house and land packages are due to come on to the market and who the provider(s) would be
- Clarification about whether the 70 new house and land packages include the 48 already approved
- Clarification of the ratio of local/regional/FIFO employees for the construction and operation phases of the project
- Evidence to support the assumption that “15% of family groups will gain employment for both partners” as stated on page 112 of the Supplementary EIS in response 16.0.2.2
- A timeframe for when the 48 new dwellings are due to come on to the market and associated management mechanism proposed by Cudeco. If Cudeco propose to sell the houses:
 - how housing sales would be limited to employees only or
 - If sales would be on the open market how CuDeco would ensure enough dwellings are made available to fill the accommodation needs of the CuDeco workforce rather than the latent housing need in the local Cloncurry township and
- In light of the above, further analysis to demonstrate that sufficient housing for the project workforce would be provided by Cudeco without having a detrimental impact on the availability of open market housing in Cloncurry.

Cudeco provided a response to the above issues in an Addendum to the Supplementary EIS that was received by DERM on 30 June 2011. DERM forwarded the Addendum to DLGP on 4 July 2011 for consideration. However, there was insufficient time for DLGP to complete its assessment of Cudeco’s response for the purposes of this EIS assessment report. Consequently, Cudeco should liaise with DLGP regarding any further outstanding information that may be required to address the above issues.

4.12 Transport

During construction and operation, heavy vehicle transport deliveries will be either from Cloncurry or from Mt Isa, along the Barkley Highway turning into the Burke Development Road and then Corella Park Road to the site. The construction and operational workforces would also use this route from and to Cloncurry in cars and company buses.

Copper concentrate products from the processing plant would be trucked mostly along the same route, except for a heavy vehicle bypass to a rail loading facility in Cloncurry. Concentrate would then be railed to Townsville Port for distribution to local customers and export. Some concentrate may be trucked to Mt Isa. If it eventuates that a majority of concentrate is sent for treatment in Mt Isa, the proposed southern access route directly to the Barkly Highway should be further investigated.

Whilst the proponent has indicated potential transport modes, routes, volumes and impacts associated with the project, a number of project variables may influence the preferred transport routes and alter the potential impacts of their use. The preferred transport routes will need to be finalised before the scale of safety improvement works, rehabilitation and maintenance costs can be determined. Therefore, the Department of

Transport and Main Roads (DTMR) has requested Cudeco to prepare an updated Road Impact Assessment (RIA) based on the finalised transport impacts. The RIA will be completed in accordance with Chapters 3 to 7 of the Guideline for Assessment of Road Impacts for Development (GARID) and AUSTROADS' Guides to Traffic Engineering Practice, and include a pavement impact assessment, traffic operations assessment, safety review, environmental review, and propose impact mitigation measures. The proponent will be fully responsible for all of the costs necessary for safety improvements, rehabilitation and maintenance required to deal with road traffic impacts.

DTMR has requested the proponent to continue to liaise with DTMR's Assets & Operations Division in Cloncurry in order to resolve the outstanding road related issues associated with the project.

In relation to proposed amelioration measures that would address safety issues at railway level crossings, Cudeco's response in the Supplementary EIS concluded that the change in traffic across the Aerodrome Road/Sir Hudson Fysh Drive level crossing at Cloncurry warrants the upgrading from signs to a flashing light arrangement. However, the response does not subsequently make a commitment to implement the installation of flashing lights and boom gates at the level crossing. DTMR requires the proponent to commit to installing flashing lights and boom gates at the rail crossing ID4037, if selected as the preferred traffic route. To progress implementation of this measure the proponent should liaise with the Coal and Minerals Transport Unit within the Rail, Ports & Freight Division of DTMR and with the Network Projects Unit within the Assets & Operations Division of Queensland Rail.

It is DTMR's requirement that the RIA and Road-use Management Plan (RMP) would be finalised prior to commencement of any construction works on the project site, or in, or near state-controlled road reserves, and that the proponent for the Rocklands Copper Project shall:

- Update the RIA in accordance with Chapters 3 to 7 of GARID, 2006 and the relevant AUSTROADS' Guides to Traffic Engineering Practice, to address impacts on the safety and efficiency of state-controlled roads, including a pavement impact assessment, traffic operations assessment, safety review, environmental review, and impact mitigation measures
- Submit the updated RIA to DTMR's North West Office in Cloncurry for assessment
- Prepare a RMP for all use of state-controlled and other roads for each phase of the project. The RMP will document latest project traffic volumes, proposed transport routes, required road infrastructure maintenance and/or upgrades to mitigate road impacts, any necessary requirements about access/connection to public roads, transport scheduling, dust control, road safety and so on. The RMP should be prepared in consultation with the DTMR regional office and approved prior to implementation
- Prepare a traffic management plan for all construction and other activities in the state-controlled road corridor. All activities relating to traffic management and control must be carried out by a traffic control organisation that is registered with DTMR
- Upgrade the intersection of the Burke Developmental Road (89A) and Corella Park Road to a standard agreed to by DTMR.
- Contribute full costs towards improvement works and any other necessary road maintenance and upgrades identified in the finalised RIA to ameliorate any adverse impacts of the road use by the project on state-controlled roads
- Obtain the relevant licenses and permits under *the Transport Infrastructure Act (Qld) 1994* for works within the state-controlled road corridor
- Submit to DTMR all concept design plans and supporting documentation certified by a Registered Professional Engineer of Queensland (RPEQ) in electronic format and two paper copies for assessment
- Where DTMR's Road Planning and Design Manual and/or Road Drainage Manual is/are amended after submission of the concept design plans, amend the proposed road works accordingly and incorporate any changes into the detailed design plans
- Subject to DTMR's written approval of the concept design plans, provide at no less than 12 weeks prior to the anticipated commencement of construction of the works for DTMR's assessment and written approval:

- Detailed engineering plans
- A bill of works for the whole of the cost of the works, including management and supervision
- Ensure all contractors engaged for design or construction works are pre-qualified under DTMR's pre-qualification system available from the regional office
- Prior to commencing any program of oversize transport movements that may be required for the construction of the project, the proponent will consult with DTMR, the Queensland Police Service and Cloncurry Shire Council and
- Obtain the necessary permits for any excess mass or over-dimensional loads associated with the project as required under *the Transport Operations (Road Use Management) Act (Qld) 1995*.

The proponent may enter into an Infrastructure Agreement with DTMR to formalise:

- The upgrade to the Burke Developmental Road (89A) / Corella Park Road intersection
- Rehabilitation and maintenance contributions associated with project traffic as calculated and agreed upon with DTMR and
- The upgrade to the rail crossing (ID4037) located at Aerodrome Road/Sir Hudson Fysh Drive with the provision of flashing lights and boom gates, if selected as the preferred traffic route.

The election by the proponent to undertake an infrastructure agreement should include:

- Works and contributions required to mitigate the impacts of project traffic on the state-controlled road network and
- The delivery and staging of amelioration works required as a consequence of the proposed project development.

Cudeco provided a response to the above issues in an Addendum to the Supplementary EIS that was received by DERM on 30 June 2011. DERM forwarded the Addendum to DTMR on 4 July 2011. In the response Cudeco advised that they would continue to liaise with DTMR to resolve the above issues in a timely manner.

5 Adequacy of the EM plan for the project

An EM plan was included with the version of the EIS that was available for public submissions. A number of submissions on the EIS raised issues that required amendments to the EM plan and many of these amendments were addressed by Cudeco in an amended EM plan, which was received on 3 May 2011. DERM has reviewed that amended EM plan, but decided that it did not adequately address the content requirements of section 203 of the EP Act. On 16 June 2011, Cudeco was provided with a list of matters where the EM plan was deficient and which would need to be addressed before the document would be acceptable. The recommendations provided to Cudeco are outlined below:

- Incorrect references to sediment dams for dams containing potentially contaminated water and inconsistent management measures for dams with the same hazard category
- Insufficient surface water management and seepage control structures for potentially contaminated run-off and seepage from the Eastern WRD (subsequently addressed in the Addendum)
- Insufficient information about environmentally relevant activities (ERAs) and notifiable activities as defined in Schedule 2 of the Environmental Protection Regulation 2008 and Schedule 3 of the EP Act respectively
- A lack of material safety data sheets for reagents and consumables to be used at the project site (subsequently addressed in the Addendum)
- Insufficient information about the management of potential discharges to water and air from the storage areas for the concentrate filter cakes
- Insufficient detail about the movement of water between the sediment ponds and the Water Harvesting Facility (subsequently addressed in the Addendum)

- Inconsistent referencing of dams in the site water balance diagrams and the associated sediment dam monitoring points in the proposed environmental authority conditions (subsequently addressed in the Addendum)
- Incomplete list of monitoring locations for dams potentially containing contaminated waters that could discharge directly to the receiving environment (subsequently addressed in the Addendum)
- Insufficient information about the proposed methods for re-using or disposing sewage effluent from the sewage treatment plant
- Incomplete list of parameters for the proposed sewage effluent monitoring program
- Insufficient information about the preferred approach for power generation on-site and the management of emissions (subsequently addressed in the Addendum)
- Insufficient information about the probable maximum flood levels along the proposed Morris Creek diversion channel and the need or otherwise for additional flood management controls, including a Backflow Prevention Dam on the upstream side of the Northern WRD
- Insufficient information about the engineering designs and rehabilitation of the TSF (subsequently addressed in the Addendum)
- Inconsistent information about decommissioning and rehabilitation of the TSF (subsequently addressed in the Addendum)
- Incomplete rehabilitation methods for exploration drilling operations (subsequently addressed in the Addendum)
- Incomplete information about the proposed dust monitoring program (subsequently addressed in the Addendum)
- Incomplete conditions for managing the air environment (subsequently addressed in the Addendum)
- Outdated definitions from superseded legislation for the surface water environmental values (subsequently addressed in the Addendum)
- No contaminant limits included in the proposed environmental authority conditions for surface water management (subsequently addressed in the Addendum)
- Incomplete list of default trigger values in receiving waters for all potential contaminants in the proposed environmental authority conditions for surface water management (subsequently addressed in the Addendum)
- Incomplete details about all the dams proposed on-site that would contain hazardous waste or be regulated dams with a high hazard category under the DME Technical Guidelines
- Incomplete information about the preferred strategies for PAF disposal and waste rock dump designs
- Incomplete information about the proposed treatment method for soil contaminated by hydrocarbon spills and associated management and control strategies (subsequently addressed in the Addendum) and
- No preliminary design drawings of the Morris Creek diversion channel and associated surface water management infrastructure, including the Backflow Prevention Dam.

On 30 June 2011, Cudeco submitted an Addendum to the Supplementary EIS in response to the above issues. DERM assessed the Addendum and found that it adequately addressed many of the outstanding issues in the EM plan and DERM would expect Cudeco to amend the EM plan to include the relevant information from the Addendum. However, there are still a number of outstanding issues that were not adequately addressed by the Addendum and these issues are outlined below:

- Dams currently referred to as sediment dams located downstream of the WRDs and the TSF embankment that would potentially capture contaminated leachate and discharge directly off-site should be renamed as leachate collection dams in order to reflect their true purpose and hazard category within the overall site water management system. Details of dams with the potential to contain contaminated water that would discharge directly off-site should also be listed in the relevant tables relating to regulated dams in the environmental authority conditions proposed in the EM plan

- Table 2.4 (Notifiable Activities) incorrectly lists the Environmentally Relevant Activities that apply to the mining project and Table 2.5 (Environmentally Relevant Activities) incorrectly lists the Notifiable Activities. The tables should be alternated so that they match the appropriate table headings
- Plans should be provided showing the design of the concentrate loading area, together with details about the machinery and methods required for loading and transporting concentrate filter cake off-site that would minimise the risk of environmental harm to surrounding areas. Consideration should be given to the re-design of the loading area as a negative pressure environment as a fully enclosed shed.
- The manner in which biosolid waste/sewage sludge from the sewage treatment plant will be dried and stored prior to collection and transport to the Cloncurry waste handling facility must be described. Reference to stormwater and leachate management methods should also be provided (if required)
- Details and plans should be provided about the alternative PAF disposal option involving an additional PAF cell in the northern portion of the Western WRD on top of the old Morris Creek channel downstream of the Morris Creek diversion dam. The information should include the likely volume of PAF that would be contained within that PAF cell if in-pit disposal is determined to be unsuitable, the design of the basal layer of benign NAF waste rock and any additional monitoring and leachate management controls.
- Details and plans should be provided of the revised designs for the proposed Backflow Prevention Dam. If the Backflow Prevention Dam is proposed to be constructed on the northern and eastern sides of the Northern WRD then the "small backflow dam" proposed along the western toe of the Northern WRD should not be constructed. Instead, the revised designs should include a free draining channel constructed to drain water from underneath the Northern WRD back into the Las Minerale pit. Details should also be provided of the recalculated water balance for the Las Minerale pit and the final void taking into account the Northern WRD catchment. Alternatively, the Backflow Prevention Dam proposed on the northern and eastern sides of the Northern WRD should be removed from the designs completely and revised designs should be provided showing a Backflow Prevention Dam positioned on the western side (i.e. the upstream side) of the Northern WRD, constructed of the same low permeability clay, of the same proportions, and to the same height (i.e. 1 m above the PMF level) as the Backflow Prevention Dam shown in Section A in Figures A and B in the Addendum to the Supplementary EIS.

DERM would expect Cudeco to consider the outstanding issues outlined above and make further amendments to the EM plan in addition to those outlined in the Addendum to the Supplementary EIS, prior to submitting the amended EM plan to DERM for final assessment. An amended EM plan will be assessed by DERM after the EIS process is completed and would need to be determined to adequately address the content requirements of section 203 of the EP Act, prior to DERM finalising the conditions of the draft environmental authority. The conditioning requirements for the draft environmental authority are discussed in further detail in section 6.1 of this report.

6 Recommendations for conditions for any approval

6.1 Environmental Protection Act 1994

This report includes a draft set of conditions that are recommended as the basis for developing the draft environmental authority for the Rocklands Copper Project. The conditions are outlined in Appendix 1 of this report and are referenced in the relevant sections throughout this report.

However, while section 59 of the EP Act states that this EIS assessment report must recommend any conditions on which any approval required for the project may be given, section 202 of the EP Act states it is the purpose of the submitted EM plan to propose environmental protection commitments to help the administering authority prepare the draft environmental authority for the application. As outlined in section 5

of this report, the EM plan received by DERM on 3 May 2011 was deficient in certain areas, and additional amendments need to be made to the EM plan, prior to DERM completing an assessment. Consequently, this EIS assessment report is unable to make full recommendations for specific conditions for the draft environmental authority.

Furthermore, it is recognised that the conditions outlined in Appendix 1 may not be appropriate or applicable for some activities where site specific factors yet to be assessed in the amended EM plan would be incompatible with recommended conditions. In such circumstances variants of the conditions and/or different conditions to those outlined in Appendix 1 may be included in the draft environmental authority.

In summary, now that the EIS process has been completed, and once DERM receives an amended EM plan from Cudeco, DERM will complete its assessment of the amended EM plan, and when the EM plan adequately meets the content requirements of s203 of the EP Act, DERM will prepare a full suite of conditions for the draft environmental authority.

6.2 Approvals under other legislation

6.2.1 Water Act 2000

As outlined in section 3.2 of this report and discussed within relevant sections of this report a number of water licences and associated development approvals under the *Water Act 2000* and *Sustainable Planning Act 2009* respectively would be required for the Rocklands Copper Project. These approvals relate to the construction of the Morris Creek diversion, Water Harvesting Facility and pit dewatering bores, as well as the take of surface water resources.

However, the EIS has provided insufficient detail about the engineering designs, rehabilitation and monitoring for the proposed Morris Creek diversion and Water Harvesting Facility, and details about the groundwater bores for the proposed pit dewatering operation, for this EIS assessment report to be able to include recommended conditions for those water licences and development approvals. Conditions for these activities will be decided when Cudeco has lodged water licence and development approval applications subsequent to the EIS process being completed.

6.2.2 Cultural Heritage Act 2003

As outlined in section 3.2 of this report and discussed within section 4.10.1 of this report the *Aboriginal Cultural Heritage Act 2003* requires the proponent of a project subject to an EIS process to develop a CHMP and have it approved by the relevant Aboriginal parties. DERM has not been advised whether the CHMP signed by the Mitakoodi & Mayi and Kalkadoon Peoples includes the area of land covered by ML90219 (the infrastructure lease linking the other two mining leases to one another). Consequently, Cudeco will need to ensure that a CHMP covering the area of ML90219 has been approved under the *Aboriginal Cultural Heritage Act 2003*.

6.2.3 Transport Infrastructure Act 1994

As outlined in section 3.2 of this report and discussed within section 4.12 of this report a number of licences and permits for works within the state-controlled road network associated with the transport routes and railway level crossing upgrades (if required) under the *Transport Infrastructure Act 1994* would be necessary for the Rocklands Copper Project. Furthermore, excess mass loads or non-standard vehicle movements on state-controlled roads will require a permit under the *Transport Operations (Road Use Management) Act 1995*.

However, the transport routes for the project have not been finalised and the details about non-standard vehicle movements may vary during the construction and operational phases of the project. Consequently, recommended conditions for any transport related approvals cannot be included in this EIS assessment report. Conditions for the transport related activities will be decided by DTMR when Cudeco has lodged applications for the relevant transport approvals.

7 Suitability of the project

DERM has considered the final TOR (see section 3.3.1 of this report), the submitted EIS (see section 3.3.2 of this report), all submissions on the submitted EIS (see section 3.3.3 of this report), and the standard criteria (see section 3.3.4 of this report). Despite some areas where the TOR was not fully addressed, the submitted EIS and supplementary information have not identified impacts of sufficient magnitude to prevent the project from proceeding. However, the recommendations and necessary amendments to the EM plan outlined in this EIS assessment report should be fully implemented.

Approved By

Stuart Cameron

Signature

27 July 2011

Date

Stuart Cameron
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