

CHAPTER 1- Introduction

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This chapter provides a brief overview of ABM Resources NL’s (“ABM” or “the company” or “the proponent”) proposed Twin Bonanza mine project (“the project”). This chapter also describes the purpose and structure of the Environmental Impact Assessment (EIA) for the project.

1.1 The project — background & context

The Twin Bonanza 1 project is located approximately 750km NW of Alice Springs (by road) (Figure 1-1) and approximately 16km east of the Northern Territory and Western Australian border. The site is located approximately 33km south of the Tanami Road, which runs North West from Alice Springs to the Northern Territory and Western Australian border (Figure 1-1).

Local communities include Alice Springs, Halls Creek, Balgo, Billiluna, Ringer Soak (Kundat Djarau) and Yuendumu. The closest permanent settlement is Balgo which is located 120 km to the west of the site.

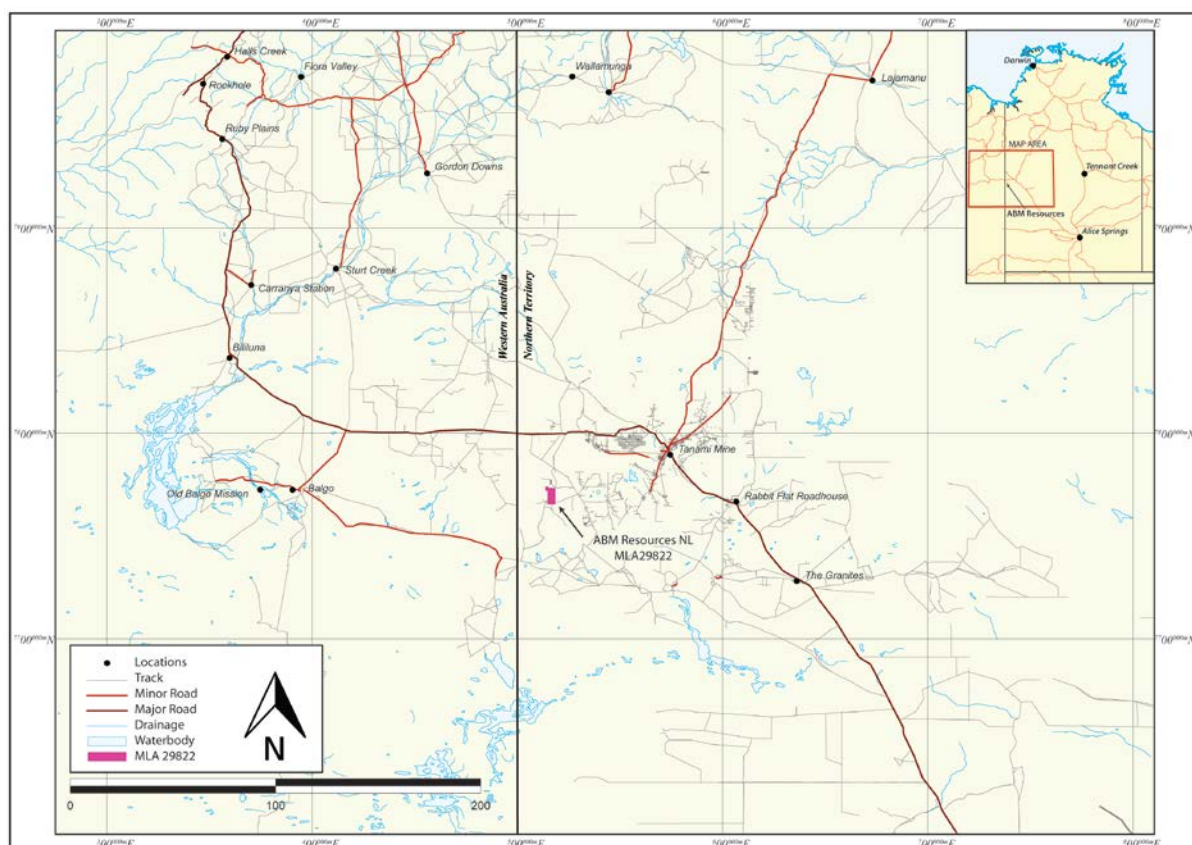


Figure 1-1. Project location map.

ABM is applying a staged approach to mining with stage one, trial mining and processing under an exploration licence, currently underway and stage two and stage three being the subject of the Environmental Impact Statement (EIS). Stages two and three encompass open pit mining, and onsite processing including associated tailings dams, waste dumps and infrastructure including a power station, accommodation, workshops and offices.

The stage two phase of mining is projected to process between 120 000 and 150 000 tonnes of ore per annum and is proposed to have an initial mine life of two years. The stage three phase is projected to process between 200 000 and 300 000 tonnes of ore per annum and have a proposed mine life of a further three to four years.

The project is part of a wider Twin Bonanza 1 project area and the mining lease application area includes the Old Pirate, Golden Hind, Old Glory and Buccaneer deposits. The extension of the mineral lease area to Buccaneer allows the extraction of clay or other materials that may be required in the construction of the infrastructure (tailings dam lining) to mine and process the Twin Bonanza 1 project. At a later stage, after Buccaneer has undergone further assessment, an additional proposal to facilitate the mining and processing of Buccaneer may be submitted.

The Twin Bonanza 1 project is a major asset of ABM and the company has spent in excess of \$20 million on the Twin Bonanza project area since acquiring the tenements from Newmont Asia Pacific (Newmont) in March 2010.

Stage two and stage three of the project are estimated to have combined capital costs between \$5.75 million and \$15.75 million.

The project aims to use and expand on the trial mining (stage one) infrastructure and processing facilities already in place.

Stage one trial mining is expected to increase understanding of the geology, including grade, grade distribution, thickness, orientation and mineralisation controls as well as the processing characteristics and overall amenability to gravity recovery methods. It may also expose additional veins and further expand the resource base. The deposit has a very high coarse gold effect which means that drilling data alone cannot represent the overall grade and size of the system and hence the staged approach of gradually building up processing and mining capacity presents the lowest risk way to develop the system.

Subject to the successful completion of stage one trial mining and Northern Territory Government approvals, the staged approach will commence implementation during 2013/14 and continue, subject to findings in stages two and three for an estimated period of 2 to 6 years. Given the high-grade nature of the deposit, there is strong potential for an underground operation following open pit operations. An underground operation is subject to additional drilling data, and results of stage one, two, and three. There will be preliminary discussion in the following chapters regarding underground mining however this EIS is

focused solely on stage two and stage three open pit mining. Appropriate approvals will be sought for underground mining if it is deemed feasible.

Further upgrades to milling capacity, or changes to the method of recovery, may be necessitated to improve or maintain an economic operation into the future, other than those stated in the EIS.

ABM intends to use predominately Australian contractors and suppliers. As a result the contribution to GDP is estimated at a total of 95% of the total revenue. Employment levels are expected to increase to approximately 70 workers during the construction and the operations phases of mining.

1.2 Land and water resources

This section briefly describes the land and natural resources present at the Twin Bonanza gold project. Geology, land systems, soils, geochemistry, land capability, water and visual amenity are included.

Detailed information on the potential impacts and mitigation measures of land and water resources are provided through the EIS of particular interest are Chapter 7: Water management, Chapter 10: Tailings and waste management, Chapter 11: Rehabilitation and mine closure and Appendix O: Conceptual Mine Closure Plan.

1.2.1 Existing environment

1.2.1.1 Climate

The Tanami region has a typical Northern Australian climate with most of the average annual rainfall occurring during a 'wet season' between November and April. The summers are hot with temperatures in excess of 40°C and winters are usually mild although nights are cold with occasional overnight minimum temperatures below 0 °C. The closest weather station is located at Rabbit Flat, approximately 90km to the east. Average annual maximum temperature is 33.6 °C, average annual minimum temperature is 16.6 °C with an average annual rainfall of 430.7mm (Figure 1-2).

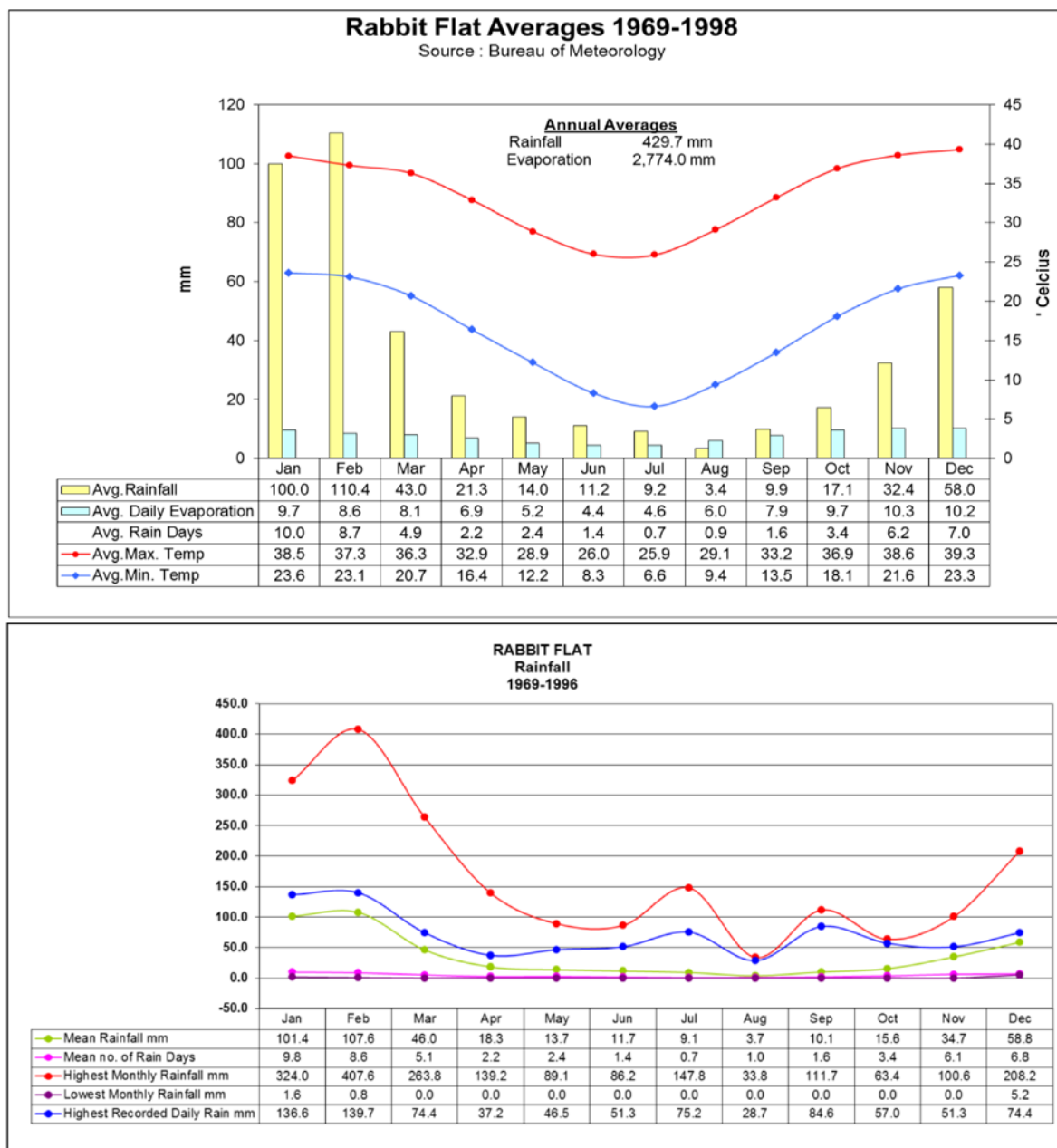


Figure 1-2. Graphical presentation of weather from Rabbit Flat (Weather Station 015666), (BOM, 2012).

Average pan evaporation for this region is between 2 400 and 2 800mm per annum, far exceeding the average rainfall (BOM, 2012).

Winds are calm year round, particularly during the dry season and generally in an easterly direction, tending northeast during the wet season. Wind speeds average 14.9km/hour in the morning to 15.5km/hour in the afternoon (BOM, 2012).

1.2.1.2 Topography

The Tanami Desert comprises predominantly semi-arid sand plain. Moderate relief in the form of low hills and rocky outcrops occurs sporadically throughout the Tanami. The relief rarely contains incised drainage. Flat sand-plains predominate but are punctuated by high

ranges of both basement complexes and younger sedimentary successions, particularly further south in the Arunta (e.g. Mt Doreen, Reynolds Range, Harts Range). Incised drainage systems are common in these areas of higher relief (Figure 1-3).

1.2.1.3 Land use

Land underlying the project area is Aboriginal freehold land that is used by the Traditional Owners, for traditional purposes, and has more recently been explored for mineral potential. The nearest Traditional Owners' settlement, Balgo, is 120km to the west of the project area and ABM actively employs staff from the local community.

1.2.1.4 Groundwater and surface water

The water table is generally between 90 –150m below surface with an average of around 100m over the deposit area, this varies due to changing rock types and fractures. Regionally the majority of groundwater is contained in palaeochannels (or palaeodrainage systems) which are ancient river systems. Palaeochannels located to the east and west of the project are defined as higher order palaeochannel (Wilford 2000) and are characterised by surficial deposits of aeolian sand, alluvial sand/silt/clay, gravel, calcrete and silcrete. Palaeochannels are considered to be unconfined with variable depths to water of 3-6m in calcrete aquifers and 5-10m in alluvial systems (seasonally variable).

The Cenozoic palaeodrainage system in the Tanami region forms a network of topographic depressions with broad trunk palaeochannels and narrow higher-order palaeochannels, with evidence for significant tectonic disruption and diversion. Domahidy (1990) identified two large Cenozoic palaeochannels in the region, one west-trending and the other south-trending, which converge between Rabbit Flat and Tanami Downs and then head southwards towards Lake Mackay, incorporating additional tributaries on the way. Detailed mapping by Wilford (2000) identified and delineated an extensive and higher-order palaeodrainage network using surface flow modelling (Figure 1-3).

The project area is located relatively high in the landscape, and does not intersect any regional-scale surface water features. The shape of the landscape indicates that sheet flow will be the dominant surface water flow process, with some accumulation of flows possible in lower-lying areas after large storm events, although there are no permanent water features present. Regionally surface water flows concentrate along topographic depressions formed by the palaeochannels. There are two distinctive types of palaeodrainage. Type 1 is the saline system associated with salt lakes, and soils affected by various salts including sodium chloride and gypsum and others. Type 2 is the drainage depressions where the salinity has been masked by overlying sediments such as aeolian or alluvial sands

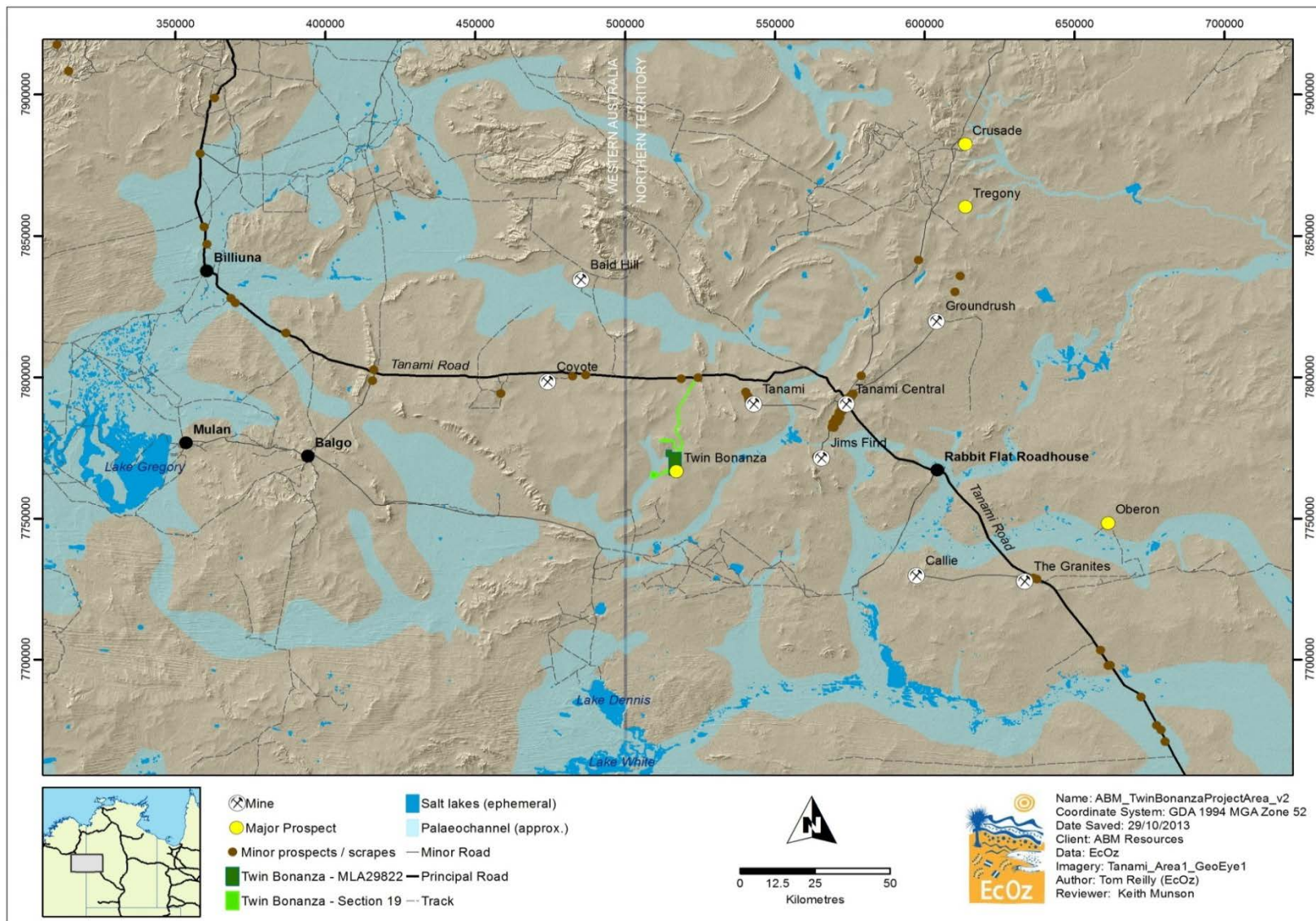


Figure 1-3. Regional Salt lakes and palaeochannels in the Tanami region

1.2.1.5 Soils / regolith and landforms

The project occurs within the Tanami sand plains region, characteristics include sand plains with minor longitudinal dunes in the south, floodplains and floodouts on the margins. The geomorphology generally consists of saprock (>50%), colluvial sediments (20-50%) and saprolite (<20%). Broad scale soils are sand, loamy sand or clayey sand (<10%) with a pH of less than 4.3.

The Twin Bonanza project area lies within a series of palaeochannels to the east and west, all of which trend southwest. The prospect is on a flat, to gently undulating depositional plain covered by a veneer of colluvial sheetwash sediments and ferruginous lag; there are also some aeolian components of the regolith. The rocks that host the mineralised system outcrop occasionally.

1.2.1.6 Geochemistry

The area surrounding the Old Pirate deposit is naturally anomalous in arsenic and gold, which is associated with the multiple narrow high grade veins that host mineralisation (ore). Associated with the quartz veins are trace pyrite, arsenopyrite and galena. Waste rock and tailings characterisation indicated that the potential for acid mine drainage is low. Appendices L: ABM Tailings Memo and M: ABM Waste Memo provides further details on the tailings and waste rock characterisation.

1.2.1.7 Seismicity

The Tanami Desert area is not considered to be a seismically active zone. No evidence of past earthquake activity has been recorded in the immediate area of the project, which is located in an area of lowest earthquake hazard potential, based on the 1991 map of earthquake risk in Australia, published by the Australian Earthquake Engineering Society (McCue et al. 1993).

1.2.1.8 Visual amenity

There are no tourist routes or permanent residents within 40 km of the site hence there are no direct receptors for visual amenities within the area. However ABM is aware of the impact infrastructure will have on the cultural landscape and visual aesthetics of the region. Project planning has incorporated measures including final infrastructure height, slope design and rehabilitation techniques to reduce visual impact. For example waste rock dumps will be contoured to be compatible with the surrounding topography and have local provenance vegetation established on the slopes. During operations, on-country meetings will be held with the Traditional Owners via the Central Land Council (CLC) to further refine the final design of rehabilitated landscapes and landforms.

1.3 Project description

Key project elements include:

- a. a series of open pits excavated using drill blast, load and haul techniques
- b. installation of associated water storage, tailings dams and concentrate residual dam
- c. installation of waste material storage facility
- d. installation and operation of gravity processing equipment for processing and refining ore
- e. installation of a small intense cyanide leach system
- f. installation of ancillary infrastructure, including
 - a. generators (diesel operated)
 - b. staff accommodation and ablution blocks
 - c. workshops
 - d. office areas
 - e. reverse osmosis water treatment facility
- g. installation of a mine water / waste water management system , including
 - a. clean water diversion drains
 - b. integrated mine area run-off collection, storages and settlement traps
 - c. on-site water re-use procedures
- h. sewage treatment facility
- i. upgrading and lengthening of existing Twin Bonanza airstrip
- j. upgrade of existing, and construction of new access roads around the project
- k. sourcing of water from MLA 29822 from initially two bore locations and from bores located on section 19 granted leases – these include a paleochannel and a bore field.

The project involves the trucking of ore from the pits to a run of mine pad proximal to the processing plant, where the material will be crushed and run through the Knelson gravity circuit. Fine wastes (tailings) from the processing operation will be disposed into the tailings dam. The concentrate will then be smelted, poured into dore and transported to the Perth Mint.

The project's current open pit mining schedule reflects the staged approach with estimates for stage two and stage three presented in chapter 3. However, over the life of the project, mining plans will be continually reassessed to maximise ore recovery and economic returns. If mining plans are updated they will be reflected in the annual MMP as required by the *Mining Management Act 2001* (NT).

No major water courses are present or will be diverted as part of the project.

The proposed operating footprint is shown in Figure 3-2 in Chapter 3: Project description.

1.3.1 Project proponent

ABM is the current owner and will be the operator of the Twin Bonanza 1 project and surrounding mining lease. ABM is a Western Australian based exploration company operating wholly within the Northern Territory. The project is ABM's first mine. The company is listed on the Australian Securities Exchange under code ABU.

ABM is an exploration company developing several gold discoveries in the Central Desert region of the Northern Territory of Australia. The company has a multi-tiered approach to exploration and development with a combination of high-grade potentially short-term production scenarios such as the Old Pirate high-grade gold project (currently undergoing trial mining), large scale discoveries such as Buccaneer, and regional exploration discoveries such as the Hyperion gold project. In addition, ABM is committed to regional exploration programs throughout its extensive holdings.

ABM holds an exploration licence and license application portfolio covering more than 33,000km² containing multiple highly prospective exploration targets and areas. This makes ABM one of the largest gold exploration license holders in Australia. ABM has a total resource estimation base of 3.5Moz across multiple projects in the highly prospective Central Desert of the Northern Territory, Australia.

ABM's staged approach using the advantages of Old Pirate (coarse high-grade gold from surface) within the Twin Bonanza project area, should enable the expansion and development of the project to be largely self-funding. However, ABM has the capacity to for other financing options if the expansion cannot be self-funded, including a current \$10M stand-by loan facility with ANZ.

The proponent's contact details for the project and this draft Environmental Impact Statement (EIS) are as follows:

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Chief Operating Officer

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Telephone: (08) 9423 9777

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The primary contact for the project's EIA process is ABM's environmental manager:

Justin Robins

Environmental Manager

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1.3.2 Project context

The project is part of ABM's extensive tenure in the Central Desert region of the Northern Territory of Australia and sits within exploration licence EL28322 and the subsequent mineral lease application. The project will be the first new mine in the Central Desert region of the Northern Territory for the last 18 years and will increase revenue and the economy of the Northern Territory. A more detailed analysis of the benefits to stakeholders can be

found in Chapter 13. The project has a very small footprint and, due to the high-grade nature of the deposit, will have limited environmental impact.

The feasibility of ABM's integrated plan for the Twin Bonanza 1 project is the dependant on the implementation of the staged approach to mining. Successful implementation of the project will ensure that satellite prospects (such as Buccaneer) can be successfully mined in the future with limited expansions to the mining infrastructure whereby additional approvals will be sought.

A number of new mining developments have been approved in the Northern Territory within the past 24 months include Matilda Zircon (Zircon mine - Tiwi Islands), Crocodile Gold (underground gold mine and new pit- Pine Creek), Xstrata McArthur River (zinc, lead, silver – Phase 3 expansion – Gulf), Aust Ilmenite (Ilmenite mine – Roper River) and Western Desert Resources (new Iron ore mine). These new developments have been detailed in CORE (Creating Opportunities for Resource Exploration) administered by the Northern Territory Department of Mines and Energy recently released a report summarising the likely new mining developments in the Northern Territory over the next 1-4 years (Department of Mines and Energy, 2013). Crocodile Gold new mine at Pine Creek is the closest of these new developments to the proposed project and is 700 km away; consequently there will be no cumulative impacts on the region.

1.3.3 Project land tenure and environmental aspects

All project activities will take place within existing ABM tenements and the Mineral Lease Application (MLA29822) area. The area under Section 56(2) of the Mineral Titles Regulations 2011 covers 3,257 hectares over the south eastern portion of exploration licence EL28322. The proposed mine site is located on Aboriginal Land Trust land and ABM have current agreements with the CLC for work on the project area and surrounds. A mining agreement has been executed and is currently with the Department of Mines and Energy for granting of the mineral lease.

Principal site access is by road, from the Tanami Road to the north of Twin Bonanza. Gaining access will involve utilising existing access roads across leases outside the proposed mineral lease but within section 19 agreement areas. Section 19 agreements (pursuant to the *Aboriginal Land Rights (Northern Territory) Act 1976*) have been executed with the CLC for areas outside the mineral lease. As, A section 19 lease also covers the proposed water extraction point from the palaeochannel.

The general location of the project on the mineral lease is shown in Figure 1-4.

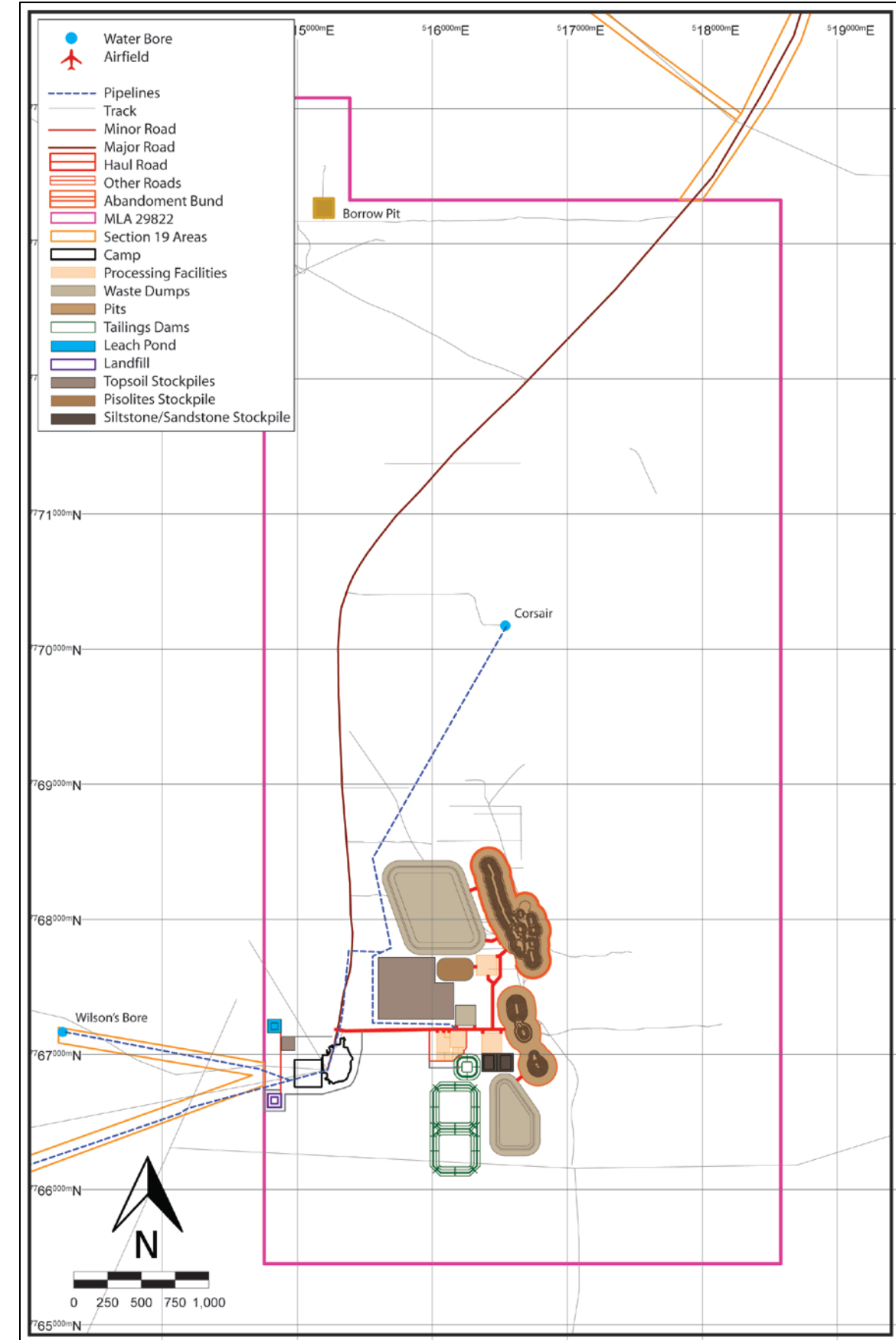
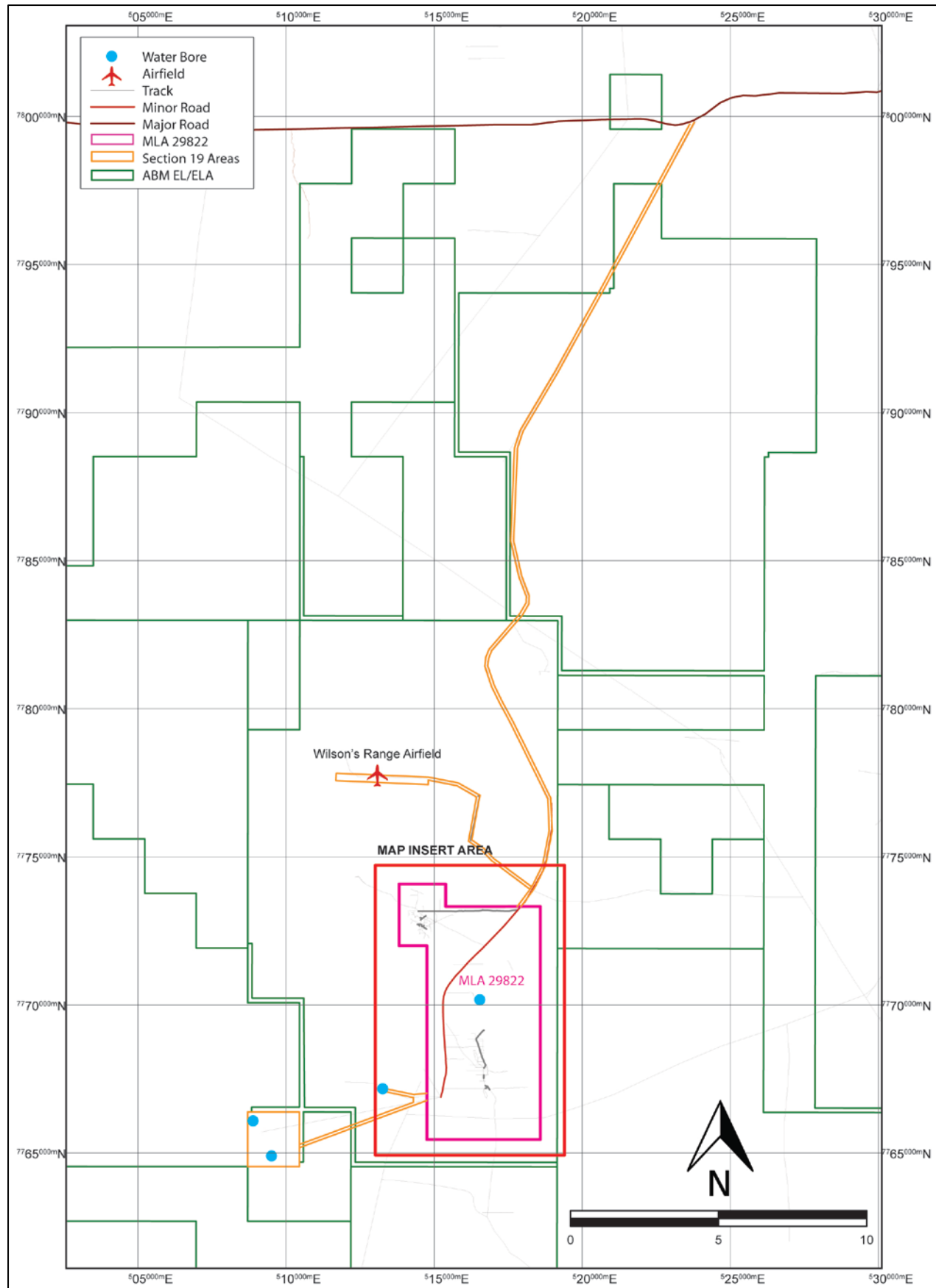


Figure 1-4. Mineral lease application boundary & infrastructure. Left: Mineral lease application and section 19 leases; wider Twin Bonanza infrastructure. Right: Mineral lease application and local mine infrastructure.

Flora and fauna surveys undertaken in 2012 assessed (EcOz Environmental Service and GHD) the project area in the Tanami bioregion which is characterised by Baker et al. (2005) as:

- occurring entirely in the Northern Territory, encompassing an area of 258,224 km²
- being comprised of red Quarternary sandplains overlying Permian and Proterozoic strata, which are exposed locally as hills and ranges
- having sandplains supporting mixed shrub steppes of *Hakea suburea*, desert bloodwoods, acacias and grevilleas over *Triodia pungens* hummock grasslands. Acacia shrublands over hummock grass communities occur on the ranges. The Stuart Creek drainage in the north supports *Chrysopogon* spp. and *Iseilema* spp. short grasslands, often as savannah ecosystems in association with river gum (*Eucalyptus* sp.).
- having a climate that is arid tropical with summer rainfall
- exhibiting relatively frequent fires, occurring at an average rate of once every two to three years across a mosaic of habitats.

The project is located on Aboriginal Land Trust land owned by the Mt Frederick No.2 Aboriginal Land Trust and as a result is subject to a number of agreements with the CLC, including the recently completed mining agreement. The CLC has approved all previous exploration work, and the CLC archaeology / anthropology team and Traditional Owners have conducted several sacred site clearances and surveys.

The exclusion zones address sacred sites or areas of other relevance to the Traditional Owners, principally the Jaru people of Balgo, Billiluna and Ringer Soak (Kundat Djarau) areas. Locations of the exclusion zones are confidential and cannot be published in this document. The mining agreement with the CLC covers sacred site procedures to protect and preserve these sites. No sacred sites have been identified in the project area.

The Southern Tanami Indigenous Protected Area (IPA) and the Northern Tanami Indigenous Protected Area are located within the broader Tanami region. The Twin Bonanza project is located approximately 50-60 kilometres away from the closest boundary of both IPAs.

1.3.4 Project objectives

The project's key objectives are to:

- a. construct and operate a mine that complies with all relevant statutory obligations and continue to improve operations to facilitate sustainable environmental management

- b. maintain and sustainably operate an efficient and profitable mine
- c. construct, design and operate a mine in a way to meet sustainable environmental and social indicators and standards
- d. use proven practices and strategies to minimise impacts, for example:
 - i. salvage and stockpiling topsoil and other landform materials
 - ii. progressive rehabilitation of disturbed areas wherever practicable
 - iii. protection of water quality through utilisation of appropriate water management systems
 - iv. adoption of appropriate landform designs to maximise sustainability
 - v. planning for a nominated final land use.

ABM is instigating a risk managed and staged approach to development where the scale of the project is grown incrementally based on the knowledge derived during trial and mining phases. The staged approach to mining is part of risk management and is an incremental assessment of feasibility. A standard feasibility study will not be supplied. The staged approach will also stage the level of environmental disturbance and allow for a sound financial approach as capital will be expensed incrementally allowing findings of each stage of development to dictate the expenditure for the next stage. This risk managed approach will lead to appropriate plant size, minimized financial and environmental risk.

There are numerous economic benefits to regional indigenous communities, regional centres and the Northern Territory. These include but are not limited to:

- a. Direct employment opportunities:
 - a. Indigenous employment programs
 - b. decrease in overall unemployment
 - c. increasing income tax and payroll tax contributions.
- b. Economic benefits through increasing gold production as contribution to the economy of Australia including:
 - a. increasing GDP and net exports of Australia
 - b. increasing GSP and net exports of the Northern Territory.

- c. Increasing contractor / business opportunities to regional centres including Alice Springs.
- d. Increasing revenue to the CLC / Traditional Owners (as key stakeholders).
- e. Increasing revenue to the Northern Territory Government / *Mineral Royalty Act 1982* (NT).
- f. Return to ABM shareholders on exploration and development investment in the region:
 - a. potential increasing share price performance and dividends.

1.3.5 Project schedule and current status

The project is currently undergoing stage one (under exploration license / mining management plan):

- The pilot processing facility is running at 150 tonnes per day on a split shift basis.
- Ore is being processed from the top 5 metres of selected areas of the deposit.
- Water is being drawn from existing bores.
- A small scale portable mining camp is in place.
- Waste rock is being stockpiled next to the excavation area.
- Tailings are being stored in a lined tailings dam.

After receiving authorisation to mine, the company will proceed to stage two. It is anticipated that earthworks and development will commence within 1 month and mining and processing will commence within 2 months.

1.4 Environmental impact assessment process

This draft EIS has been prepared in accordance with the requirements of the Northern Territory Government's *Environmental Assessment Act 1982 (EA Act)* and the Environmental Assessment Administrative Procedures 1984 (Administrative Procedures) under which the *EA Act* is implemented. The act and procedures establish the framework for the assessment of potential or anticipated environmental impacts of development.

There are seven key steps to the EIS process:

1. Notice of Intent (NOI)

- a. A NOI was submitted for the project to the Northern Territory's Department of Mines and Energy (DME) on the 11th of January 2013, for consideration under the *Mining Management Act*. The NOI outlined the project's scope and enabled the Northern Territory Environmental Protection Authority (NT EPA) to establish the project's level of assessment.

2. Level of assessment

- a. On March 13th 2013 the project was referred to the Australian Government Department of Environment (formally Sustainability, Environment, Water, Population and Communities (SEWPaC)). The project was determined to be a controlled action under the *Environment, Protection and Biodiversity Conservation Act 1999* (Cth) on 23rd of April 2013.
- b. On May 15th 2013, the NT EPA determined that the project required assessment under the *EA Act* at the level of an Environmental Impact Statement. Reasons given for an EIS level assessment can be summarised as follows:
 - potential for the operation to impact sites of indigenous and non-indigenous cultural or archaeological significance
 - potential loss of habitat and individuals of a number of species listed as threatened under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) and the *Territory Parks and Wildlife Conservation Act 2000*
 - an increased risk of environmental damage and degradation to the site
 - potential impacts to groundwater resources in the surrounding area through the abstraction of water
 - uncertainty of project scope and complexity of all components
 - potential impacts associated with the disposal of wastewater and other contaminants
 - the effect of the operation on current social and economic aspects of the region.
- c. The Australian Government concluded that it would accredit the Northern Territory's EIS process under the *NT EA Act*, on the 16th of May 2013, to assess the EPBC controlled action.

3. Public review of the EIS guidelines

- a. Following the conclusions of the level of assessment, taking into account relevant information from the NOI and consultation with relevant agencies, the NT EPA prepared draft guidelines for the preparation of an EIS. The draft EIS guidelines were released to the public for comment on 28th of June 2013 until 12th of July 2013.
 - b. The final EIS guidelines (included as Appendix A: Final EIS guidelines) were issued to ABM on 31st of July 2013. The final guidelines took into account comments received from the community and relevant Northern Territory Government agencies. There is no statutory time limit imposed on the life of the final EIS guidelines.
4. Preparation of a draft EIS
- a. A draft EIS was prepared by ABM based on the final guidelines, starting in June 2013.
5. Submission of draft EIS and public review
- a. Following submission of this draft EIS, the document will be published for public and relevant Northern Territory Government agencies review. The review period is set at four weeks and will be publically available through the NT EPA website, hardcopies of the draft for all stakeholders and neighbours of the property and public exhibition at the designated NT Government Agencies. Notification of exhibition centres and submission procedures will be advertised in the local newspapers; stipulated in the final EIS guidelines as *The Centralian Advocate, Tennant and District Times and NT News*.
6. Preparation of EIS supplement
- a. If required, ABM will then submit a supplement to the draft EIS that addresses comments received during the exhibition process. The draft EIS together with the EIS supplement will constitute the final EIS, which will be reviewed by the NT EPA.
7. Government review and decision
- a. Following the submission of the draft EIS and the supplement, the NT EPA will prepare an Environmental Assessment report (EAR). The NT EPA will then provide the minister for lands, planning and the environment a copy of the EAR, who will forward it to the minister(s) responsible for consent for inclusion permit, lease or licence conditions.
 - b. A copy of the EAR will also be provided to the Australian Government for consideration of approval. The Australian Government minister of the

environment, under an accredited assessment, will make an approval decision.

1.4.1 Consultation process

The project's EIA process makes provision for community consultation and facilitates environmental protection giving comprehensive consideration to potential impacts and management strategies.

The draft EIS has been prepared to inform decision makers, affected parties, key stakeholders and the public about potential environmental impacts relating to the project development and operation, and management of such impacts. The content of the draft EIS reflects the assessment requirements contained in the final EIS guidelines issued by the Northern Territory Government. During the development of the draft EIS, members of the public and other interested or affected parties have been encouraged to participate in the EIA process by providing input during public consultation programs.

A key component of the draft EIS preparation process has been the involvement of various advisory bodies and other stakeholders. Advisory body and stakeholder consultation included emails, telephone conferencing and meetings with key stakeholders and affected persons and addressing issues of interested groups. Traditional Owners, through the CLC, and the Northern Territory Government were included in the process.

To better understand the effect of the Twin Bonanza gold project on the social environment ABM has mapped key stakeholders affected by the project. Stakeholders are considered to be the individual(s) and/or groups that have an interest in a given decision associated with the Twin Bonanza Project. ABM has communicated with and engaged the separate stakeholders regarding the life of the mine and at mine closure to ensure stakeholder concerns are valued and fully considered. The defined stakeholders are:

- CLC
- Traditional Owners
- Central Desert Shire
- ABM employees and contractors
- ABM shareholders
- Department of Mines and Energy, Northern Territory
- Northern Territory Environment Protection Authority
- Department of Lands, Planning and Environment, Northern Territory

- Commonwealth Department of Environment
- Department of Treasury and Finance, Northern Territory

There are 4 forms of stakeholder engagement strategies that ABM employs;

1. formal engagement with Traditional Owners – through the CLC
2. informal engagement with Traditional Owners – inadvertent through visitors, employees and colleagues
3. engagement with the Government of the Northern Territory
4. engagement with the people, businesses and Northern Territory inhabitants as a whole.

A number of chapters and management plans were reviewed by the CLC during the preparation of the draft EIS including:

- Conceptual Mine Closure Plan
- Conceptual Care and Maintenance Plan
- Fire Management Plan
- Social Impact Management Plan
- Cultural Heritage Management Plan
- Archaeological Survey
- Chapter 13: Social, economic, cultural and heritage risks

Preliminary feedback from the CLC has resulted in:

- modifying procedures and processes to ensure compatibility with traditional activities and surrounding land management practices
- modifying the design of infrastructure to manage the project's impact on the cultural landscape
- shaping the management of social and cultural heritage impacts.

In addition, since the commencement of exploration at the Twin Bonanza project regular on country meetings have been held with the Traditional Owners via the CLC to detail work programs, undertake surveys and discuss any concerns that have arisen. This process has created a clear dialogue and an understanding of the surrounding community's expectations. In the future these meetings will continue with additional liaison groups focused on mining related topics.

For further details regarding the methodology of stakeholder engagement strategies refer to Appendix T: Social Impact Management Plan and Chapter 13: Social, economic, cultural and heritage risks. For details on the stakeholders that were consulted refer to Appendix AE: Consultation.

1.4.1.1 Public consultation

The draft EIS will be made available for public exhibition at the following locations:

- NT Environment Protection Authority, 2nd Floor, Darwin Plaza, 41 Smith Street Mall, Darwin
- Mines and Energy Information Centre, Department of Mines and Energy, 3rd Floor, Paspalis Centrepoint, 48 Smith Street Mall, Darwin
- Department of Lands, Planning and the Environment, Floor 1, Alice Plaza Building, Todd Street Mall, Alice Springs
- Central Land Council, 27 Stuart Highway, Alice Springs
- The Australian Government Department of Environment Library, John Gorton Building, Parkes, Canberra
- Northern Territory Library, Parliament House, Darwin.

Any person, group or organisation can make a written submission about the draft EIS. Such submissions do not have to relate to the whole of the draft EIS and may relate to any aspect. Persons making a submission do not have to be an expert in any of the issues assessed in the draft EIS. Comments and submissions must be made in writing within the comment period, as advertised in the public notice about the draft EIS and should be forwarded to the project officer. The contact phone number is (08) 8924 4047 and facsimile (08) 8924 4053 or e-mail eia.ntepa@nt.gov.au. Comments can be posted to the Project Officer at NT Environment Protection Authority, GPO Box 3675, Darwin NT 0801. Members of the public who wish their comments to remain confidential or anonymous should specify this in the comments.

Comments received by the Northern Territory Government will be collated and forwarded to the proponent for consideration. The proponent is then required to address the submissions and provide appropriate responses to the Northern Territory Government. The final decision on the project's overall acceptability will be made on the basis of the information provided in the final EIS. The project's EIA process and approval time frame are further discussed in Chapter 2: Regulatory environment.

1.4.2 Historical environmental compliance

ABM has submitted mine management plans (under the *Mining Management Act 2001*) for 2010, 2011, 2012 and 2013 for the project area. No compliance issues have arisen.

1.5 Relevant legislation

1.5.1 Legislation

The Northern Territory Government has jurisdiction over legislation pertaining to the project's location, construction and operation. Preparation of this draft EIS has been undertaken in accordance with the requirements of the Northern Territory Governments NT *Environmental Assessment Act (1982)* and the *Environmental Assessment Administrative Procedures 1984* under which the *EA Act* is implemented.

The *Mining Management Act 2001* is also a significant piece of legislation pertaining to the Project. Pursuant to the MMA a Mining Management Plan (MMP) will be submitted once the mineral lease is approved and before operations proceed.

The referral of the NOI to the Department of the Environment makes the Commonwealth Government's *EPBC Act* relevant to the project.

The objectives of the *EPBC Act* (Department of Environment, 2013) are to:

- provide for the protection of the environment, especially matters of national environmental significance
- conserve Australian biodiversity
- provide a streamlined national environmental assessment and approvals process
- enhance the protection and management of important natural and cultural places
- control the international movement of plants and animals (wildlife), wildlife specimens and products made or derived from wildlife
- promote ecologically sustainable development through the conservation and ecologically sustainable use of natural resources

- recognise the role of Indigenous people in the conservation and ecologically sustainable use of Australia's biodiversity
- promote the use of Indigenous peoples' knowledge of biodiversity with the involvement of, and in cooperation with, the owners of the knowledge.

The *EPBC Act* stipulates that any proposed developments require assessment if they have the potential to effect one or more matters of national environmental significance (NES).

The nine matters of national environmental significance (NES) to which the *EPBC Act* applies are:

1. world heritage sites
2. national heritage places
3. wetlands of international importance
4. nationally threatened species and ecological communities
5. migratory species
6. Commonwealth marine areas
7. the Great Barrier Reef Marine Park
8. nuclear actions (including uranium mining)
9. a water resource, in relation to coal seam gas development and large coal mining development.

Matters considered to have a significant impact on matters pertaining to NES applicable to ABM's project, were raised in the final EIS guidelines and are as follows:

- listed threatened species and communities (protected under part 3 of the *EPBC Act* – section 18 and 18A).

The project was referred to the then Department of Sustainability, Environment, Water, Population and Communities, and on 23 April 2013 was determined to be a controlled action under the *EPBC Act*. On 16 May 2013, the department decided that it would accredit the assessment process under the *EA Act* for the purposes of this action.

The legislation significant to the project's assessment and approval process is further discussed in Chapter 2: Regulatory environment.

1.5.2 ABM policies – community and environment, including sustainable development

ABM has formalised their commitment to the community and environment in the following policy statement:

ABM Resources NL acknowledges that it conducts mineral exploration and mining on land owned by Traditional Owners and that ABM's access to this land is guided through processes with the Central Land Council. ABM is committed to a close working relationship with the Central Land Council, the communities and the Traditional Owners. ABM is committed to offer employment opportunities to people in local communities and the promotion of knowledge, understanding and respect for Indigenous Australians Traditions and Culture.

ABM is committed to responsible exploration, development, operations and closure. ABM is focused on conducting its business in harmony with stakeholders' and the wider community's desire to conserve and protect the natural environment and community interests.

To deliver on ABM's commitment to stakeholders and the environment, ABM will:

- *comply with legislative and regulatory requirements for the environment*
- *proactively develop and maintain management systems to measure and continually improve environmental performance*
- *operate in a responsible manner to minimise impacts on the environment and prevent pollution*
- *care for the environment and its heritage value*
- *work closely with the community and governing bodies to ensure that a good approach is always followed relating to environmental protection*
- *encourage employees to value the heritage and the environment in which we work*
- *reduce waste, recycle and recognise the by-product of our consumables*
- *maintain an open consultation process with regulators, the community and stakeholders*
- *minimise workplace exposure to hazards, ecosystem disturbance or degradation*
- *re-establish disturbed areas as sustainable ecosystems and community assets*
- *facilitate the training of employees and contractors in relation to their roles and responsibilities to environmental management*

- *periodically audit ABM's environmental systems and performance to further improve environmental outcomes.*

ABM is committed to the highest standards of health, safety and environmental performance, community co-operation and principles of sustainable development.

ABM complies fully with Australian law and regulations. The company is also a member of the AMEC (Association of Mining and Exploration Companies) and CME (Chamber of Minerals and Energy).

1.6 Draft EIS structure and objectives

The primary objective of the draft EIS is to identify and assess the potential environmental consequences of the project's development, and operation; with the aim to identify and develop (where applicable) appropriate management strategies to manage these impacts.

The draft EIS is stipulated to be a self-contained document that will enable interested stakeholders and relevant government departments including the NT EPA, to understand the environmental impacts of the proposed development. The document is prepared to provide:

1. a basis for public consultation and informed comment on the project
2. a source of information from which individuals and groups may gain an understanding of the proposal, the need for the project, the alternatives, any environmental effect, impacts that may occur and measures taken to minimise impacts
3. a framework against which decision-makers can assess the environmental aspects of the project to allow input to the environmental management and monitoring programs.

The draft EIS document pertains to the open pit stage two and stage three; including the construction, operation, maintenance, rehabilitation and mine closure. The level of analysis and technical details in the report pertains to the level of significance for individual impacts.

1.6.1 Environmental studies

A number of studies have been undertaken on the Twin Bonanza project area including baseline studies and assessments for flora and fauna, surface water, groundwater, cultural heritage, and waste rock/ tailings characterisation, leachate characterisation and tailings dam design.

Project environmental studies and assessments undertaken by ABM or on behalf of ABM by specialist consultants are as follows:

- Wet Season Flora and Fauna Survey – GHD (Darwin)
- Early Dry Season Fauna Survey – EcOz (Darwin)
- Mineral Lease Survey including Bulk Sample Pre-clearance Survey - EcOz (Darwin)
- Biodiversity Management Plan and Chapter 5 EIS - EcOz (Darwin)
- Erosion and Sediment Control Plan – Soilwater Group (Perth)
- Water Management Plan – Soilwater Group (Perth)
- Surface water assessment- Topography and Surface Hydrology – Soilwater Group (Perth)
- Preliminary Groundwater resource assessment / Hydrogeology – Earth Systems (Brisbane)
- Tailings Storage Facility and Geotechnical Conceptual Design report – 4DG Geotechnical Consultant (Perth)
- Waste rock characterisation and impact assessment – internal (Rebecca Richards, ABM – Perth) peer reviewed by Soilwater Group (Perth)
- Tailings and leachate characterisation and impact assessment - internal (Rebecca Richards, ABM– Perth) peer reviewed by Soilwater Group (SWG)
- Air Quality Assessment and Greenhouse Gas Management Plan - Internal (Rebecca Richards, ABM– Perth)
- Stakeholder Consultation (Socio and Economic Aspects) – internal (Darren Holden, ABM– Perth)
- Social impact assessment and community consultation – internal (Darren Holden, ABM– Perth)
- Economic impact assessment – internal (Darren Holden, ABM– Perth)
- Cultural heritage /Archaeological – Tim Hill (Alice Springs)
 - Aboriginal Heritage
 - European Heritage
- Noise and vibration impact assessment - internal (Rebecca Richards, ABM– Perth)
- Transportation assessment - internal (Rebecca Richards, ABM– Perth)

- Vehicle Management Plan – internal (ABM – Perth)
- Biting Insect Management Plan - internal (Rebecca Richards, ABM– Perth)
- Environmental Management Plan - internal (Rebecca Richards – Justin Robins, ABM– Perth)
- Conceptual Mine Closure Plan – internal (Justin Robins, ABM– Perth) peer reviewed by Mike Slight and Associates
- Conceptual Care and Maintenance Plan – internal (Justin Robins, ABM– Perth)
- Topsoil characterisation and erosion analysis - Soilwater Group (Perth)

1.6.1.1 Flora and fauna

ABM has conducted three baseline flora and fauna surveys over the Twin Bonanza areas and which also cover the entire mineral lease. The first two surveys (wet season flora and fauna survey conducted in early April 2012 and a dry season fauna survey in September 2012) assessed the presence of significant species, species diversity and related distribution over the project area. These surveys were a wet season flora and fauna survey conducted in early April 2012 and a dry season fauna survey in September 2012. A third survey, prior to the commencement of the bulk sample, was targeted to assess the presence of the greater bilby, brush tailed mulgara and the great desert skink within the area proposed to be cleared for bulk sampling purposes. This survey was completed during May 2013. Further information of the flora and fauna investigations is provided in Chapter 5: Biodiversity. These surveys have directed the design and location of infrastructure, aided in the development of clearing procedures and fauna management measures. Further details of the management measures are detailed in Appendix D: Biodiversity Management Plan.

1.6.1.2 Surface water

Surface water management and flood modelling studies as well as detailed digital terrain models have been undertaken over the project area. An Erosion and Sediment Control Plan (Appendix E) and Water Management Plan (Appendix F) were completed to minimise the effect on surface water. Further information of the surface water investigations is provided in Chapter 7: Water Management, Appendix G: Surface Water Assessment and Appendix: AB Topsoil Characterisation and Erosion Analysis.

1.6.1.3 Groundwater

An extensive desktop hydrogeological assessment was undertaken to improve understanding of the groundwater systems in the project area, for the purposes of identifying potential groundwater target areas, and to assist with the development of a sustainable groundwater utilisation strategy whilst fulfilling environmental permitting requirements. Recommendations with regards to optimum ground water management

practices for the project area were discussed. Further information on the groundwater investigations is provided in Chapter 7: Water Management and Appendices F: Water

1.6.1.4 Waste rock characterisation and impact assessment

A full characterisation assessment has been undertaken for all of the waste units identified at the mine. The assessment includes acid mine drainage and metalliferous drainage potential from the extraction and storage of the waste rock units. Further information is provided in Chapter 10: Tailings and waste rock management, and Appendix M: ABM Waste Memo.

Tailings and leachate characterisation and impact assessment

An assessment has been undertaken for the tailings characteristics. The assessment includes acid mine drainage and metalliferous drainage potential from the extraction and processing. Further information is provided in Chapter 10: Tailings and waste rock management, and Appendix L: ABM Tailings Memo.

1.6.1.5 Tailings dam

ABM has engaged a specialise geotechnical engineering company to undertake a conceptual geotechnical design of the proposed tailings dam and concentrate residual dam for the Twin Bonanza project. Further information on the tailings dam and concentrate residual dam assessments are provided in Chapter 10: Tailings and waste rock and Appendix I: Tailings storage facility geotechnical conceptual design report.

1.6.1.6 Air quality assessment and greenhouse gas management

An assessment of the predicted greenhouse gas emissions from the Twin Bonanza project was undertaken as a requirement of the EIS under the *EA Act*, and in-conjunction with the Air Quality Management Plan. Emissions from the Project are generated primarily from mining activities that result in the movement of waste rock and ore, and subsequent ore processing. The main particulate emission of concern is dust, and to a lesser extent, emissions associated with the vehicles, processing plant and power station operations.

Further information on the air quality assessment and greenhouse gas management is provided in Chapter 8 – Air Quality and Appendix K.

1.6.1.7 Stakeholder consultation (social and economic aspects)

ABM has undertaken a social impact assessment and implemented a Social Impact Management Plan (SIMP). This SIMP presents the structure whereby ABM monitors its impacts on key stakeholders as a result of mining at the Twin Bonanza project.

Further information on the stakeholder consultation is provided in Chapter 13: Social, economic, cultural and heritage Risks and Appendices U & V: Cultural Heritage Risk Management Plan and Social Impact Management Plan, respectively.

1.6.1.8 Social impact assessment and community consultation

ABM has undertaken a social impact assessment and community consultation. Further information on the social impact assessment and community consultation is provided in Chapter 13 Social and Economic, and Cultural and Heritage Risks and Appendices U & T - Cultural Heritage Risk Management Plan and Social Impact Management Plan, respectively.

1.6.1.9 Economic impact assessment

The Social Impact Management Plan incorporates the Economic Impact Assessment undertaken by ABM Resources. Further information is provided in Chapter 13 - Social and Economic, and Cultural and Heritage Risks and Appendix T Social Impact Management Plan, respectively.

1.6.1.10 Cultural heritage

On ground sacred site surveys have been completed with the CLC and Traditional Owners. No sacred sites were identified in the project area. ABM has undertaken an independent archaeological survey over the area. The results and recommendations from the survey form the basis of this Cultural Heritage Risk Management Plan. Further information on the cultural heritage assessments is provided in Chapter 13: Social, economic, cultural and heritage risks and Appendix U: Cultural Heritage Risk Management Plan.

1.6.1.11 Noise and vibration impact assessment

ABM has undertaken a noise and vibration risk assessment resulting in the Noise Management Plan (Appendix Y). The purpose of the Noise Management Plan is to identify and control potential noise impacts. This will enable compliance with legislation and regulatory requirements applicable to mining within MLA29822 and to reduce the noise impact from the mining, processing and accommodation areas on sensitive receptors.

Further information on the noise and vibration risk impact assessment is provided in Chapter 16: Additional Environmental Impacts and Appendix Y.

1.6.1.12 Vehicle management / traffic and transportation assessment

An internal vehicle management / traffic management plan has been implemented to provide minimum rules and guidelines to manage hazards arising from the operation of vehicles at the project. Further information on vehicle management is provided in Chapter 12: Road Transport and Traffic Management, and Appendix S: Vehicle Management Plan.

1.6.1.13 Biting insect management

A Biting Insect Management Plan has been developed to ensure that biting insect control practices are implemented on site to minimise the risk of creating biting insect breeding sites, namely mosquitos, associated with mining activities. Further information on biting

insect management is provided in Chapter 16: Additional environmental impacts and Appendix AA.

1.6.1.14 Environmental management

The Environmental Management Plan (EMP) has been prepared in accordance to leading practices with reference to AS/NZS ISO 14001:2004 and in keeping with regulatory requirements. The EMP and related documents apply to all aspects of the projects construction, operation and decommissioning.

The purpose of this strategic document is for the facilitation of environmental management measures to minimise the environmental risks associated with the project and to protect the environment. Further information on EMP is provided in Chapter 14: Environmental management plan.

1.6.1.15 Conceptual mine closure

The Conceptual Mine Closure Plan (CMCP) for the Twin Bonanza mine site (within ML 29822 and the section 19 areas granted under the *Aboriginal Land Rights (Northern Territory) Act* has been written to identify the closure obligations and commitments (determined in conjunction with relevant stakeholders), describe the proposed post-mining land use and closure objectives, develop completion criteria for closure of the Twin Bonanza mine site, document the process of financial provisioning for mine closure and describe how the CMCP will be implemented at the Twin Bonanza mine site including monitoring and maintenance post closure. Further information on CMCP is provided in Chapter 11: Mine closure and rehabilitation, and Appendix O.

1.6.1.16 Conceptual Care and Maintenance Plan

The Conceptual Care and Maintenance Plan (CC&MP) provides clear guidance as to the care and maintenance of the Twin Bonanza mine site if the mining operations are forced to close temporarily. The development of a care and maintenance plan is designed to take into consideration the legal obligations and environmental risks associated with the Twin Bonanza project. Further information on CC&MP is provided in Appendix P.

1.6.1.17 Topsoil characterisation and erosion analysis

Specialist soil scientists were engaged to undertake a pre-mine soils assessment for the proposed Twin Bonanza gold project. The study was undertaken with the intention to identify the surficial soil materials present with the project area, and to characterise their physical, chemical, and hydraulic properties so that their behaviour during mining, waste dump construction, and rehabilitation is known and predictable. In addition, landscape evolution modelling was undertaken based on the proposed material used to construct the external batters of the waste rock dump. Further information on the topsoil characterisation and erosion analysis is provided in Appendix AB.

1.7 Draft study team

Details of the draft EIS team are provided below.

Table 1-1. Details of Draft EIS team.

Chapter no. or Appendix no.	Chapter name	Section	Staff member name and company	Qualifications and experience
Executive Summary	Executive Summary	All	Darren Holden ABM Resources	BSc Hons, MAusIMM, Managing Director, 19+ years
Chapter 1	Introduction	All	Rebecca Richards ABM Resources	Geochemist/ Project Geologist, MSc Earth Sciences, 3.5 years
			Justin Robins ABM Resources	BSc Geology, PDip Environmental Management, 16+ years
Chapter 2 Appendix B	Regulatory environment	All Legislation Matrix for Twin Bonanza Project	Rebecca Richards ABM Resources	Geochemist/ Project Geologist, MSc Earth Sciences, 3.5 years
			Justin Robins ABM Resources	BSc Geology, PDip Environmental Management, 16+ years
			Jutta Zimmerman ABM Resources	Dip AQF, Dip Information Technology, Chief Financial Officer, Company Secretary, 20+ years
			Ashley Watson Piper Alderman	Partner Resources and Projects, LLB, 20 + years
Chapter 3	Project description	All	Brad Valiukas ABM Resources	BEng (Mining), Chief Operating Officer, 16+ years
			Rebecca Richards ABM Resources	Geochemist/ Project Geologist, MSc Earth Sciences, 3.5 years
			Justin Robins ABM Resources	BSc Geology, PDip Environmental Management, 16+ years
Chapter 4	Project rationale and alternatives	EIS Chapter	Darren Holden ABM Resources	BSc Hons, MAusIMM, Managing Director, 15+ years

Chapter no. or Appendix no.	Chapter name	Section	Staff member name and company	Qualifications and experience
			Rebecca Richards ABM Resources	Geochemist/ Project Geologist, MSc Earth Sciences, 3.5 years
			Justin Robins ABM Resources	BSc Geology, PDip Environmental Management, 16+ years
			Jutta Zimmerman ABM Resources	Dip AQF, Dip Information Technology, Chief Financial Officer, Company Secretary, 20+ years
Chapter 5	Risk assessment	EIS Chapter	Rebecca Richards ABM Resources	Geochemist/ Project Geologist, MSc Earth Sciences, 3.5 years
			Justin Robins ABM Resources	BSc Geology, PDip Environmental Management, 16+ years
Chapter 6, Appendix C, Appendix D	Biodiversity	EIS Chapter	EcOz - Tom Reilly	Project Manager/Senior Environmental Consultant, BSc (Hons) MEIANZ
		Biodiversity Technical Report	EcOz - Dane Trembath	Senior Zoological Consultant, BSc, MappSc
		Biodiversity Management Plan	Justin Robins ABM Resources	BSc Geology, PDip Environmental Management, 16+ years
Chapter 7, Appendix E, Appendix F, Appendix G, Appendix H, Appendix I, Appendix J, Appendix AB.	Water management	EIS Chapter	SWG – Joe Powers	Environmental Engineer, Bsc, Msc, 8 years
		Erosion and Sediment Control Plan	SWG – Adam Pratt	Director, Principal Soil Scientist, Bsc, PhD, 20 years
		Water Management Plan	Pascal Hill	BSc (Hons) MAIG, Exploration Manger – Geologist, 15+ years’ experience
		Surface Water Assessment Memo	Earth Systems – Dr Jeff Taylor	AMD and Water Chemistry Specialist / Senior Principal Environmental Geochemist, CEnvP, BSc, PhD, 30 + years
		Groundwater Monitoring Standard Procedures		

Chapter no. or Appendix no.	Chapter name	Section	Staff member name and company	Qualifications and experience
		Surface water Memo Preliminary Groundwater Resource Assessment	Earth Systems – Mr Nigel Murphy	Project Director / Senior Principal Environmental Scientist, BSc, MSc, 25 + years
Chapter 8 Appendix K	Air quality and greenhouse gas	EIS Chapter Air Quality Management Plan	Rebecca Richards ABM Resources	Geochemist/ Project Geologist, MSc Earth Sciences, 3.5 years
			Brad Valiukas ABM Resources	BEng (Mining), Chief Operating Officer, 16+ years
Chapter 9	Waste management	EIS Chapter	Rebecca Richards ABM Resources	Geochemist/ Project Geologist, MSc Earth Sciences, 3.5 years
			Justin Robins ABM Resources	BSc Geology, PDip Environmental Management, 16+ years
			Brad Valiukas ABM Resources	BEng (Mining), Chief Operating Officer, 16+ years
Chapter 10 Appendix I, Appendix L, Appendix M, Appendix N.	Tailings and waste management	EIS Chapter Tailings Storage Facility Geotechnical Conceptual Design report ABM Tailings Characterisation Memo ABM Waste Dump Characterisation Memo Geochemical Characterisation Memo	Rebecca Richards ABM Resources	Geochemist/ Project Geologist, MSc Earth Sciences, 3.5 years
			4DG – Ian Lewis	Principal Engineering Geologist, MappSc, BSc, 30 + years
			4DG – Richard Rudd	Senior Engineering Geologist, BSc, 10 + years
			4DG – Brian Francis	Senior Geotechnical Engineer, MCE, BCE, 10 years
			SWG – Joe Powers	Environmental Engineer, Bsc, Msc, 8 years
			SWG – Adam Pratt	Director, Principal Soil Scientist, Bsc, PhD, 20 years
			SWG – Hayley Castlehouse	Environmental Geochemist, BSc, (Soil Science) MSc, (Environmental Biogeochemistry) PhD. Sam Collins BSc, (Applied Geology).

Chapter no. or Appendix no.	Chapter name	Section	Staff member name and company	Qualifications and experience
			Justin Robins ABM Resources	BSc Geology, PDip Environmental Management, 16+ years
			Brad Valiukas ABM Resources	BEng (Mining), Chief Operating Officer, 16+ years
Chapter 11 Appendix O, Appendix P, Appendix X.	Mine closure and rehabilitation	All Mine Closure Plan Care and Maintenance Plan Ground Disturbance Management Plan	Justin Robins ABM Resources	BSc Geology, PDip Environmental Management, 16+ years
			Rebecca Richards ABM Resources	Geochemist/ Project Geologist, MSc Earth Sciences, 3.5 years
Chapter 12 Appendix S	Road transport and traffic management	EIS Chapter Vehicle Management Plan	Rebecca Richards ABM Resources	Geochemist/ Project Geologist, MSc Earth Sciences, 3.5 years
			Justin Robins ABM Resources	BSc Geology, PDip Environmental Management, 16+ years
			Brad Valiukas ABM Resources	BEng (Mining), Chief Operating Officer, 16+ years
Chapter 13 Appendix T, Appendix U, Appendix V, Appendix W.	Social, economic, cultural and heritage risks	EIS Chapter Social Impact Management Plan Cultural and Heritage Management Plan Archaeological Heritage Clearance Report – Tim Hill	Darren Holden ABM Resources	BSc Hons, MAusIMM, Managing Director, 15+ years
Chapter 14	Environmental management plan	All	Justin Robins ABM Resources	BSc Geology, PDip Environmental Management, 16+ years
			Rebecca Richards ABM Resources	Geochemist/ Project Geologist, MSc Earth Sciences, 3.5 years
Chapter 15	Environmental offsets	EIS Chapter	Justin Robins ABM Resources	BSc Geology, PDip Environmental Management, 16+

Chapter no. or Appendix no.	Chapter name	Section	Staff member name and company	Qualifications and experience
				years
			EcOz - Tom Reilly	Project Manager/Senior Environmental Consultant, BSc (Hons) MEIANZ
			EcOz - Dane Trembath	Senior Zoological Consultant, BSc, MappSc
Chapter 16 Appendix Z, Appendix Y, Appendix AA, Appendix X.	Additional environmental impacts	EIS Chapter	Rebecca Richards ABM Resources	Geochemist/ Project Geologist, MSc Earth Sciences, 3.5 years
		Fire Management Plan		
		Noise and Vibration Management Plan	Justin Robins ABM Resources	BSc Geology, PDip Environmental Management, 16+ years
		Biting Insect Management Plan, Ground Disturbance Management Plan		
Acronyms and Glossary		EIS Chapter	Collated by ABM Resources	N/A
References		EIS Chapter	Collated by ABM Resources	N/A
Appendix A	ABM Final EIS guidelines	EIS Appendix	NT EPA	Not applicable
Appendix B	Legislation Matrix for Twin Bonanza Project	EIS Appendix	Rebecca Richards ABM Resources	Geochemist/ Project Geologist, MSc Earth Sciences, 3.5 years
			Justin Robins ABM Resources	BSc Geology, PDip Environmental Management, 16+ years
			Jutta Zimmerman ABM Resources	Dip AQF, Dip Information Technology, Chief Financial Officer, Company Secretary, 20+ years
			Ashley Watson Piper Alderman	Partner Resources and Projects, LLB, 20+ years
Appendix C	Early dry season Flora and Fauna Report 2013	EIS Appendix	Tom Reilly EcOz	BSc (Hons) MEIANZ

Chapter no. or Appendix no.	Chapter name	Section	Staff member name and company	Qualifications and experience
Appendix D	Biodiversity Management Plan	EIS Appendix	Tom Reilly EcOz	BSc (Hons) MEIANZ
Appendix E	Erosion and Sediment Control Plan	EIS Appendix	SWG – Joe Powers	Environmental Engineer, Bsc, Msc, 8 years
			SWG – Adam Pratt	Director, Principal Soil Societist, Bsc, PhD, 20 years
Appendix F	Water Management Plan	EIS Appendix	SWG – Joe Powers	Environmental Engineer, Bsc, Msc, 8 years
			SWG – Adam Pratt	Director, Principal Soil Societist, Bsc, PhD, 20 years
Appendix G	Surface Water Assessment Memo	EIS Appendix	SWG – Joe Powers	Environmental Engineer, Bsc, Msc, 8 years
			SWG – Adam Pratt	Director, Principal Soil Societist, Bsc, PhD, 20 years
Appendix H	Groundwater Monitoring Standard Procedures	EIS Appendix	SWG – Joe Powers	Environmental Engineer, Bsc, Msc, 8 years
			SWG – Adam Pratt	Director, Principal Soil Societist, Bsc, PhD, 20 years
Appendix I	Twin Bonanza Conceptual Geotechnical Design Report for the Tailings Dams and Concentrate Residual Dam	EIS Appendix	4DG – Ian Lewis	Principal Engineering Geologist, MappSc, BSc, 30 + years
			4DG – Richard Rudd	Senior Engineering Geologist, BSc, 10 + years
			4DG – Brian Francis	Senior Geotechnical Engineer, MCE, BCE, 10 years
Appendix J	Preliminary Groundwater Resource Assessment	EIS Appendix	Earth Systems – Dr Jeff Taylor	AMD and Water Chemistry Specialist / Senior Principal Environmental Geochemist, CEnvP, BSc, PhD, 30 + years
			Earth Systems – Mr Nigel Murphy	Project Director / Senior Principal Environmental Scientist, BSc, MSc, 25 + years
Appendix K	Air Quality Management Plan	EIS Appendix	Rebecca Richards ABM Resources	Geochemist/ Project Geologist, MSc Earth Sciences, 3.5 years

Chapter no. or Appendix no.	Chapter name	Section	Staff member name and company	Qualifications and experience
Appendix L	Tailings Characterisation	EIS Appendix	Rebecca Richards ABM Resources	Geochemist/ Project Geologist, MSc Earth Sciences, 3.5 years
Appendix M	Waste Dump Characterisation	EIS Appendix	Rebecca Richards ABM Resources	Geochemist/ Project Geologist, MSc Earth Sciences, 3.5 years
Appendix N	Geochemical Characterisation – tailings and waste materials	EIS Appendix	SWG – Joe Powers	Environmental Engineer, Bsc, Msc, 8 years
			SWG – Hayley Castlehouse	Environmental Geochemist, BSc, (Soil Science) MSc, (Environmental Biogeochemistry) PhD. Sam Collins BSc, (Applied Geology).
			SWG – Adam Pratt	Director, Principal Soil Scientist, Bsc, PhD, 20 years
Appendix O	Conceptual Mine Closure Plan	EIS Appendix	Justin Robins ABM Resources	BSc Geology, PDip Environmental Management, 16+ years
			Brad Valiukas ABM Resources	BEng (Mining), Chief Operating Officer, 16+ years
Appendix P	Conceptual Care and Maintenance Plan	EIS Appendix	Justin Robins ABM Resources	BSc Geology, PDip Environmental Management, 16+ years
			Brad Valiukas ABM Resources	BEng (Mining), Chief Operating Officer, 16+ years
Appendix Q	Hazardous Substances Management Plan	EIS Appendix	Gary Scells	HSEC
Appendix R	Emergency Response Management Plan	EIS Appendix	Pascal Hill	BSc (Hons) MAIG, Exploration Manger – Geologist, 15+ years' experience
Appendix S	Vehicle Management Plan	EIS Appendix	Tim Hutchins	HSEC
Appendix T	Social Impact Management Plan	EIS Appendix	Darren Holden ABM Resources	BSc Hons, MAusIMM, Managing Director, 15+ years
Appendix U	Cultural and Heritage Risk Management Plan	EIS Appendix	Darren Holden ABM Resources	BSc Hons, MAusIMM, Managing Director,

Chapter no. or Appendix no.	Chapter name	Section	Staff member name and company	Qualifications and experience
				15+ years
Appendix V	Twin Bonanza Archaeological Heritage Assessment	EIS Appendix	Tim Hill of Tim Hill Heritage Management and Planning	BA Hons
Appendix W	AAPA Search	EIS Appendix	Aboriginal Areas Protection Authority	Not Applicable
Appendix X	Ground Disturbance Management Plan	EIS Appendix	Justin Robins ABM Resources	BSc Geology, PDip Environmental Management, 16+ years
Appendix Y	Noise Management Plan	EIS Appendix	Rebecca Richards ABM Resources	Geochemist/ Project Geologist, MSc Earth Sciences, 3.5 years
Appendix Z	Fire Management Plan	EIS Appendix	Rebecca Richards ABM Resources	Geochemist/ Project Geologist, MSc Earth Sciences, 3.5 years
Appendix AA	Biting Insect Management Plan	EIS Appendix	Rebecca Richards ABM Resources	Geochemist/ Project Geologist, MSc Earth Sciences, 3.5 years
Appendix AB	Topsoil Characterisation and Erosion Analysis	EIS Appendix	Rebecca Richards ABM Resources	Geochemist/ Project Geologist, MSc Earth Sciences, 3.5 years
Appendix AC	EIS Commitments Summary	EIS Appendix	Rebecca Richards ABM Resources	Geochemist/ Project Geologist, MSc Earth Sciences, 3.5 years
Appendix AD	EIS Cross-reference table	EIS Appendix	Rebecca Richards ABM Resources	Geochemist/ Project Geologist, MSc Earth Sciences, 3.5 years
Appendix AE	EIS Consultation Summary	EIS Appendix	Rebecca Richards ABM Resources	Geochemist/ Project Geologist, MSc Earth Sciences, 3.5 years
Appendix AF	EIS Contribution Summary	EIS Appendix	Rebecca Richards ABM Resources	Geochemist/ Project Geologist, MSc Earth Sciences, 3.5 years

1.8 Draft EIS structure

The structure of the draft EIS is outlined below:

Executive summary

- A brief overview of the project, its environmental implications and the proposed management objectives.

Chapter 1: Introduction

- The introduction to the draft EIS provides a brief background and context to the project including; project description, project proponent, project objectives, EIS process and consultation process, and relevant legislation to the EIS.

Chapter 2: Regulatory environment

- The regulatory environment chapter details the principal legislative requirements for the ABM Twin Bonanza -1 project including project approvals, permits, and licences for specific activities.

Chapter 3: Project description

- Provides a full description of the proposed project.

Chapter 4: Project rationale and alternatives

- Provides details of the project's potential alternatives and addresses the rationale, benefits and alternatives to carrying out the Twin Bonanza mine development (the project).

Chapter 5: Risk assessment

- Describes the process and presents results of an assessment of the risks associated with potential impacts of the ABM project.

Chapter 6: Biodiversity

- Outlines the steps taken to assess the biodiversity values that may be impacted by the Twin Bonanza project area followed by a risk assessment that discusses hazards, risk rankings and mitigations. The project area is examined with regard to its contribution to local, regional, national and international biodiversity values, and overall conservation significance. The character and typical range of terrestrial species and ecosystems within the proposed development are summarised.

Chapter 7: Water management

- The water management chapter provides a comprehensive description of the available surface and groundwater sources at the Twin Bonanza project and surrounds.

Chapter 8: Air quality and greenhouse gas emissions

- Discusses the potential impacts on air quality and the emissions of greenhouse gases associated with the project; including mitigation measures when practicable.

Chapter 9: Waste management

- The aim of the waste management for the Twin Bonanza mine site is to identify potential waste streams and volumes, potential impacts of waste generation, together with management measures applied to minimise impacts. Waste management for non-mineralised waste will be discussed in this chapter.

Chapter 10: Tailings and waste management

- Waste management for mineralised waste, including waste rock and tailings, will be discussed in this chapter.

Chapter 11: Mine closure and rehabilitation

- Outlines the proposed rehabilitation and mine closure methods to be used at the project.

Chapter 12: Road transport and traffic management

- The potential impacts and proposed routes of increase road and air traffic are discussed in this chapter, together with mitigation measures for the project.

Chapter 13: Social, economic, cultural and heritage risks

- This chapter will discuss the social, economic, cultural and heritage risks of the Twin Bonanza project, including a social impact assessment and mitigation strategies.

Chapter 14: Environmental management plan

- Outlines the project's strategic environmental management. The purpose of this strategic document is for the facilitation of environmental management measures to minimise the environmental risks associated with the project and to protect the environment.

Chapter 15: Environmental offsets

- Details environmental offsets undertaken by ABM to offset the environmental impact of the project on the environment.

Chapter 16: Additional environmental impacts

- Describes additional environmental impacts that were required prepared to address the requirements of the Twin Bonanza EIS. These impacts, and their mitigation/management measures, were not addressed in previous chapters but are still

relevant to the project and include: bushfires, noise, biting insect management, clearing and land disturbance.

Acronyms and Glossary

- A list of technical terms and abbreviations referred to and used in the preparation of the Twin Bonanza EIS.

References

- A list of documentation referred to and used in the preparation of the Twin Bonanza EIS.

Appendices

- Contains additional technical details, reports and management plans which support the assessments provided in the chapters.

1.9 Conclusion

ABM has developed this EIS taking into account relevant acts, regulations, leading practice guidance, and industry standards. The company aims to reduce uncertainty and impact of the Twin Bonanza project as well as adopt robust operational practices. In addition to being guided by these documents during preparation of the EIS, ABM has consulted with the CLC, government agencies (including NTEPA and DME) and various consulting groups. The company has documented the impacts of developing mining operations at the Twin Bonanza project and has developed a comprehensive set of management plans and measures to minimise the impacts on the key environmental and social values.