



McArthur River Mine Phase 3 Development Project

Notice of Intent

11 March 2011

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1 Introduction

1.1 Objectives

This Notice of Intent (NOI) documents the intention of Xstrata Zinc to apply for environmental approvals for the McArthur River Mine (MRM) Phase 3 Development Project, an open pit zinc/lead/silver mining and bulk concentrate processing operation, planned for commencement in 2012.

This NOI has been prepared in accordance with the Northern Territory Department of Natural Resources, Environment, the Arts and Sport (DNRETAS) Information Guidelines for a Notice of Intent (DNRETAS, 2007) and the Department of Resources Environmental Assessment of Mining Proposals Advisory Note (DPIFM, 2006).

The NOI presents an overview of the environmental aspects of the project to assist the Northern Territory Government Department of Resources and the Environmental Assessment Branch of DNRETAS in the determination of the level of environmental assessment for the project.

The objectives of this NOI are to:

- Provide formal notification to the Northern Territory Government and other interested parties, of Xstrata Zinc's intention to develop the McArthur River Mine (MRM) Phase 3 Development Project (the 'Project').
- Present an outline of the proposed Project, including the potential economic, social and environmental benefits that may be associated with it.
- Describe the existing environment of the Project area based on recent and historic investigations.
- Identify and describe the potential environmental and social issues associated with the project.
- Describe high-level management and mitigation measures with the potential to minimise adverse environmental impacts as a result of the Project.
- Outline the proposed baseline and impact assessment studies proposed to inform the environmental and social impact assessment for the project.

1.2 The Project

MRM is located in the Northern Territory and is accessed by sealed road from Daly Waters to the west and from the Barkly Highway 350km to the south. The proposal is to increase bulk concentrate production using ore extracted from an expanded open pit mining operation.

Current information and testing indicates that the ore body can support, and achieve better resource utilisation through a large-scale project. It is envisaged that the expanded pit will be developed in stages with the current open pit mine being expanded to a total annual capacity of approximately 5 million tonnes (Mt) of ore mined and 800,000 tonnes (t) of bulk zinc/silver/lead concentrate produced.

A scoping study conducted in 2010 has confirmed the development project would not expand the open pit beyond the current boundary of the bund wall and there is no intention of further diversions to the McArthur River or Barney Creek channels.

Around half of all zinc currently consumed is used for galvanizing steel, which is an environmentally friendly method of protecting steel against corrosion. Zinc also finds application in the manufacture of die-cast alloys, brass and the production of zinc oxides and chemicals.

The Project's environmental management will be significantly assisted by the current operational knowledge of the existing environment. In the case of some key aspects of the Project, such as overburden placement and tailings management, options will be developed and determined through the feasibility study.

Environmental focus for the project will explore the mitigation of the potential environmental aspects associated with the following operational requirements:

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- Expanded open pit mining.
- Overburden Emplacement Facilities (OEF).
- Water management.
- Tailing Storage Facility (TSF) upgrade.
- Processing plant.
- Power supply.
- Building a temporary construction camp and extension to the existing accommodation facility.

The proposed Project would build on the success of the conversion of MRM from underground to open pit mining completed in 2009 by further increasing the mineable zinc reserves and the life of mine.

Based on preliminary planning, MRM's mineable reserves are expected to increase from 53 million tonnes (as of June 2010) to 115 million tonnes, extending the life of mine to 2033 at the higher rate of production.

The estimated Project development cost is estimated to be AUD270 million.

The Project is part of a USD900 million integrated plan involving MRM, and Xstrata Zinc's European and Canadian smelters which is essential for the long term sustainability of the mine. The timing for the Project is driven by the changes in the zinc smelter market.

Over 90% of zinc produced globally is produced by electrolytic smelters. The market MRM supplies – the Imperial Smelting Furnaces – is less cost competitive and now produces less than 6% of the world's primary zinc and is in decline. A new market is required for the zinc bulk concentrate as it cannot be used by electrolytic smelters.

Xstrata's proprietary hydrometallurgy technology smelters are able to use MRM bulk concentrate as a feedstock. This creates a new market for MRM's expanded production in addition to the current customers in Europe and Asia.

1.3 Notice of Intent Structure

The NOI comprises eight chapters and a Table of Contents that outlines figures, tables and plates in relevant chapters. The format of the main report is:

- Chapter 1 (this chapter) – introduction and purpose of the NOI.
- Chapter 2 – Background proponent details, project details, project summary.
- Chapter 3 – Public involvement and stakeholder consultation.
- Chapter 4 – Description of the project.
- Chapter 5 – Description of existing environment.
- Chapter 6 – Identification of potential environmental and social issues, management and mitigation measures to address these issues, and scope of investigations to inform the Environmental Impact Assessment process.
- Chapter 7 – Legislative framework (including Commonwealth and Northern Territory legislation, international conventions and national policies and strategies) and schedule.
- Chapter 8 – References.
- Appendices – documents supporting the information presented in this NOI.

2 Background

2.1 Project Owners

The project proponent is McArthur River Mining Pty Ltd. MRM Pty Ltd is a company wholly-owned by global mining group Xstrata Zinc and is the operator of the McArthur River Mine.

Headquartered in Madrid, Spain, Xstrata Zinc is one of the world's largest producers of zinc and one of the commodity business units within the major global diversified mining group Xstrata plc. Xstrata's zinc and lead operations and exploration projects are located in Australia, Canada, Germany, Peru, Spain and the United Kingdom.

In Australia, operations comprise of: the Mount Isa, George Fisher underground, Handlebar Hill open cut and Black Star open cut zinc-lead mines, zinc-lead concentrator, lead smelter and Bowen Coke Works in north Queensland; and the McArthur River Mine, processing and loading facility in the Northern Territory.

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2.2 Location

MRM is located 60 kilometres south west of the township of Borroloola in the Gulf Region of the Northern Territory, approximately midway between Darwin and Mount Isa in Queensland.

Figure 1 shows the general location of MRM.



Figure 1 MRM Location

2.3 Tenements

MRM spans seven individual mineral leases (**Table 1**). The mine site is contained within five contiguous mineral leases (MLN1121, MLN1122, MLN1123, MLN1124 and MLN1125), located on the McArthur River Station Pastoral Lease, which is made up of the McArthur River Pastoral Lease (PL860), the Tawallah Pastoral Lease (PL864) and the Bing Bong Pastoral Lease (PL868).

The leases were combined and now exist as the McArthur River Station. The property lease is 100% owned by Colinta Holdings Pty Ltd, an Xstrata subsidiary.

Also contained on the McArthur River Station Pastoral Lease is the minor mineral lease MLN582. The mining operations encompass MLN 1121, MLN 1122 and MLN 1124 (the Overburden Emplacement Facility). The Tailing Storage Facility, camp accommodation and part of the airport are on MLN 1123.

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The Bing Bong port facility is situated on MLN1126, located on the Bing Bong Pastoral Lease. Adjacent to the Bing Bong Mineral Lease is the Bing Bong Dredge Spoil Emplacement area, located on the Non-Pastoral Land Use Approval NP033. The general locations of the mineral leases are depicted in **Figure 2** and the layouts of the McArthur River Mine Site Leases are shown in **Figure 3**.

Table 1 McArthur River Mining Leases

Lease Type	Name	Lease No.	Area (hectares)	Term(Years)	Expiry Date
Mining	HYC	MLN1121	372.4	25	5/1/2018
Mining	GLYDE	MLN1122	3348	25	5/1/2018
Mining	BUFFALO	MLN1123	3884	25	5/1/2018
Mining	Emu	MLN1124	3283	25	5/1/2018
Mining	Emu East	MLN1125	656.8	25	5/1/2018
Mining	Bing Bong Port	MLN1126	900	25	5/1/2018
Mining	Batten	MLN582	16.4	20	31/12/2019
Pastoral*	Dredge Spoil	PPL1051	89.3	3	31/12/2012
Authorisation	Emu Fault	AN366	9	2	4/6/2012
		Total Area	12469.6		

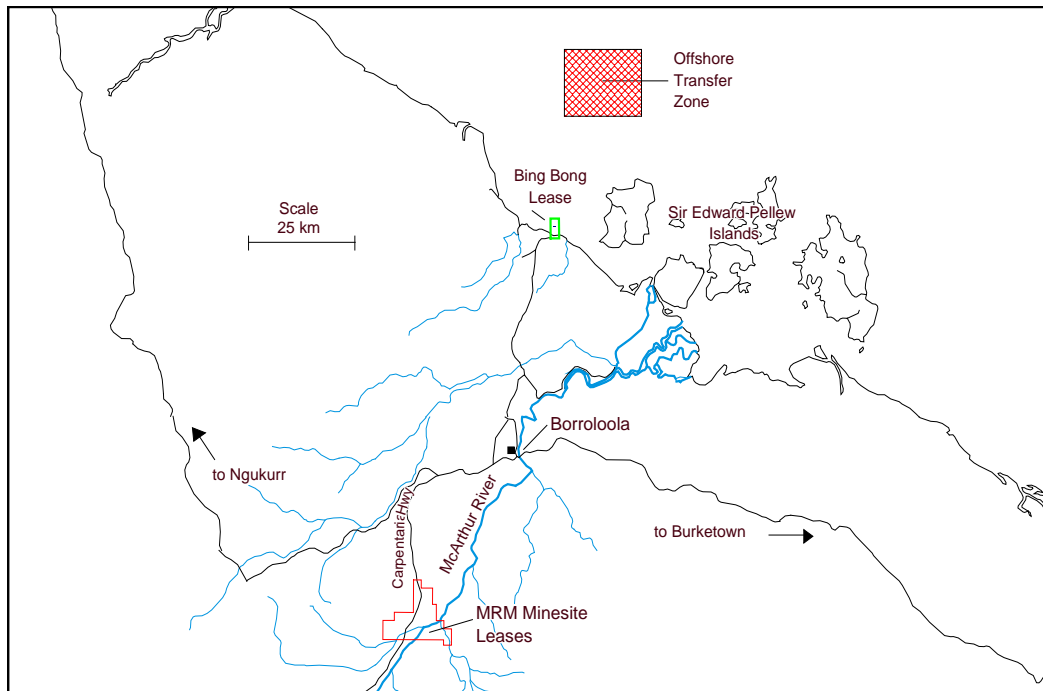


Figure 2 MRM Regional Location

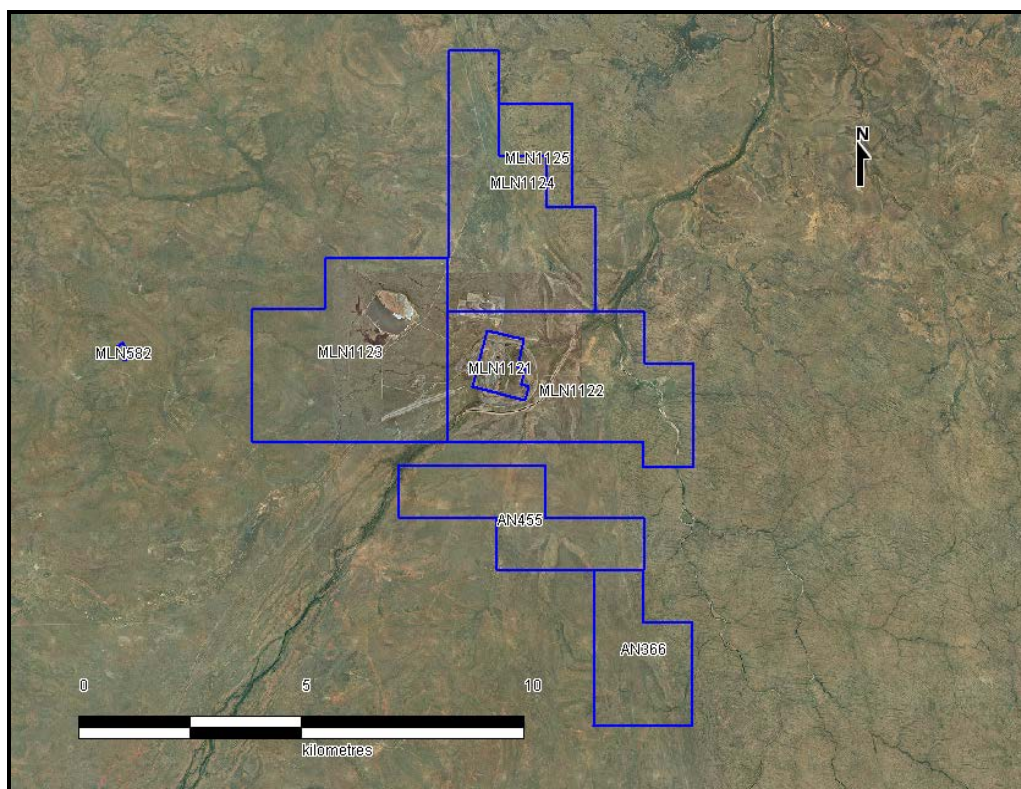


Figure 3 McArthur River Mine Leases

2.4 MRM Project History

MRM is a major open cut operation mining one of the largest known sedimentary stratiform zinc-lead-silver deposits in the world. The ore bodies making up the deposit, named Here's Your Chance (HYC), were discovered by Mount Isa Mines Limited geologists in 1955, but development did not commence until 1995. This gap in time between the deposit's discovery and development resulted from the unusual structure and extensive faulting of the ore bodies and the extremely fine-grained nature of the ore which combined to make commercial exploitation of the resource unfeasible for many years.

A number of technological advancements in mining, ore treatment and concentrate transport were necessary before the project could proceed on an economic basis. Trial work failed to develop an economically viable technique of ore beneficiation in the 1960's and 1970's.

A small decline and pilot plant were constructed on site in 1975, with the consequent preparation of a feasibility study and environmental report in 1979. That study was based on a high-tonnage, open pit operation. In addition to poor recovery rates, no market existed at that time for the low-grade lead and zinc concentrates produced by the pilot plant.

Subsequent metallurgical developments in fine grinding technology and the emergence of a market for high-grade bulk concentrate for use by smelters using the Imperial Smelting Process (ISP) technique enabled MRM to become a viable project. Construction of the current project commenced in 1994, with the first shipment of concentrate loaded in mid-1995. McArthur River Mining produces bulk concentrate (containing payable zinc, lead and silver) for overseas and domestic markets.

In August 2005, MRM announced its intention to convert the underground zinc-lead mine at McArthur River to an open pit operation to enable the mine to continue production. An Environmental Impact Statement (EIS) was lodged as part of a formal assessment process by the Northern Territory Government based on the Terms of Reference issued in 2003. This was followed by the submission of an EIS Supplement (December 2005), Public Environmental Report (July 2006) and Mining Management Plan (September 2006).

The Northern Territory Government approved MRM's open pit development in October 2006. Later that same month, the Australian Government provided its consent under the Environmental Protection and Biodiversity Conservation Act 1999. The \$110 million open pit development which combined with an expansion of the concentrator, extended the mine's life by an estimated 21 years to 2027.

While the environmental assessment process was conducted, MRM commenced operating a test open pit. The first stage of this pit commenced in August 2005. This contributed ore for sampling and for processing as underground operations reduced. The test pit was subsequently extended in April 2006 when underground mining ceased.

After the approval for the open pit development, site works were undertaken over a two year timetable and were completed in late 2008. Key development milestones achieved were:

- construction of the Southern Anabranch to a temporary bund wall to allow the open pit to be expanded and support an increase in production rates.
- completion of new benchmark studies into local and migratory birds, fish populations and movement and macroinvertebrates.
- the development of the McArthur River channel and the Barney Creek/Surprise Creek channels which were opened for waterflow in the 2009 wet season.

In March 2007, MRM announced an AUD50 million expansion of its concentrator to increase its capacity from an annual throughput of 1.8 million tonnes of ore to 2.5 million tonnes. Since then, further technological advances to the concentrator have enabled MRM to for the first time, produce a new zinc concentrate. This is supplied to electrolytic smelters and has opened a new market for MRM concentrate.

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The current total workforce is currently 440 permanent personnel and contractors. Production employees work a 7 days on/ 7 days off roster, with most support and management staff working a 5/2,4/3 roster.

An overview of the current McArthur River Mine area is shown in **Figure 4**.



Figure 4 McArthur River Mine – Current Project

3 Public Consultation

An effective, consultation program involving Xstrata Zinc, government, local residents, communities, Indigenous groups and other stakeholders will be essential to the successful development of the Project. Community engagement and consultation will be a key element in assessing the project's potential impacts on and benefits to the community. This will take into consideration the opportunities for socioeconomic development based on the needs and aspirations of the gulf region community.

3.1 Consultation Objectives

The goal of Xstrata Zinc's consultation program is to reveal the social, economic, environmental and development priorities and concerns arising from the proposed Project amongst stakeholders and based on this, to inform decision-making through the environmental assessment.

3.2 Stakeholders

Stakeholders are parties with an interest in the project who can potentially influence, or are influenced by, its development. Stakeholder groups and their level of interest and influence will vary throughout the life of the mine.

Stakeholders associated with the project can be grouped into broad categories that reflect their interest in the project.

Table 2 provides a summary of the key external stakeholders.

Table 2 McArthur River Mining - Stakeholders

Group	Specific Stakeholder
Government	Northern Territory Government including (but is not limited to): <ul style="list-style-type: none"> - Chief Minister and Cabinet - Member for Barkly - Department of Resources - Department of Natural Resources, Environment and The Arts and Sport - Local Police - Borroloola School
	<ul style="list-style-type: none"> - Australian Government Department of Resources - Department of Sustainability, Environment, Water, Population and Communities
	Roper Gulf Shire Council
Community organisations and interest groups	MRM Community Reference Group
	King Ash Bay Fishing Club
	Mungoorbada Aboriginal Corporation (Robinson River)

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Group	Specific Stakeholder
	Mawurli and Wirriwangkuma Aboriginal Association
	Rrumburriya Malandari Aboriginal Corporation
	IST
	Mabunji Aboriginal Resource Association Inc.
	Northern Land Council
	Li-Anthawirriyarra Sea Rangers
	Amateur Fishermen's Association of the NT
	Northern Territory Environment Centre
Pastoralists	McArthur River Station
	Other regional/neighbouring properties
Community members	Residents of the region and specifically the communities of Borroloola, King Ash Bay, Sir Edward Pellew Islands and Robinson River
Traditional owners	Gurdanji, Marra, Garrawa and Yanyuwa people
Business	Minerals Council of Australia Northern Territory division
	NT Chamber of Commerce
	Over 400 NT-based suppliers including more than 20 local suppliers in Borroloola
MRM	Employees
	Contractors

3.3 Consultation Plan

Effective community consultation starts with listening to community views to develop a deep and empathetic understanding of community attitudes and concerns. Effective consultation will help shape subsequent communication strategies to ensure that issues of concern are either addressed or explained appropriately, including culturally appropriate communications strategies.

These strategies will follow the inform, consult, involve, collaborate, and empower process recognised as best practice consultation principles:

- Inform
 - Ensuring key stakeholders and the community are provided with information advising of the Project
 - Ensuring there are a variety of appropriate channels for key stakeholders and the community to receive information, including community meetings, one on one briefings,

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written and electronic communication, a telephone and email based inquiry line, factsheets and media relations.

- There are several stages at which information needs to be provided including critically, the final stage when the environmental assessment is submitted in order to close the loop with key stakeholders and the community about issues/concerns/ideas raised, and detailing proposed strategies to mitigate or maximise them. This includes discussion of what alternatives were considered and any amendments made as a result of stakeholder consultation.
- Consult
 - Systematic series of meetings with key stakeholders within the community in Borroloola, Darwin and government representatives in the Northern Territory and federally
 - It is intended that the local meetings with Indigenous representatives actually represent a series of discussions in order to be culturally appropriate
 - Key requirement is to be inclusive of all language groups, Indigenous and non-Indigenous community members
 - All consultation meetings are to be fully documented using Consultation Manager software for depth of reporting and tracking of issues and opportunities arising
- Involve, collaborate, empower
 - Encouraging key stakeholders and community members to actively participate in the engagement process
 - Utilise established networks and groups including the MRM Community Reference Group and various committees

The community consultation and engagement program will continue throughout the Project, in order to:

- Ensure open and transparent communication between Xstrata Zinc, the local community, the Traditional Owners, non-government organisations, and Northern Territory and Australian government.
- Identify and talk to key stakeholders as new issues arise.
- Disseminate information to all stakeholders on key issues identified during the environmental assessment.
- Prepare relevant documents for review by government agencies and other stakeholders.
- Explain how impacts will be mitigated or managed
- Report on all activities.

4 Project Description

4.1 Mining Methodology

4.1.1 Mining Method

Xstrata Zinc has been operating MRM as an open cut operation since 2006. Previously, the mine had been an underground operation since 1995 and this has been phased out. Xstrata Zinc is currently investigating the feasibility of expanding the open pit.

The open pit expansion comprises a conventional staged development of the HYC deposit within the currently approved bunded area. The open pit mining rate would be approximately 5 Mtpa of ore, achieved through an expanded fleet of conventional excavators / face shovels and large haul trucks.

The increase in reserve possible through the larger scale operation would extend the MRM life until approximately the year 2033. The ultimate pit is likely to be approximately 420m deep, 1700m long by 1500m wide, with an area of around 200 Ha.

A possible pit outline and site layout is indicated in **Figure 5**.

Mine planning options will be further explored in the feasibility process.



Figure 5 Possible Pit Outline and Site Layout

The waste rock generated from mining will be placed in the existing purpose built overburden emplacement facility (OEF), or potentially other areas that are currently being investigated. Preliminary estimates of the

open pit waste generated are around 500 Mt. The waste rock will be characterised as to its acid generating potential and selectively managed so as to minimise potential acid generation, as is the current practice.

A perimeter drain will be continued to capture surface runoff, which will be collected in a pond and utilised in the operation as appropriate. The OEF(s) will be progressively rehabilitated, as is the current process.

Wherever possible suitable waste rock from the pit will be utilised for construction purposes on site. Where practical, waste rock will be backfilled into the open pit.

4.2 Process Description

4.2.1 Crushing and Comminution

The current processing operation will be expanded to handle the increased ore production.

The ore will be crushed down to rock sizes of around 8-15mm through a primary crushing circuit, followed by secondary and tertiary crushing using cone crushers. Run of mine ore will be delivered to the plant at an approximate rate of 5 Mtpa and an average zinc grade of 10.7% w/w.

The crushed ore will be conveyed from the stockpile to a Heavy Medium Plant, where waste reject rates of up to 30% are expected, and then into a SAG mill operating in series with two closed circuit ball mills. Discharge from the ball mill circuit will then be pumped to the concentrator and stored ahead of flotation.

4.2.2 Ore Flotation

Ground ore will be conditioned with flotation reagents prior to being pumped to a bank of pre-flotation cells where a carbonaceous concentrate will be removed and transferred to tailings. After pre-flotation, the slurry will be pumped to a bank of rougher flotation cells, where approximately 92% of the zinc and 85% of the lead bearing minerals will be recovered to a rougher concentrate. The remaining ore slurry will be pumped to a tailings thickener, where the slurry will be thickened and transferred to the Tailings Storage Facility (TSF).

All waste streams from the process plant will report to this thickener for blending with concentrator tailings prior to disposal to the TSF. Rougher concentrate will be transferred to a bank of fine grinding mills, which will grind the concentrate to a size in the range 80% passing 9 - 18 microns. Finely ground concentrate will then be pumped to a bank of cleaner flotation cells, where approximately 90% of the zinc and 70% of the lead bearing minerals will be recovered to a final flotation concentrate, grading 30% w/w zinc.

The tailings from the cleaning stage will be pumped to the tailings thickener.

4.2.3 Pre Cycloning

The rougher concentrate material is then pumped through a pre-cycloning stage to produce two products: fine and coarse material. The fine material is sent to the cleaning conditioner tanks and the coarse material is sent to the regrinding circuit.

4.2.4 Final concentrate

The fine ground materials are then conditioned with reagents prior to passing to a seven stage cleaner circuit to produce a final zinc/silver/lead bulk concentrate. The concentrate and tailings products are pumped to different thickening tanks. Thickened concentrate is then sent to storage tanks prior to filtering and stockpiling.

4.3 Tailings Management

All waste streams from the process plant will report to the tailings thickener for blending with concentrator tailings prior to discharge to the TSF. Thickened tailings will be deposited in the existing TSF which will be

expanded. Investigations are underway to determine the tailings management design and operational strategy.

Test work of the tailings material will continue to be undertaken to determine the acid generating potential and leachate characteristics, as is the current practice.

The tailings rehabilitation strategy will be based on the current approach of establishing a capillary layer, 800mm nominal cover with inert material and shedding water from the surface. This approach is currently being tested and confirmed during rehabilitation trials on the existing TSF. The rehabilitated tails will be left in a safe and stable condition.

4.4 Power Generation

Gas fired power generation already exists on site (current generating capacity 20 Mw) and a range of options are being considered to increase this by another 20 Mw for a total capacity of approximately 40 Mw.

4.5 Transport

The transport of the finished product will be by truck to the existing Bing Bong Port along the existing sealed highway. The product tonnages will be increased to 800 000 metric tonnes per annum, up from the current annual average of 358 000 tonnes. It is anticipated that the existing Bing Bong infrastructure does not need to be changed to support the proposed Project. This will be confirmed during the Project Feasibility Study.

The bulk concentrate will be transported from the mine site in trucks and will be unloaded at the Bing Bong Port and transported by barge to anchorages in the Gulf of Carpentaria where it will be transferred to awaiting cargo vessels, as is the case currently. The number of transport movements will increase to cater for the additional increase in bulk concentrate.

The MV Aburri, which transports the bulk concentrate to an offshore loading zone, is able to cater for the increased capacity.

No additional dredging of the existing Bing Bong port facilities will be required as part of the Phase 3 Development Project.

4.6 Water Management

The climate of McArthur River region is tropical monsoonal, with a pronounced wet season between December and March and generally drier conditions for the remainder of the year.

The water management system must accommodate both cases and give consideration for severe shortages and surpluses of water over the life of the mine.

Aspects of the McArthur River Mine (MRM) Phase 3 Development Project that will have an impact on water management include:

- Upgrade of the process plant.
- Upgrade of TSF.
- Raw water collection and storage.
- Increased open pit area and depth.
- Overburden emplacement.

The water management system will be designed and operated around these structures and the following principles will be applied:

- Separation of clean and dirty water;
- Minimise water consumption.
- Maximise water recycling.
- Establish a preferential hierarchy of uses based on water quality.

- Control discharges from operational areas of the lease.
- Minimise the disturbance of land.

4.7 Infrastructure

The new project is expected to utilise all infrastructure currently being used by the existing operation, with some improvement or upgrade required. Examples of these improvements are the village facilities, which would have to be expanded to cater for the extra personnel.

Building wherever possible onto the existing infrastructure will occur. The aim of this is to:

- Minimise disturbance to land.
- Design to topographic contours (to minimise cut and fill requirements).
- Utilise existing infrastructure.
- Design around local issues (e.g. cultural considerations).
- Design above known and calculated flood levels.
- Control potential contaminants.

4.8 Workforce

The operational workforce will increase from its current level of 440 permanent staff and contractors to approximately 550 as the mining strip ratio increases.

It is expected that during the construction phase, the site based construction workforce will peak at around 900. There will be a range of other indirect jobs created within the Northern Territory and other areas of Australia as a result of the project and procurement contracts within the Australian industry.

4.9 Rehabilitation and Decommissioning

On final decommissioning all plant and infrastructure will be made safe or dismantled and removed unless stakeholders suggest otherwise. Mine closure planning will be conducted in consultation with stakeholders to ensure that the final rehabilitation and mine closure objectives incorporate their requirements and keep them informed of achievement of mine closure criteria.

Mine closure planning is a continuous process that commences prior to project development. Closure plans will be progressively refined and adapted throughout the life of the mine. This ensures that the planning adapts to information that becomes available during construction and operations, and to changes in regulations, stakeholder expectations, technology, knowledge and mine planning.

End use objectives will be established through a consultative process involving Xstrata Zinc, government and relevant community stakeholders.

Progressive rehabilitation will be undertaken wherever practicable. Whilst opportunities for placement of waste rock in the open pit will be maximised, the open pit will remain as a void and will fill with water over time.

The mine closure plan will be developed in line with the following objectives, developed from the Department of Resources mine closure objectives (DRPIFR, 2006):

- Ensure compatibility with post closure land use.
- Ensure physical safety to protect human health and safety.
- Ensure low risk to biota.
- Reduce the need for long term monitoring and maintenance through design of and construction of landforms that are geotechnically, erosionally and geochemically stable.
- Develop landforms that are consistent with the surrounding landscape.
- Develop an environmental monitoring and reporting program that is focused towards demonstrating the achievement of closure outcomes.

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- Undertake progressive rehabilitation of the site during operations.
- Ensure that the full cost of decommissioning and rehabilitation is understood and that a mechanism for funding exists.
- Ensure that residual risks and liabilities are identified and controlled to an acceptable level.

4.10 Project Summary

The predicted changes between the existing and proposed projects are shown below:

Item	Current Approved Project	Proposed McArthur River Mine Phase 3 Development Project
1. Resource	53 Mt measured indicated and inferred	Likely mining reserve of 115 Mt total
2. Mine Life	Estimated 21 years from 2006 approvals (2027)	Additional 6 Years to 2033
3. Mining method	Open pit mine using conventional drilling, blasting, loading and haulage methods	No Change
4. Open Pit Dimensions	Length – 1500 metres Width – 800 metres Depth – 210 metres Overall footprint – 103 hectares	Length – 1500 metres Width - 1500 metres Depth - 410 metres Overall footprint – 203 hectares (note: within the currently approved bunded area)
5. Mining Rate Capacity	2.5 million tonnes of ore per annum	Approximately 5 million tonnes of ore per annum
6. Tailings	Tailings discharged to TSF	Extension to existing TSF or increase height of existing TSFs to create additional capacity.
7. Overburden Emplacement Facility	185 Mt overburden emplacement facility	Extra 500 Mt of overburden to be emplaced in a number of additional sites.
8. Processing	Grinding and flotation to produce zinc concentrate	No Change.
9. Power	20 Mw from a gas fired power station	Estimated extra 20 Mw required (total 40 Mw)
10. Product/year	Zinc concentrate – 360 000 dry metric tonnes (166 000 tonnes of zinc in concentrate)	Zinc concentrate – 800 000 dry metric tonnes (368 000 tonnes of zinc in concentrate)

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Item	Current Approved Project	Proposed McArthur River Mine Phase 3 Development Project
11. Transport	Concentrate trucked to Bing Bong and barged offshore for further shipment	No change in method. Approximate doubling of concentrate volume trucked to Bing Bong Port for shipment
12. Water Management	Bore fields supply (if required) Mine water collected and utilised in the process Emergency discharge licence in place	To continue. Existing water management structures to be upgraded. No diversions necessary
13. Workforce	440 permanent staff and contractors	Construction peak 900 Approximately 550 permanent staff and contractors

5 Existing Environment

5.1 Climate

The climate of the McArthur River region is tropical monsoonal, with a pronounced wet season between December and March and generally dry conditions for the remainder of the year, although a build-up to the wet season with some rain often occurs during November.

Mean annual rainfall for the mine site is 715mm with the area around the Bing Bong Port receiving a mean annual total of 1040mm. Mean annual evaporation varies from 3000mm at the mine site to around 2300mm at the coast. Average daily minimum and maximum temperatures for McArthur River are 12°C to 29°C in June whilst in December they range from 25°C to 38°C.

Winds during the dry season blow predominantly from the southeast to south in the morning and change to east to northeast in the afternoon. During the wet season, there is no predominant wind direction in the morning, whilst in the afternoon; winds predominate from the north to east. McArthur River has more calm observations than those in coastal locations.

Extreme events include cyclones, floods, droughts and fire. Cyclones are an annual threat to coastal areas in the Gulf region. The McArthur River Mine is outside the cyclone risk area but is affected by the tropical low pressure systems that can result in flooding. Flooding is an annual risk at McArthur River. Large departures from the normal annual cycle are possible.

Regionally there is a high risk of dry season fires. Mine site surrounds are control burnt approximately every two to three years to reduce this risk.

5.2 Air Quality

The Project area is remote from pollution sources and the only air pollutant that is likely to be present at significant concentrations is particulate matter from wind-blown dust and bushfire smoke during the dry season.

5.3 Noise and Vibration

There are few sources of noise and vibration in the Project area. Noise levels are typical of those for a rural environment.

The existing McArthur River Mine is located 20 km away from the nearest sensitive receptor, and noise has not been an issue for the existing mine.

5.4 Geology

The McArthur Basin comprises Carpentarian and Adelaidean rocks extending from the Alligator River in the Northern Territory to the Queensland border including the greater part of Arnhem Land and the Gulf of Carpentaria drainage region.

The sediment hosted stratiform HYC deposit has similarities with ore-bodies at Mount Isa and Hilton in Queensland. It is about 1.5km long and 1.0km wide with an average thickness of 55m. The HYC deposit occurs near the base of the HYC pyritic shale member, within the Middle Proterozoic McArthur Group. The member comprises a sequence of inter-bedded pyritic bituminous dolomitic siltstones, sedimentary breccias and volcanic tuffs.

The HYC deposit has been folded and eroded along its western margin, which is covered with 30m of soil. This western margin contains the Hinge ore zone, which is sub-vertical with a strike length of 1.0km and vertical height of 200m. The northern margins inter-finger with sedimentary breccias and the southern margin grades into thinned nodular barren pyritic siltstone. On the eastern margin the ore-body thickens and is

folded to form the Fold Zone, which has a strike length of over 600m. The south-eastern corner is down faulted 110m by the north-eastern trending Woyzbun Fault.

5.5 Water Resources

The mine site is situated adjacent to the McArthur River in the middle reaches of the river's catchment, between the confluences of the Kilgour and Glyde Rivers. The catchment area of the river above the mine site is approximately 10,000km². The 100 year average recurrence interval (ARI) flood level at the mine site is 39.5 m. All major infrastructure on the site is located above this level. With the exception of some spring fed tributaries, most of the flow of the McArthur River comes from wet season rains.

The river ceases to flow in some dry seasons, and most stretches, particularly in the vicinity of the mine area, can dry to a series of large isolated pools. During the wet season the river can become extremely turbid when in flood. Flow data for the McArthur River in terms of ARI is 7,250 (m³/s) for 1 in 100 year event (RL 40 m), whilst 1,000 (m³/s) for 1 in 2 year event.

The main creek systems which bound the tailings and mine site are Barney and Surprise Creeks. Barney Creek has a catchment area of 600km² at the mine site. The creeks are dry throughout most of the year. This is particularly the case for Surprise Creek, which has a catchment size of only 85km², and normally flows for only a few days each wet season.

Water quality in the McArthur River has been affected by the mining activity, namely, the McArthur River diversion channel that was constructed as part of the mine's conversion from an underground to open cut operation. Water quality contains background levels of lead and zinc due to mineralisation containing these metals upstream of the mine site. Extensive environmental monitoring is undertaken of surface water, both upstream and downstream of the McArthur River diversion.

Water quality monitoring and visual appraisal of the ephemeral creeks on the mine site show that they are not being significantly impacted by heavy metals. Surprise Creek is showing increased levels of sulphates related to tailings seepage but no significant biological impacts on this creek system have been identified to date.

The MRM has two main aquifers in the immediate vicinity: the alluvial aquifer and the lower fault aquifer. The alluvial aquifer is readily linked to the McArthur River and contains good quality fresh water. The faults in the dolomite and shales contain groundwater that is linked to the alluvial aquifer in part. Dewatering of the current mining operation has had no observable impact on the hydrology or ecology of the McArthur River.

The dominant relief is low escarpments, plateaux and ridges, with limestone or dolomite rocks of Palaeozoic age or older in the western part of the McArthur River catchment upstream of the Project site, and sandstone and conglomerate rocks in the eastern sub-catchments, including the Kilgour and Glyde Rivers.

Mining development has had minimal impact on the physical aspects of the region, with the disturbance area being a small proportion of the McArthur River Mining Leases.

5.6 Land Use

Land use in the region is predominantly cattle grazing on large pastoral properties and the occasional mining activity. Encompassing all mining leases is McArthur River Station, which is 100% owned by Colinta Holdings, an Xstrata subsidiary. Other regional pastoral enterprises are owned by private persons, companies, and Aboriginal groups.

McArthur River Station stocks approximately 10000 head of cattle over 8000 km², utilising approximately one third of the area for grazing. Cattle have been excluded from the mining and processing areas.

McArthur River Mine is located in one of the more sparsely populated areas of Northern Australia. Populations of townships fluctuate with people leaving outstations in the wet season.

Borrooloola Township has a total population of approximately 900 with the majority of the workforce employed in fishing, retailing or government sectors. The rural workforce is mainly employed in the pastoral industry and in mining.

Local employment and training opportunities, together with transportation and provision of services, are currently the most important economic links between MRM and the community. MRM has had a positive input into the local community development to date in terms of health development, general and specialised education, financial, and employment. MRM has also entered into a business arrangement with the local aboriginal corporation (MAWA). The impact on pastoral properties is considered negligible with the exception of the flow-on effects from the provision of additional services for the area.

5.7 Terrestrial Flora

The botany of the project area is characterised as being complex, with a high number of community types, with relatively low numbers of constituent species.

Nine distinct vegetation communities occur within the McArthur River Mine project area. Four of these are upland communities on sandstone or rocky hills, three are lowland woodland communities, and two are riparian or riverine communities. The dominant vegetation types in the proposed development area are lowland woodland plains dominated by *Eucalyptus terminalis*, *E. microtheca*, *Excoecaria parvifolia* or *Lysiphyllum cunninghamii*. Communities on upland hills are dominated by species such as *Cochlospermum spp*, *Terminalia canescens*, *Erythrophloeum chlorostacys* and *Eucalyptus leucophloia*.

Riverine communities along the McArthur River are dominated by tall *Melaleuca spp* and *Eucalyptus papuana*.

Previous flora surveys held for the 2005 EIS (i.e. the conversion from an underground to open pit operation) found a total of 364 plant species from 84 families and 215 genera. The most speciose plant families were Poaceae (53 species); Fabaceae (31 species); Myrtaceae (24 species) and Cyperaceae (20 species). Speciose genera included *Acacia* (14 species); *Eucalyptus* (8 species) and *Ficus* (7 species).

The surveys undertaken in previous EIS studies revealed no plants of rare or endangered status on site. There has been no additional significant species found to date.

Weeds are common on the mining leases including Noogoora Burr, Devil's Claw, Bellyache Bush, and Parkinsonia particularly in those areas disturbed by grazing.

Being located at the edge of a coastal plain, the vegetation communities at Bing Bong are substantially different to those around the mine site. The coastal plain consists largely of poorly drained clay soils dominated by open woodland communities. Along the coast, cheniers composed of sand and shell deposits cast up by cyclones are interspersed with salt-flats.

5.8 Terrestrial Fauna

Since 1976, several comprehensive fauna surveys have been undertaken at the Project and in the region, and the site fauna is well known. Vertebrate fauna recorded includes 114 bird, 44 reptile, 17 mammal, 16 frog and 18 freshwater fish species.

Insect fauna has been described as rich (over 5 000 species) and diverse reflecting the wide range of habitats available. The survey areas were considered unlikely to include restricted species.

Riverine habitats are the richest areas for fauna, and include some specialist birds such as the Purple-crowned Fairy-wren (*Malurus coronatus*) and White-browed Robin (*Poecilodryas superciliosa*). Common fauna of the open woodland habitats includes honeyeaters, Grey-crowned Babbler (*Pomatostomus temporalis*), Varied Lorikeet (*Psitteuteles versicolor*) and Agile Wallaby (*Macropus agilis*).

Some species are restricted to the stony hills habitats, including reptiles such as Hosmer's Skink (*Egernia hosmeri*) and Storr's Monitor (*Varanus storr*). Freshwater crocodiles (*Crocodylus johnsoni*) and the turtle *Emydura worrelli* are abundant in the McArthur/Glyde river systems.

Identified feral animals particularly of note are pigs, feral cats, donkeys, horses, buffalo and cane toads.

The Gouldian Finch (*Erythrura gouldiae*) is currently listed as endangered under the Commonwealth EPBC Act but has never been observed on the mining leases.

No mammals of significance have been identified on the mining leases. Based on previous studies no endangered or vulnerable species were reported to occur within the area affected by the proposed development

5.9 Aquatic Biology

The McArthur River has an apparent low species richness of freshwater fishes when compared to other systems in the Gulf drainage division. The low species richness is possibly due to the ephemeral nature of the system and the low diversity of habitats available.

There are four broad aquatic habitats in the region: the McArthur River and its tributaries, permanent spring-fed refuge pools (particularly the Glyde headwaters), off river Billabongs (such as Caranbirini Waterhole), and ephemeral streams.

The Freshwater Sawfish (*Pristis microdon* - Vulnerable under the EBPC Act) has been recorded from a number of locations in the upper McArthur, Glyde and Kilgour Rivers. It has been recorded from the vicinity of the project area, with extensive surveys undertaken. The species also occurs in many other coastal rivers throughout the Northern Territory, Kimberley and northern Queensland. While little is known of the biology of this species, it is essentially a marine fish which lives extensively in freshwater habitats.

Most of the fish species recorded to date have widespread distributions. Downstream, in the McArthur River, fish are exploited for commercial and recreational purposes.

5.10 Infrastructure, Traffic and Transport

The mine site is connected to Darwin by road via the Carpentaria Highway to Daly Waters and then the Stuart Highway to Darwin. The site is also connected to Mt Isa via the Tablelands and Barkly Highways. Apart from those that live locally, all operational workers fly in and out of the mine site. The airstrip is fenced to exclude cattle.

Bulk concentrate is currently hauled by road from the mine site to the Bing Bong loading facility.

5.11 Aboriginal and Cultural Heritage Sites

The project is on lands traditionally used by the Gudanji, Binbinga, and Yanyula people. Although areas of land are identified as belonging to particular language and family groups, other groups may have important traditional interests in that land.

Borroloola and its immediate surrounds have residents from a number of Aboriginal groups and include the Garawa, Mara, and Alawa people.

Not all of these groups are traditional owners of lands likely to be directly affected through mine development. A number of Aboriginal site investigation studies have been undertaken and agreements made with the traditional owners for the current mining lease approvals.

MRM holds Authority Certificates referenced #C2004-007 to 023 issued by the Aboriginal Area Protection Authority. These certificates include all operational areas. The AAPA has also issued authority certificates for all of the mine's operations including the open pit development in accordance with Section 22 of the Northern Territory Aboriginal Sacred Sites Act 1989.

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A number of Aboriginal site investigation studies have been undertaken and agreements made with the Traditional Owners for the current mining lease approvals. Site investigations were also undertaken for the areas affected by the open pit development including archaeological and ethnographic surveys of all land to be disturbed.

This work was undertaken in cooperation with Traditional Owners and other local Aboriginal elders to ensure sites of cultural significance are protected. Access by mine personnel is prohibited.

As a further safeguard in normal operations, any employee or contractor needing to undertake any ground disturbing activity must first obtain approval from both MRM's Community Relations and Environmental Departments in order to ensure actions are checked against the AAPA authority certificates for cultural heritage sites.

No identified sacred areas have been impacted during the life of the current operation. There is no planned impact with the expanded operations on identified sacred sites. Some sites are close to the open pit operation and will be protected during the future of the operation.

Traditional owners and representative bodies will be consulted as part of the environmental assessment process.

6 Potential Impacts and Mitigation Measures

Previous Environmental Impact Assessments for the MRM were conducted in 1992 and 2005 and identified potential areas of impact. Subsequent monitoring and evaluation of the mining activities potential impact has been developed from the environmental risks identified in these studies.

An approved environmental monitoring program has been conducted annually since the mining operation commenced at MRM.

McArthur River Mining currently monitors surface water (McArthur River, Surprise Creek, and Barney Creek), groundwater, artificial surface waters, sea water, potable water, marine sediment, stream sediment, dust, soil, noise, rehabilitation (vegetation and soil profile), marine flora and fauna, waste management aspects, meteorological and greenhouse gas emissions.

The main environmental issues that require further investigation are discussed below. A large amount of information has been collated for the current environmental mining lease approvals and progressively during the current mining operation.

More information can be found at the McArthur River Mine website: www.mcarthurrivermine.com.au

6.1 Land Resources

6.1.1 Potential Impact

The project has limited potential to reduce the land available for agricultural activities in the region as extensive land suitable for these land uses remains within the region. While the project area will be rehabilitated, there will be some areas, such as the final pit voids, which will be permanently unavailable for pastoral or horticultural activities. These areas will not restrict any future agricultural use of the remaining project area. Removal of vegetation within the project area may result in some topsoil and subsoil erosion, with subsequent impacts on the future uses of affected land.

Soil contamination may occur during project activities from chemical or fuel spills, product spills, and dust emissions. Soil contamination may inhibit revegetation and limit suitable future land uses.

Some waste rock and tailings are potentially acid forming (PAF). Acid neutralising materials will also be mined to encapsulate PAF material (which is the current practice on site) as this controls the potential for Acid Rock Drainage (ARD). A laboratory testing program will be continued and based on test results, strategies implemented to negate the potential environmental impact from the long term storage of waste rock and tailings.

Existing experience at the site has shown that ARD is not a major issue with the current waste rock management procedures in place which involves the encapsulation of PAF material with Non Acid Forming (NAF) rock.

6.1.2 Management and Mitigation Measures

Management measures to reduce or avoid impacts associated with changes to land resources and use include:

- Using appropriate transport, storage and handling methods for fuels, lubricants and other chemicals.
- Using spill response procedures when required.
- Ensuring site personnel have a high level of operator training and diligence.
- Assessing soils prior to mine closure for contamination and undertaking appropriate remediation measures where necessary.

- Restricting vegetation clearing to the project footprint, undertaking progressive rehabilitation, utilising erosion controls where appropriate and controlling surface water runoff.

To minimise ARD impacts the following will occur:

- Characterise waste rock and tailings.
- Waste rock dump and tailings storage facility modelling and design.
- Determine implications for surface water and groundwater management.

Rehabilitation and decommissioning will continue at MRM to minimise land impacts, and this is discussed further in **Section 6.14**.

6.2 Surface Water

6.2.1 Potential Impact

The local hydrological regime will be modified through the development of the existing open pit, overburden emplacement facilities, tailings upgrades and water management structures.

The Project will not expand the open pit beyond the current boundary of the bund wall and there will be no impact on the McArthur River or Barney Creek channels.

Local surface water may be affected by:

- Contaminants in surface runoff.
- Eroded sediment from disturbed areas, the TSF and overburden emplacements.
- Leachate from waste rock and ore, particularly that with potentially acid-generating potential.
- Drawdown of aquifers reducing supply for groundwater-dependent ecosystems.
- Altered surface water flow patterns due to surface water management on site.

The project may require controlled discharges. If not appropriately managed, these discharges could impact downstream water quality. A detailed site water balance, incorporating operational water requirements and the need to manage extreme climatic events will be developed, as is currently the case. A water management strategy will be used to assess potential impacts and mitigation strategies.

6.2.2 Management and Mitigation Measures

Existing information will be complemented with further studies on the receiving waters, including:

- Characterising current hydrological regime.
- Characterising existing water quality.
- Assessing the impact of alterations to existing conditions, such as downstream water quality.
- Determine operational parameters to maximise water resource utilisation.
- Maintaining a site water balance.
- Develop appropriate water management strategies to minimise the potential for adverse impact.

Other mitigation and management measures include constructing sediment basins and bunds for surface water collection and treatment, and collecting contaminated water, such as that with low pH, for reuse or discharge in accordance with the Project waste discharge license. If necessary, Xstrata Zinc will obtain a waste discharge license for all water discharged from site.

6.3 Groundwater

6.3.1 Potential Impact

The potential impacts to groundwater relate to:

- Groundwater extraction and mine dewatering. Groundwater may be used to provide water during operation of the project. In addition, the pit may intercept the water table and as a consequence water will have to be pumped out of the pit. Groundwater extraction and mine dewatering may adversely impact regional groundwater resources and affect existing operating bores.
- Groundwater contamination. Contaminates have the potential to enter groundwater aquifers from spills or seepage from overburden emplacement facilities, the TSF and final voids. Geochemical characterisation of waste rock has indicated that some has the potential to be acid forming, requiring proper management and mitigation measures to reduce the potential for contamination.

6.3.2 Management and Mitigation Measures

Management measures to reduce or avoid impacts associated with reduction in groundwater quality and quantity include:

- Operating project-related bores at sustainable extraction rates.
- Undertaking continued groundwater level and quality monitoring.
- Replacing or deepening existing wells if they are substantially affected (based on the establishment of sustainable levels) by dewatering activities, or provide alternative water sources for affected users.
- Appropriately designing, constructing and draining OEF areas.
- Appropriately bunding and managing wastes and chemicals.

6.4 Terrestrial Flora and Fauna

6.4.1 Potential Impact

Flora and fauna of the MRM site and surrounds have been extensively studied. Additional disturbance in the open pit mine, OEF(s), processing plant hardstand, camp, TSF and additional power will be required. The project has the potential to impact upon individual species of flora and the vegetation communities within the project area. This includes the loss of vegetation.

Some vegetation will need to be disturbed for the project. The clearing of vegetation will remove individual plants from the broader regional population. This has the potential to impact on the distribution, dispersal and genetic diversity of populations of species in the region. However, the vegetation of the project area is typical of the region and is not considered to be regionally significant.

The removal of vegetation also has the potential to fragment and reduce the area of habitat available for fauna species dependent on it for resources, with possible consequences including increased inter and intra-specific competition for resources due to reduced foraging areas, increased hunting pressure from prey species due to a reduction in habitat providing cover, and the isolation of breeding populations. There is also the potential for loss of individual animals during the clearing of vegetation.

Some threatened mammal and bird species present or potentially present in the project area are listed for their conservation significance. Ground disturbance (including mining) and vegetation clearing may reduce the abundance of threatened animal species in the project area.

Project-related vehicles and equipment (especially earth-moving equipment) have the potential to introduce and/or spread weed species within and around the project site. However, the areas are already relatively heavily infested with weeds. Increases in weed density and distribution have the potential to further reduce the available local habitat for fauna species that are dependent on specific vegetation communities. An increase in the presence of woody weeds also has the potential to increase the fuel load and in turn increase the intensity of fires.

Ground compaction, soil or water contamination and physical damage to vegetation in the project area may also reduce the ability of plants to become established, and limit the potential for rehabilitation and revegetation of disturbed areas.

Mine infrastructure may alter the runoff and drainage characteristics of the project area which could affect downstream vegetation. This may promote weed invasion, reduce plant health and degrade habitat for existing vegetation.

6.4.2 Management and Mitigation Measures

Management measures to reduce or avoid impacts on flora include:

- Erecting flagging tape to mark 'no-go' zones to ensure areas to be protected are clearly defined, identified and avoided and that clearing and ground disturbance will only occur within designated areas.
- Ensuring current vegetation clearance protocols are followed and assessing performance against them.
- Ensuring vehicles and project equipment arrive on site free of vegetative matter, seeds and mud.
- Implementing targeted weed control measures for any observed significant increase in the distribution or density of existing weeds, or new populations of weeds.
- Regularly monitoring areas with a high potential for, or susceptibility to weed invasion; such as along roadsides, recently cleared areas and permanently wet areas such as the banks of the water storage facilities and drains, particularly following rainfall events.
- Controlling or preventing weed infestations in topsoil stockpiles to minimise the likelihood of weed introduction or increased distribution during respreading of topsoil.
- Progressively rehabilitating disturbed areas and avoiding unnecessary future disturbance of these areas.
- Implementing methods to monitor and maintain progressively rehabilitated and revegetated areas.

Management measures to reduce or avoid impacts for fauna include:

- Minimising the area of vegetation clearance.
- Minimising the potential for water to pool in areas where it is applied as a dust suppressant (e.g., along unsealed haul roads) to reduce the attraction for animals.
- Ensuring that waste management procedures are diligently followed to deter pest animals.
- Consolidating areas of vegetation to be cleared for access tracks and infrastructure pathways so that large blocks of habitat, rather than small fragments, are preserved.
- Rehabilitating cleared land following project completion.
- Regularly monitoring areas with a high potential for, or susceptibility to, increases in abundance of introduced species (e.g., administration facilities and around water sources).
- Continued monitoring of fauna.

6.5 Aquatic Biology

6.5.1 Potential Impact

No watercourses will need to be disturbed for the Project. The section of the McArthur River impacted by the existing open pit is continuously monitored for aquatic flora and fauna.

A site water balance will be undertaken to determine if discharges are required for the Project. Water discharges may affect water quality in the McArthur River if they are required, which could potentially affect aquatic flora and fauna.

6.5.2 Management and Mitigation Measures

Management and Mitigation measures include:

- Develop a water management strategy to minimise impacts.
- Determine conservation significance of species identified (if required).
- Develop an appropriate control strategy based on aquatic flora and fauna 'significance' (if required).
- Continue aquatic biology monitoring programmes.

6.6 Air Quality and Greenhouse Gases

6.6.1 Potential Impact

Dust has been extensively studied for the current operation. There are no residents within close proximity to the site and accordingly environmental impacts of dust should not affect the nearest receptor.

The construction and operation of the project may increase the greenhouse gas emissions for the region. Of the main greenhouse gases, carbon dioxide (CO₂) and nitrous oxide (NO₂) are the most significant in relation to the project since they are the main products that result from the combustion of diesel when powering earthmoving equipment. Vegetation clearing during construction will also cause emissions.

6.6.2 Management and Mitigation Measures

Air emissions from diffuse (dust) and point sources (such as expanded power generation facilities) will be;

- Characterised.
- Assessed against background levels.
- Evaluated for their potential to result in significant environmental impact.
- Addressed through application of ameliorative measures.

The following dust mitigation strategies will be adopted and continued from the existing operation:

- Using water or dust suppressants on trafficked areas (i.e., internal haul road and light vehicle access road), exposed surfaces and similar to reduce emissions.
- Maintaining roads to minimise the build-up of fine particles that are susceptible to wind erosion.
- Using speed limits on roads used by mine traffic.
- Using signage and markings to ensure traffic is kept to designated roadways.
- Designing and scheduling blasting to minimise dust emissions (i.e., scheduling blasting when conditions are suitable).
- Minimising the extent of exposed areas susceptible to wind erosion.
- Where practical, limiting high dust-generating activities during adverse wind conditions or instead increasing the frequency of road watering.

Best practice environmental measures for reducing greenhouse gas emissions will be employed during the construction and operations phases and include:

- Applying policies and procedures for energy efficient mine operation.
- Minimising haul distances to minimise diesel consumption.
- Monitoring energy consumption (e.g., diesel and electricity) and calculating greenhouse gas emissions.
- Where practicable, establishing measurable improvement targets (e.g. participation in revegetation programs) for greenhouse gas emissions.
- Reporting greenhouse gas emissions in accordance with Northern Territory and Commonwealth requirements.

6.7 Noise and Vibration

6.7.1 Potential Impact

The expected noise and vibration impacts of the Project are anticipated to be similar to those experienced already at MRM. Other than the noise and vibration generated by the Project and the associated infrastructure, there are few other sources of noise and vibration in the area. Increased noise generation may occur from additional processing infrastructure, mobile equipment and blasting.

The closest sensitive receptor is approximately 20 km away, so noise and vibration should not be an issue.

There may be an increased noise impact from the extra haulage of bulk concentrate required from the mine to the Bing Bong Port.

6.7.2 Management and Mitigation Measures

An evaluation of noise and vibration will be undertaken using modelling of the predicted impact. Guideline levels will be established and appropriate control strategies identified, and integrated into project planning and operation.

In addition, the following mitigation strategies will be adopted and/or continued from the existing operation:

- Servicing all plant, machinery and vehicles regularly.
- Selecting and positioning site buildings, access roads, equipment and plant in a way that minimises acoustic disturbance in the locality.
- Installing standard and, where necessary, additional noise abatement devices (e.g., mufflers) on machinery and vehicles.
- Undertaking noise monitoring to ensure compliance with relevant noise criteria (if required).

6.8 Waste Management

6.8.1 Potential Impact

Wastes generated from the project may cause impacts if not managed appropriately. This includes land contamination, vermin attraction and visual amenity issues.

6.8.2 Management and Mitigation Measures

Industrial wastes generated on site will be managed in accordance with current practice, which includes:

- Maximising recycling opportunities where cost effective (e.g. steel, waste oil and batteries).
- Depositing contaminated waste in the TSF.
- Burying clean waste in a designated landfill.
- Burying putrescible waste in a clay lined pit.
- A package sewage treatment plant with primary treatment and effluent irrigation.

6.9 Hazard and Risk

6.9.1 Potential Impact

Environmental and safety issues requiring control strategies will be integrated into planning to reduce risk appropriately. Understanding hazard and risk allows the operation to determine priority issues and assign the appropriate level of control.

It is necessary to anticipate, prevent and mitigate risks and impacts. A project risk assessment will be undertaken in order to:

- Anticipate, prevent and mitigate environmental risks and impacts.
- Minimise loss in all areas of the organisation.
- Improve the quality of decision-making within the organisation.

Job risk analysis will be continued as a tool to identify and record risks associated with specific work activities. A job risk analysis requires personnel to examine the task they are about to undertake and:

- Break the job into separate, defined steps.
- For each step, identify the potential hazards that could occur with that step.
- For each potential hazard, list the method to be followed to prevent the hazard causing an injury, loss, damage or environmental incident.

6.9.2 Management and Mitigation Measures

- Collate expertise to evaluate potential site environmental risks.
- Undertake an environmental issue risk assessment.
- Determine appropriate control strategies for mitigating identified risks.
- Expand the current Health and Safety Management system on site.

6.10 Visual Amenity

6.10.1 Potential Impact

The project has the potential to decrease visual amenity in the area. The impact to existing visual amenity will vary with viewer sensitivity (i.e., the degree to which change is perceived or experienced by an individual), the viewer's distance from impacted areas (i.e., local, sub-regional or regional) and the phase of the mine cycle (i.e. construction, operation or closure).

Potential impacts to visual amenity can include:

- Permanent changes to landforms.
- Vegetation removal, altering existing landscape and allowing views of the project components.
- Presence of additional vehicles and project machinery, particularly haulage trucks along local roadways.

The development of the project may impact upon the existing visual environment, for example, the visual landscapes along the Carpentaria Highway. Whilst this is not considered a significant issue due to the isolated nature of the project, a qualitative assessment will be undertaken of the visual impact and appropriate measures to minimise any impact will be incorporated into project design, operation and closure.

6.10.2 Management and Mitigation Measures

Management and mitigation measures will include:

- Designing project components in mind when considering visual impacts, i.e. reducing height where possible, bearing in mind that a reduction in height will result in an increase in footprint and hence disturbance area.
- Progressively rehabilitating areas wherever possible.
- Maintaining a high standard of housekeeping at the site.
- Considering the colours of the surrounding landscape when selecting exterior paint colours for buildings.
- Rehabilitating and decommissioning the site at mine closure.

6.11 Infrastructure, Traffic and Transport

6.11.1 Potential Impact

Potential issues relating to the project include:

- The ability of current services and facilities to support the Project (in terms of MRM's ability to support an increased population associated with the workforce and the provision of services to the development).
- Changes to local traffic volumes and resulting safety and amenity issues.

6.11.2 Management and Mitigation Measures

All appropriate laws and regulations associated with the use of public roads and other infrastructure will be abided by. Management measures to reduce or avoid any impacts will include:

- Ensuring the traffic load is within the capacity of the existing road network and will not cause any significant disturbance to it.
- Provision of measures such as escort vehicles and appropriate signage for heavy haulage of construction and mining equipment to site.
- Construction of temporary diversion roads for local traffic (if required).
- Consultation with Northern Territory Government, local council and the community regarding traffic and road aspects of the project.

6.12 Socio-Economic Impacts

6.12.1 Potential Impact

McArthur River Mining will remain a fly-in, fly-out operation. There will be some socioeconomic impact on the local community resulting from the Project. This will be reflected in increased employment and business opportunities for Borroloola township residents. McArthur River Mining expects an increased level of opportunity for local people and business to benefit from the expanded operation and this will be evaluated.

The development of the project provides an opportunity to contribute significantly to the regional economy. Local employment and business opportunities will be created both directly and indirectly as a result of the project. There is also potential for economic benefits as a result of the project for Indigenous groups.

6.12.2 Management and Mitigation Measures

Management measures to reduce or avoid negative socio-economic impacts, and maximise positive socio-economic benefits, include:

- Preferentially sourcing people, goods and services from within the local region and the Northern Territory.
- Placing a high emphasis on stakeholder consultation to foster and maintain good relationships and continue to consult with the community through all phases of the project cycle, including:
 - Planning.
 - Construction.
 - Operations.
 - Closure.
- Continuing to invest in training and education programs for employees and potential employees.
- Review existing socio-economic impact and benefits generated via the MRM Community Benefits Trust.
- Describe project workforce and changes.

- Conducting a thorough community consultation program as part of the environmental assessment process.
- Establish a plan to maximise the benefit of the development to the local community.

6.13 Archaeology and Cultural Heritage

6.13.1 Potential Impact

Current operational areas within the McArthur River mine leases have been extensively reviewed in terms of archaeological and cultural significance. These will be reviewed to take into account the new Project footprint.

Sites of Indigenous and non-Indigenous cultural or archaeological significance may occur within the Project area and the Project has the potential to disturb or destroy these sites during construction and operation. The impact of disturbance or destruction of these sites will be dependent upon the significance of the sites. Potential impacts to sacred sites will require careful consultation and management with Traditional Owners and the NLC.

6.13.2 Management and Mitigation Measures

Xstrata Zinc carries out its mining activities in accordance with authority certificates issued by the Aboriginal Areas Protection Authority (AAPA) pursuant to the Northern Territory *Aboriginal Sacred Sites Act*. Xstrata Zinc will continue to abide by all authority certificates issued to the project area, and if necessary, will seek authority certificates to be issued in its name during the permitting process for the project. The Northern Land Council and Traditional Owners will be consulted regarding management of any sites potentially affected by the project.

Other management measures to reduce or avoid impacts with associated disturbance or destruction of cultural heritage and archaeological sites include:

- Avoiding sites of significance as a first priority during the design of the project.
- Incorporating Indigenous site and object recognition training into the site inductions, and ensuring employees and contractors are aware of their legislative obligations.
- Following protocols in the event that a suspected Indigenous site, object or burial is discovered.

6.14 Rehabilitation and Decommissioning

6.14.1 Potential Impact

Mining can cause significant localised disturbance to land and mine footprint areas will include the pit, OEF, TSF and industrial areas. Rehabilitation of these disturbance areas and closure planning will be required to minimise this impact.

This ensures that the planning adapts to information that becomes available during construction and operations, and to changes in regulations, stakeholder expectations, technology, knowledge and mine planning.

6.14.2 Management and Mitigation Measures

Progressive rehabilitation and decommissioning planning commences in the project planning phase to ensure the best outcomes are achieved. Utilising information from current site rehabilitation practices and additional trials rehabilitation and life of mine options will be developed.

Rehabilitation and Decommissioning mitigation measures include:

- Undertaking progressive rehabilitation.
- Maintaining a soils map.

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- Assess rehabilitation suitability of topsoil.
- Continue soil management guidelines.
- Determine post-mining land use and rehabilitation options.
- Determine preliminary post mining land use criteria.
- Continue rehabilitation trials.
- Develop a life of mine decommissioning plan.

7 Impact Assessment Process and Schedule

7.1 Impact Assessment Process

The environmental impact assessment process is determined from the legislative requirements in the Northern Territory *Environmental Assessment Act* and the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

The project will require an environmental assessment under the Northern Territory *Environmental Assessment Act*.

In parallel with the submission of this NOI, Xstrata Zinc has lodged a referral to the Australian Government Department of Sustainability, Environment, Water, Population and Communities (SEWPAC) for the project under the EPBC Act.

This Notice of Intent is submitted for determination under the Northern Territory legislation, with the separate referral made to the Commonwealth for determination under their legislation.

7.2 Legislative Requirements

7.2.1 Commonwealth Legislation

7.2.1.1 EPBC Act

Under the Commonwealth *EPBC Act*, actions that are likely to have a significant impact on a matter of national environmental significance are assessed. SEWPAC is responsible for administering the act.

Matters that are considered to be of national environmental significance include:

- World Heritage properties.
- National Heritage places.
- Ramsar wetlands of international significance.
- Threatened species and ecological communities.
- Migratory species.
- Nuclear actions.
- Commonwealth marine areas.
- Additional matters of national environmental significance ('prescribed actions').

A referral and assessment process has been established to determine the application of the EPBC Act. The first step in this process is referral of the project to SEWPAC. The project is then assessed for the potential for impacts upon matters of national significance, and if this is applicable, to establish the significance of these impacts.

If it is determined that there will be, or there is likely to be, a significant impact to a matter of national significance the project is declared to be a controlled action.

7.2.1.2 Native Title Act

The *Native Title Act 1993* provides legal recognition of the rights and interests of the Aboriginal people over land and water possessed under their traditional laws and customs. The act sets out basic principles regarding native title in Australia and establishes a regulating and governing body, the National Native Title Tribunal.

The act also sets out processes by which native title rights are established, protected and compensation determined. Another important function of the act is through facilitating Indigenous Land Use Agreements (ILUA's) between native title parties and other interest holders.

For many years McArthur River Mining has worked closely with the Traditional Owners of the land, in order to ensure the wishes of Traditional Owners are respected.

7.2.2 Northern Territory Legislation

The initial environmental permitting of mining activities is regulated in the Northern Territory by both the *Mining Management Act* and the *Environmental Assessment Act*.

A decision on the appropriate permitting route for new mining proposals in the Northern Territory is initiated by the proponent's submission of a NOI (i.e. this document) to the Northern Territory Government through the Minerals and Energy Referral Assessment branch of the Department of Resources. If assessment under the *Environmental Assessment Act* is thought to be required, the NOI is referred to the Minister for Natural Resources, Environment and Heritage through DNRETAS for determination of the appropriate level of assessment.

Following completion of the assessment and approval process under the *Environmental Assessment Act* by the Northern Territory Minister for Natural Resources, Environment and Heritage (assisted by the DNRETAS Environment, Heritage and the Arts Division (EHA)), the Department of Resources proceeds with the approval process under the *Mining Act* and *Mining Management Act*.

7.2.2.1 Mining Act and Mining Management Act

The principal legislation for the regulation of mining proposals in the Northern Territory is the *Mining Act* and the *Mining Management Act*, both of which are administered by the Department of Resources.

Mining Act

The Mining Act establishes the framework within which activities to explore for and mine mineral resources can occur. The act sets out the administrative processes for authorising these activities through the grant of a title. Xstrata Zinc already holds an extensive tenement holding in the project area, under which McArthur River Mining is the operator for activities within these tenements. The project lies within the mineral leases (N1121, N1122, N1123, N1124 & N1125) issued under the *Mining Act*.

Mining Management Act

The objectives of the *Mining Management Act* are to ensure that the development of mineral resources is in accordance with the best practice health, safety and environmental standards and to protect the environment and health and safety of all persons on mining sites.

Under the *Mining Management Act*, an application for an authorisation to carry out mining activities must be accompanied by a mining management plan. A mining management plan includes information relating to the description of mining activities, the management system to be implemented for the management of health, safety and environmental aspects, costing of closure activities and particulars of organisational structure.

Plans of any existing or proposed mine workings and infrastructure must also be included. The mining management plan is required to be reviewed at intervals specified in the authorisation to carry out mining activities.

7.2.2.2 Environmental Assessment Act

The *Environmental Assessment Act* and the Environmental Assessment Administrative Procedures establish the framework for the assessment of potential or anticipated environmental impacts of development, and provide for protection of the environment. The Northern Territory Minister for Natural Resources, Environment and Heritage is responsible for administering the act.

The minister also determines the appropriate level of assessment for new developments or material changes to existing operations, based on the sensitivity of the local environment, the scale of the proposal and its potential impact upon the environment.

7.2.2.3 Water Act

The *Water Act* provides for the investigation, allocation, use, control, protection and management of surface water and groundwater resources, as well as the administrative process for licensing these activities. The act also considers the protection and use of water resources for purposes such as recreational, social and cultural.

Under this act, mining activities (as defined by the *Mining Management Act*) or another activity for a purpose ancillary to that mining activity, including the use of water as drinking water, are exempt from a number of provisions in the *Water Act*. This includes, but is not limited to, the use of surface water and groundwater as well as the construction of works to allow for the use of water.

While this project is not proposing to discharge waste off the Mineral Lease, if required, a waste discharge licence will be sought. Waste is defined in the *Water Act* as any solids, liquids or gas, which, if added to the water, may pollute the water.

7.2.2.4 Other Relevant Legislation

Other Northern Territory legislation relevant to the project includes the following acts and their associated amendments and regulations:

- *Aboriginal Land Act.*
- *Bushfires Act.*
- *Control of Roads Act.*
- *Dangerous Goods Act.*
- *Dangerous Goods (Road and Rail Transport) Act.*
- *Environmental Offences and Penalties Act.*
- *Heritage Conservation Act.*
- *Miscellaneous Acts Amendment (Aboriginal Community Living Areas) Act.*
- *Northern Territory Aboriginal Sacred Sites Act.*
- *Planning Act.*
- *Soil Conservation and Land Utilisation Act.*
- *Territory Parks and Wildlife Conservation Act.*
- *Traffic Act.*
- *Waste Management and Pollution Control Act.*
- *Weeds Management Act.*
- *Workplace Health and Safety Act.*

7.3 Timeline

Subject to approvals, the Project will commence in 2012 and will be undertaken over a 2 year phasing in period of open pit expansion, tailings storage facility upgrade and infrastructure development.

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Xstrata plc

Xstrata is a global diversified mining group, listed on the London and Swiss Stock Exchanges. Headquartered in Zug, Switzerland, Xstrata maintains a meaningful position in seven major international commodity markets: copper, coking coal, thermal coal, ferrochrome, nickel, vanadium and zinc with additional exposure to gold, cobalt, lead and silver. The Xstrata Group also comprises a growing platinum group metals business, iron ore projects, recycling facilities and a suite of global technology products, many of which are industry leaders. The Group's operations and projects span 20 countries.

Xstrata Zinc

Headquartered in Madrid, Spain, Xstrata Zinc is one of the world's largest producers of zinc and one of the commodity business units within the major global diversified mining group Xstrata plc. Xstrata's zinc and lead operations and exploration projects are located in Australia, Canada, Germany, Peru, Spain and the United Kingdom. In Australia, operations comprise: the Mount Isa, George Fisher underground, Handlebar Hill open cut and Black Star open cut zinc-lead mines, zinc-lead concentrator, lead smelter and Bowen Coke Works in north Queensland; and the McArthur River open pit zinc-lead mine, processing and loading facility in the Northern Territory.

Around half of all zinc currently consumed is used for galvanizing steel, which is an environmentally friendly method of protecting steel against corrosion. Zinc also finds application in the manufacture of die-cast alloys, brass and the production of zinc oxides and chemicals.

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