Perilya Limited
ABN: 85 009 193 695

MARP Cover Letter 15.02.07.doc

15 February 2007

The Chief Inspector of Mines
PIRSA, Mining Regulation and Rehabilitation Branch
GPO Box 1671
Adelaide, SA, 5001

Dear Sir

MINING AND REHABILITATION PROGRAM, BELTANA MINE

Freehold Mining Pty Ltd (a subsidiary of Perilya Limited) is pleased to present this Mining and Rehabilitation Program (MARP) for the Beltana Mine near Leigh Creek, South Australia.

This MARP has been prepared in accordance with the "Guidelines for the Preparation of a Mining and Rehabilitation Program (MARP)" version 3.12, 2006 and was discussed in detail with officers of PIRSA.

Please find three hard copies of the documentation (including appendices) and one digital copy on compact disk.

We have also provided supporting documentation including Perilya/Freehold management plans and systems documentation, and also additional documentation from the nominated contract mining company (Exact Mix Pty Ltd). This information is commercial in confidence and hence is not for public display or distribution.

We trust this information is sufficient to gain approval. Please contact the undersigned if you have any comments or require additional information.

Yours sincerely
PERILYA LIMITED

Peter Eggleston
General Manager Sustainable Development

Enc

Beltana Mine, Beltana, SA

Mining and Rehabilitation Program ML 4371, ML 4370 and ML 4369, and associated MPL

Prepared for

Freehold Mining Pty Limited

(a wholly-owned subsidiary of Perilya Ltd)
Level 10, 553 Hay Street
PERTH WA 6000

February 2007

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1.0 INTRODUCTION

1.1 Project Details Summary

Name of the operation:

- The operation's name is Beltana Mine, and forms part of the Flinders Project.

Location:

- The Beltana Mine is located approximately 10 km to the south of Leigh Creek and about 16 km to the north of the historic township of Beltana.
- The land is outside any Local Government area.

Land ownership and tenancy:

- The land on which the Beltana Mine is situated is Crown Land (Volume 1437, Folio 24), leased as Puttapa Station to G Ragless (Pastoral Lease 2498).
- Certificate of land title of pastoral lease: Volume 1437 Folio 24.
- Tenement name(s) and number(s) of the Beltana Mine - ML 4369, ML 4370, ML 4371 and associated Miscellaneous Purposes Licence (MPL).

Previous approval:

- The previous MARP for the Beltana project was approved in March 2005.

Proponent details:

- Name(s) of the mine owner and mine operator and contact person: Freehold Mining Pty Ltd, Peter Eggleston (General Manager Sustainable Development) or Mr Wayne Loxton (Project Manager).
- Address: Level 10, 553 Hay Street, Perth WA 6000.
- Contact numbers: Peter Eggleston phone 08 6210 2022, fax 6210 2099, mobile 0439 550 200; Wayne Loxton phone 08 62102000, fax 08 62102099, mobile 0419 833 090.

Type of operations:

- Mining, crushing, ore sorting, stockpiling and dispatch of zinc ore.

1.2 The Company

Freehold Mining Pty Ltd (Freehold) was formed for the purposes of exploring and developing the Flinders/Beltana Project and is a wholly owned subsidiary of Perilya Limited.

Perilya Limited is a diversified mining and exploration company based in Perth, Western Australia. The company owns and operates the Broken Hill lead, zinc and silver mine in New South Wales, Australia making it one of Australia's largest base metal miners. It also has interests in nickel and in exploration for gold, base metals, oil and gas.

The foundation for Perilya's growth came from the company's purchase of the Fortnum gold mine in Western Australia in 1994. At the time, Fortnum had a mineable reserve of 55,000 oz of gold. In the following six years Perilya produced 540,000 oz of gold from the mine, generating an operating surplus of more than $70 m before the mine closed in August 2001.

On 31 May 2002 the company successfully completed the acquisition of the Broken Hill mine from Pasminco Limited. Broken Hill is one of the largest and most renowned deposits of lead, zinc and silver in the world and has been continuously mined since 1885. Perilya's market capitalisation is currently approximately $800 m.

Perilya's principal exploration interests include projects in Western Australia, South Australia, Queensland and Sabah, Malaysia. Perilya (through Freehold) has taken a strong exploration position in South Australia in the past year, and is pursuing the investigation of zinc prospects in the Flinders Ranges, called the Flinders Project.

1.3 The Flinders Project and Beltana Mine

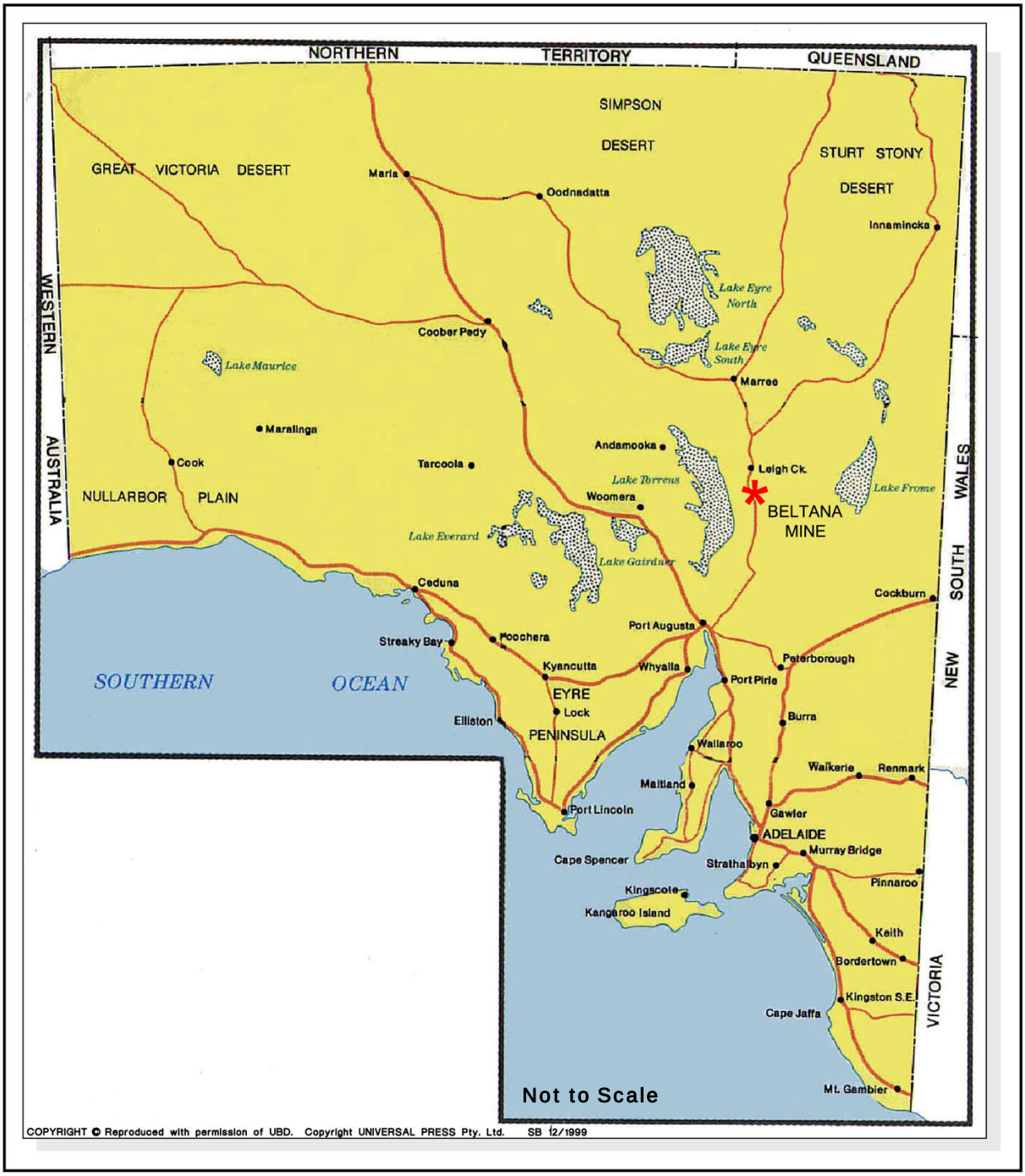
A resource of 966,000 t at 31% zinc, containing almost 300,000 t of zinc metal, has been estimated for the Flinders Project and additional resources are expected from ongoing work. The Flinders Project covers approximately 4,138 km^2 in South Australia, some 470 km north of Adelaide and 250 km north of Port Pirie (Figure 1.1). The project comprises exploration licences and mining leases under five separate joint ventures (Perilya earning between 85 and 90%), as well as exploration licences and mining leases held 100% by Perilya.

The re-opening of the Beltana Mine will initiate the Flinders Project. Beltana has an estimated ore reserve of 150,000 t at 38.3% zinc, containing approximately 57,400 t of zinc metal. In addition, the Beltana pit will also produce over 242,000 t of intermediate material at an average grade of over 21% zinc, containing approximately 52,000 t of zinc metal; this material will be stockpiled at the site in anticipation of identifying potential future markets and customers.

The upfront capital estimate for the Beltana project is $31.1 m, comprising $14.4 m project capital and a working capital of $16.7 m for pre-strip operations. The project capital expenditure includes $9.3 m for an extension to the existing storage facilities at Port Pirie, and port infrastructure modifications.

The detailed design of the Beltana pit was completed in November 2006, and the Perilya Board signed off on the project in December 2006. The first shipment of crushed ore is expected in late 2007. Further development of the Flinders Project is being investigated, including the Reliance, Tom Thumb, Aroona and Mooloolloo prospects (Figure 1.2).

Figure 1.1 – Beltana Mine Location



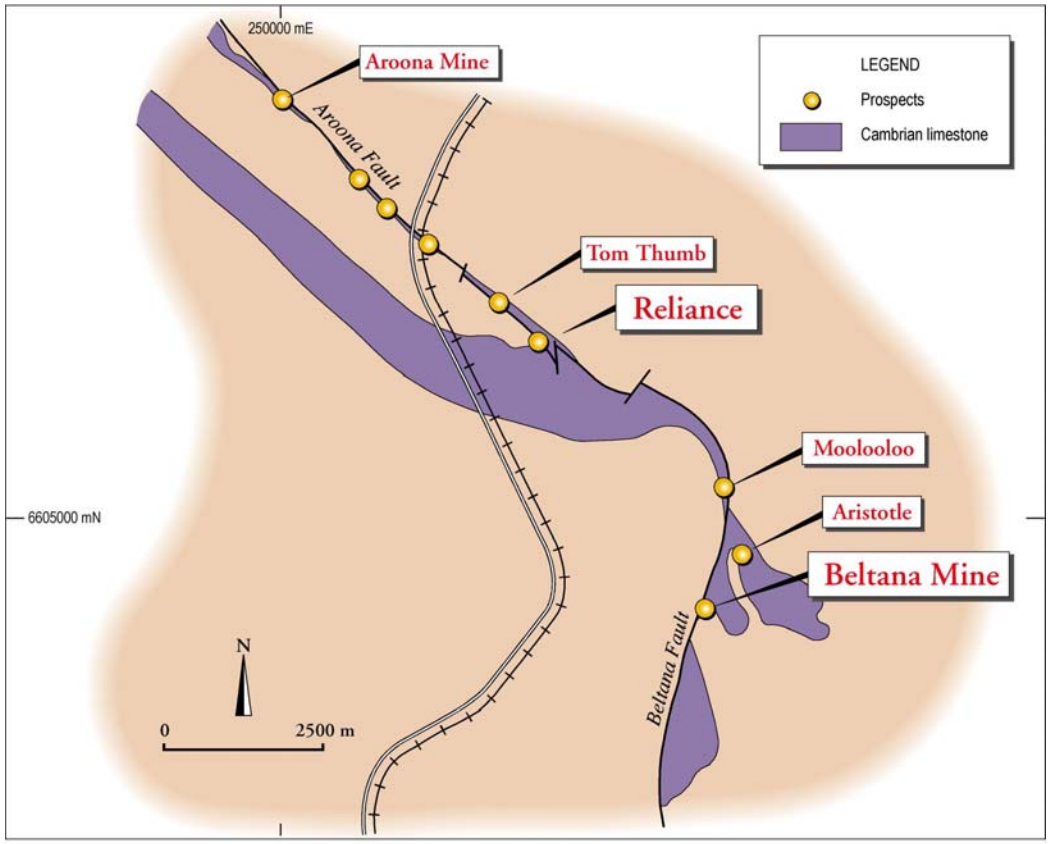
The Flinders Project is located in the northern part of the Adelaide Geosyncline, a deep sedimentary basin of Late Proterozoic to Middle Cambrian age. Lithologies include siltstone, sandstone, limestone, dolomite and black shale. Zinc mineralisation within the project area is hosted within the Wilkawillina Limestone and the Woodendina Formations.

The Beltana and Aroona zinc oxide deposits were found during exploration for large scale carbonate hosted lead-zinc sulphide deposits in the 1960s. The Beltana – Aroona trend (15 km) is the largest known willemite alteration zone in the world. The ore is a high-grade zinc silicate.

Exploration by Freehold in the Flinders Project has been focused on high grade zinc silicate mineralisation similar to that mined previously at Beltana and Aroona, which together had pre-mining reserves of 1 m tonnes at 37% zinc. Freehold's exploration has targeted extensions to high grade zinc silicate mineralisation adjacent to the open pits, and along strike within the prospective lithological and structural zones that host the deposits. Figure 1.2 shows the area of key interest in relation to the Flinders Project.

Total resources in all categories in the Flinders Project area currently stand at 966,000 t at 31% zinc. The high grade nature of the mineralisation provides the opportunity to produce a direct shipping product for sale from current resources.

Figure 1.2 – Flinders Project – Key Prospects



Freehold is taking over the Flinders Project leases from Zinifex Limited (formerly Pasminco Limited), conditional to resuming the mining of and ultimate closure of the Beltana Mine. Freehold proposes to resume mining at Beltana, and to mine out the remaining recoverable reserves of zinc ore, and to formally close and rehabilitate the mine.

1.4 The Existing and Proposed Operations

The Beltana Mine is presently in a state of care and maintenance. Mining has previously been undertaken at the site in 2003. A caretaker lived on site until 2005, and this has been followed by frequent visits by the Regional Manager based in Broken Hill, during exploration drilling in the area. This has kept the camp operational and maintained the mine site infrastructure suitable for future re-commencement of operations.

Freehold propose to resume operations at the Beltana Mine to recover the remaining ore reserves (shown red in Figure 1.3). This will involve deepening and extending the pit. It is expected that mining operations will be complete within 12 months. It is noted that the Beltana Mine has a history of being mined in short campaigns, and in this respect the proposed reopening of the mine will be in keeping with the previous mining operations.

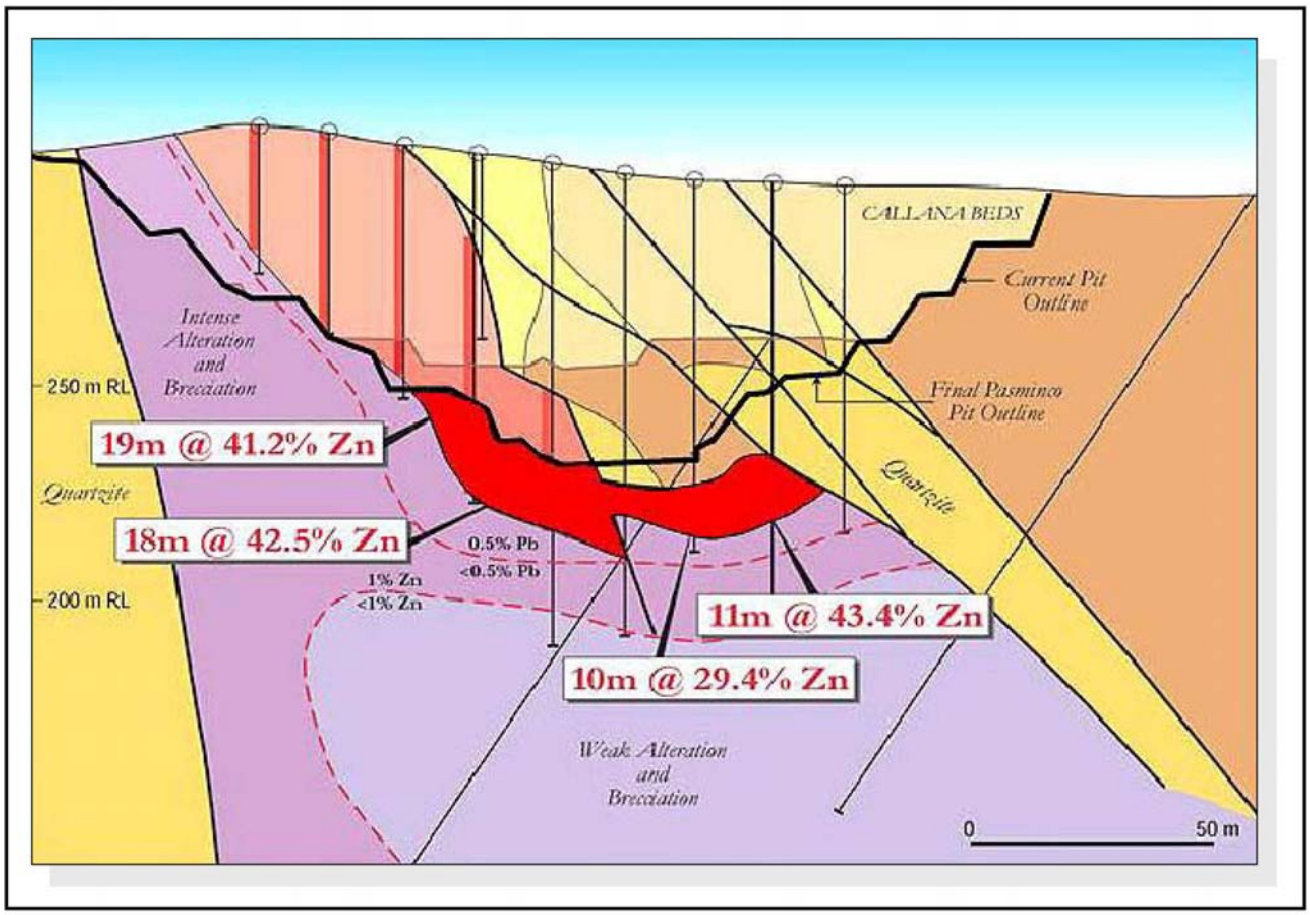
Subject to separate approval, it is also proposed to mine the nearby small Moolooloo deposit (RL6), and truck the ore to Beltana for crushing, a distance of approximately 2 km (refer Figures 2.3 to 2.5). If this approval was obtained, crushing of ore at Beltana will be undertaken for about 18 months.

After recovery of the remaining ore reserves, it is proposed to rehabilitate the mine for closure, in accordance with the Department of Industry Tourism and Resources documents *Mine Closure and Completion* (2006a), and *Mine Rehabilitation* (2006b). The rehabilitation of the main mine area including the waste rock dump will be undertaken immediately following the completion of mining, which is expected to be within about 12 months of the mine re-opening. The ore stockpile area and remaining access roads will be continued to be used for some years, until final load-out of ore from the mine. These areas will be rehabilitated following the final load-out.

The crushing and screening plant associated with the previous operations has been removed from site. In order to crush, screen and sort the mined ore, mobile crushing and screening and ore sorting plants will be installed on the site, in approximately the same location as the previous permanent crushing and screening plant. Ore will be stockpiled on site pending transfer to Port Pirie.

The ultimate profile of the rehabilitated waste rock dump has been further considered in this application, taking particular account of the context of the surrounding area, to determine an appropriate final landform more sympathetic to the surrounding area.

Figure 1.3 – Beltana Mine Cross-section



In order to achieve this, a Miscellaneous Purposes Licence (MPL) was applied for to accommodate an extended but lower profile waste rock dump. The MPL also incorporates other existing mine infrastructure, including the explosives magazine. This MARP application describes activities proposed to be undertaken on the existing MLs and the MPL, as an integrated mine operation.

The mining operations are discussed in detail in Section 4. Measures to minimise environmental impacts , including mine rehabilitation and closure are discussed in Section 6. Plates 1.1 and 1.2 show the existing mine pit.

Plate 1.1 Beltana Open Cut Pit Current Mine (looking North from within the pit)

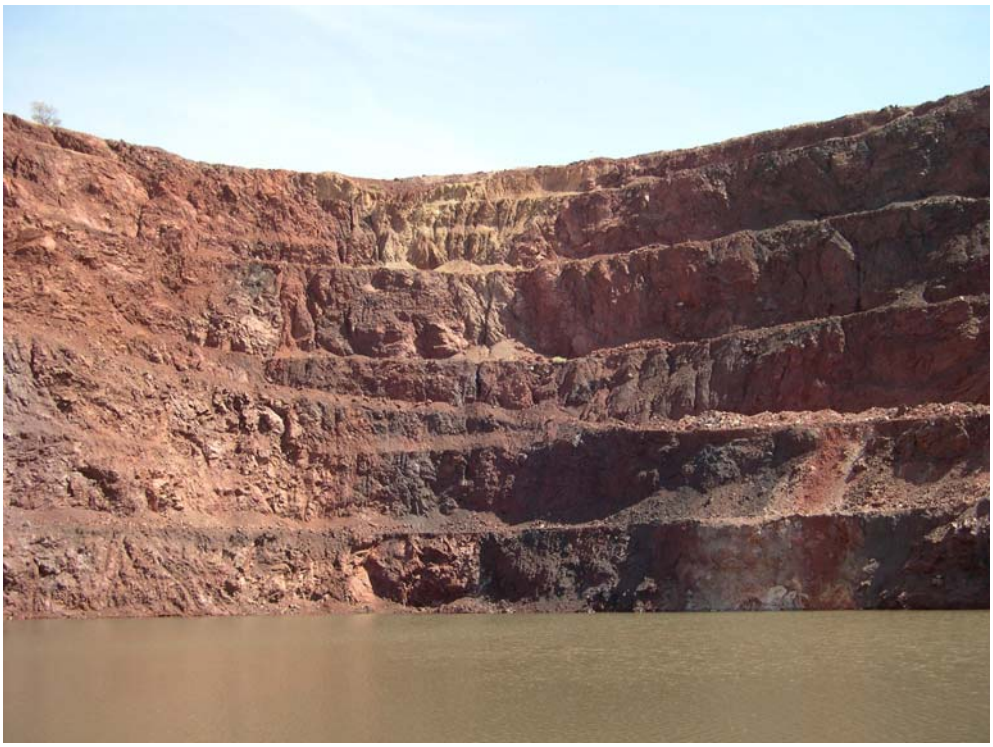


Plate 1.2 Beltana Open Cut Pit Current Mine (looking South from top of pit)

1.5 Purpose of this MARP

The original Mining and Rehabilitation Program (MARP) of 27 August 1986 was submitted to the then Department of Mines and Energy South Australia (MESA) by Electrolytic Zinc Company of Australia Limited. Subsequently, Pasminco Mining Beltana provided detail of an Amendment to the Beltana Zinc Mine development program to MESA in a letter of 20 September 1996. Previous MARP certifcates and correspondence are presented in Appendix A.

Perilya submitted an Amendment to Mining and Rehabilitation Program (MARP) No. 48/86 in January 2005, which was subsequently approved (Appendix A). Since this time Perilya (as Freehold) has undertaken further exploration work in the Flinders area, and further mine planning of the Beltana Mine has been undertaken.

The purpose of this MARP is to seek approval for an amendment to the previously approved MARP, in order to resume mining operations, and to rehabilitate and close the mine upon recovering the remaining ore reserves. This submission addresses:

- A change to the configuration and layout of the waste rock dump, in particular enlarging and changing the footprint of the waste rock dump to achieve a better final landform. The MPL will accommodate this extended waste rock dump, and also incorporate other mine infrastructure;
- A minor enlargement and change to the geometry of the pit, to incorporate an additional identified area of mineralisation, and also changes to stockpile locations;
- A change to the location of the evaporation pond and laydown area;
- Crushing of ore from the Moolooloo prospect (RL 6), which is a small deposit close to the Beltana Mine (refer Figures 2.3 to 2.5). It is noted that the proposed mining of the prospect, and the upgrading of the existing track to serve as a haul road, will be covered in a separate MARP application, plus other required approvals.
- Relocation of the Zinifex stockpile to another location within the mine lease (NB: it is understood that Zinifex has submitted a proposal for this separately; this document mentions the relocation for information and completeness only); and

The proposed mining at Beltana will be to a depth of about 210 m RL (an increased depth of about 30 m) using similar mining operations to those undertaken previously, utilising an evaporation pond for mine water disposal, a mobile crushing and screening plant and ore sorting plant, and utilising existing facilities as much as practicable. The stockpile area will be enlarged, and the waste rock dump will also be extended to allow for a low final profile.

1.6 Key Document References

This MARP application has been prepared with reference to the Primary Industries and Resources South Australia (PIRSA) *Guidelines for the Preparation of a Mining and Rehabilitation Program* (MARP), version 3.12 (January 2006), and incorporates the requirements of the Native Vegetation Council's *Guidelines for a Native Vegetation Significant Benefit Policy for the Clearance of Native Vegetation Associated with the Minerals and Petroleum Industry* (September 2005).

Other key references are the recently released Department of Industry Tourism and Resources documents *Mine Closure and Completion* (2006), and *Mine Rehabilitation* (2006).

2.0 LOCATION AND LAND USE

2.1 Location

The Beltana mine is located 470 kilometres north of Adelaide and 250 kilometres north of Port Pirie (Figure 1.1). It is approximately 16 kilometres south of Leigh Creek and 17 kilometres north of the historic Beltana township.

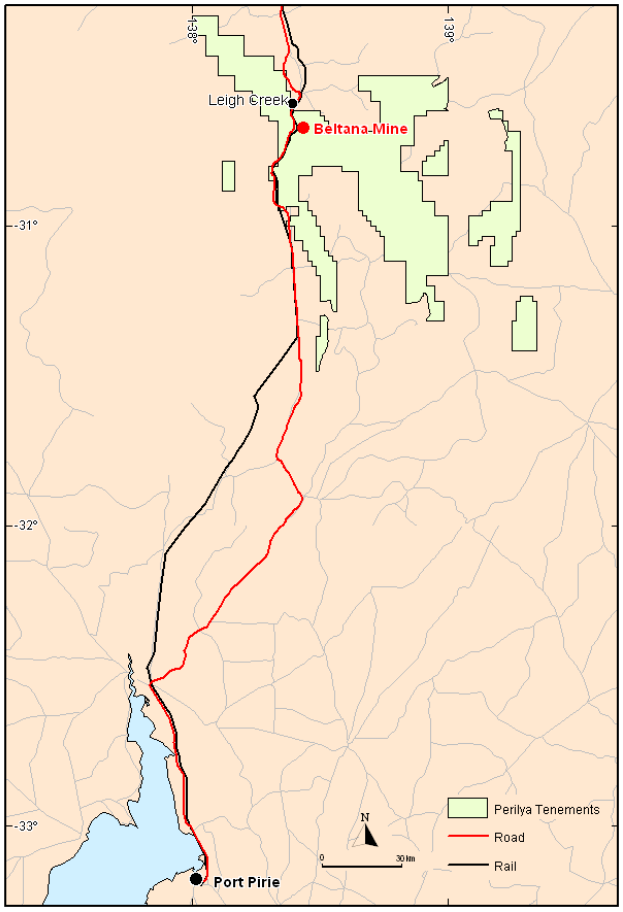
Figures 2.1, 2.2, 2.3, 2.4 and 2.5 provide additional detail on the location of the Beltana mine at progressively larger scales. Figure 2.6 shows the site in relation to state reserves and national parks.

2.2 Land Use

The northern Flinders region is characterised by a mix of pastoral activities, mining, and tourism-related activities. The predominant land uses surrounding the site include livestock grazing, coal mining to the north at the Leigh Creek coalfields, and recreational and tourism activities.

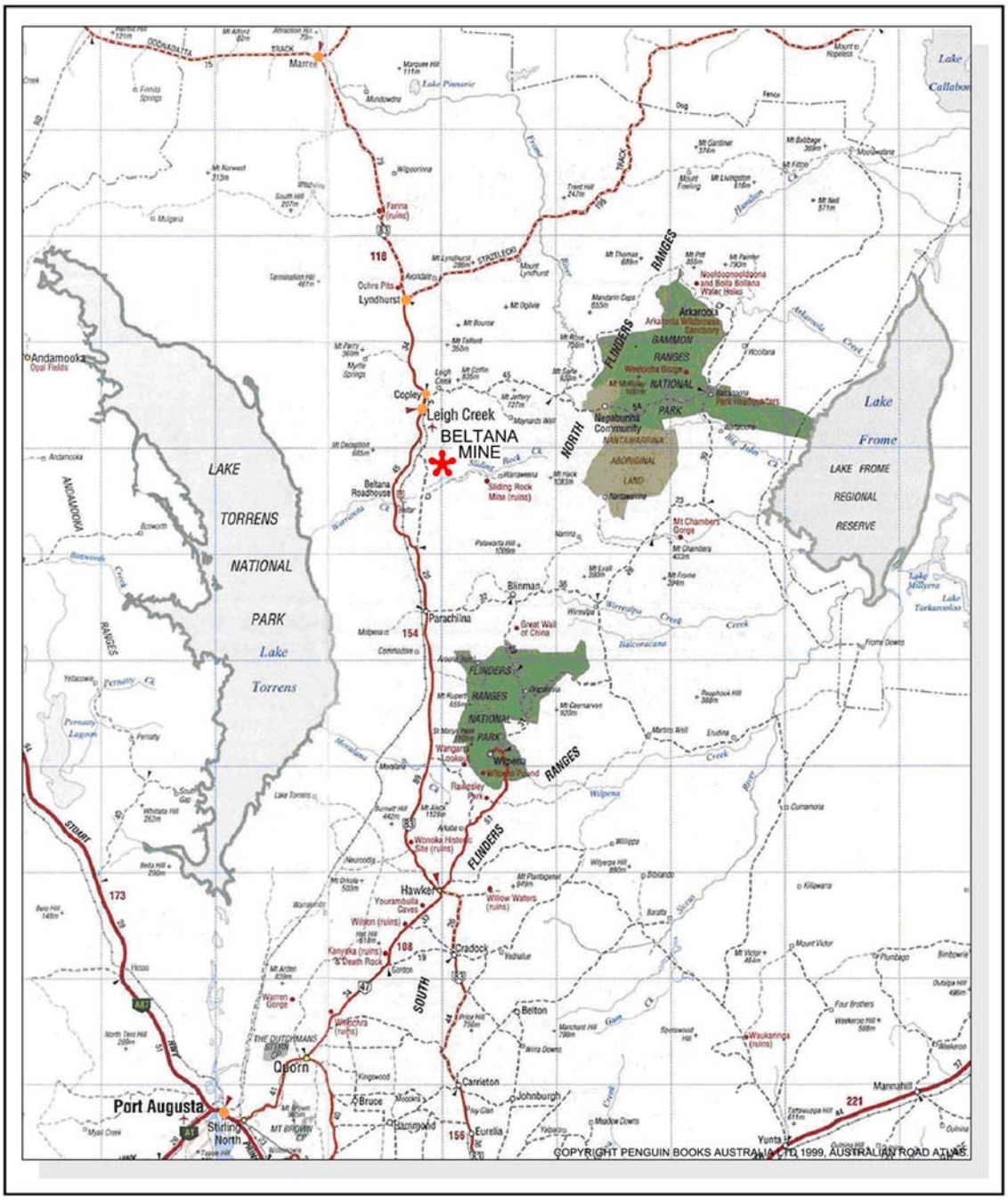
The proposed area in which the proposed mining activities are to be amended is located within the current Freehold Mining Leases at Beltana and the new MPL. The extent of the Flinders Project area and access to transport to Port Pirie is shown in Figure 2.1.

Figure 2.1 –Flinders Project Area Leases



The northern Flinders Ranges is a popular pass-through area to tourist destinations including Marree (the start of the Birdsville and Oodnadatta Tracks) and Lyndhurst (the start of the Strzelecki Track), the Flinders Ranges National Park and Wilpena Pound, and the Gammon Ranges National Park and Arkaroola (Figure 2.2). The nearby main road is also the main access for pastoralists and communities to the north, to the south and to Adelaide.

Figure 2.2 – Regional Map



The nearest townships to the site are Leigh Creek and Copley, both to the north. The area is serviced by good sealed road to the south, and to the north as far as Lyndhurst, and is connected by rail which is presently used only for the transport of coal from the Leigh Creek coalfields to the Northern Power Station at Port Augusta.

2.3 Proximity to Housing and Other Areas of Interest

The mine site, although in close proximity to the main road to Leigh Creek and beyond, and to the railway line, is relatively isolated (Figure 2.2). The proposed mining area is approximately 16 km and 22 km respectively from the nearest towns of Leigh Creek and Copley, to the north. The 'ghost' town of Beltana is approximately 17 km to the south.

A map of the Beltana surrounds is shown in Figure 2.3, and an aerial photo of the mine area is provided in Figure 2.4. Figure 2.4 also shows the Beltana Mine leases 4369, 4370 and 4371, the MPL (in red), Mooloolooo (RL 6), and immediate surrounds. Figures 2.3 and 2.5 show the relevant coordinates.

The mine is located on the Puttapa Station pastoral lease. The nearest station homestead is Beltana Station which is approximately 18 km to the south of the mine site.

The only tourist destination of interest near the mine is the historic Copper King mine. The track to the Copper King mine shares the same track to the Beltana Mine from the main road for part of the way, diverting after the Beltana Mine camp, just before the Beltana Mine site. The track passes over the top corner of ML 4369 and across RL 5 (Figure 2.4).

The Beltana Mine site is clearly signposted as being not for public access. It is partially screened by shrubs and low trees from the Copper King mine access road, and will not be noticed by many travellers. The waste rock dump is barely visible in the distance from the main Leigh Creek road, a distance of about 3 km. Otherwise there are no tourist roads within visual distance of the operation.

The other tourist sites are more distant. Arkaroola is approximately 150 km away, Wilpena Pound is approximately 70 km to the south, and Lyndhurst and Marree are respectively approximately 55 km and 130 km to the north.

The nearest bore other than those related to the Beltana Mine is the Ajax Bore, approximately 1 km east of the mine. Tank water pumped by wind mill from that bore was tested in October 2004 and was of EC 7,100 μS/cm (approximately 4,970 mg/L TDS) and pH of 7.1. It was in use for stock water supply.

Usable ground water supplies are located along the Beltana/Aroona Fault, along which the Beltana Mine and also the other potential Flinders Project prospects lie (Figure 1.2). Flinders Power operates a borefield located about mid way between Beltana and Leigh Creek. This borefield supplements the Leigh Creek water supply, which is provided from the Aroona Dam. The previous mining operations have not affected the operation of these bores, and the proposed amended mining operations are also not expected to have any impact on these bores. This issue is discussed further in Section 3.4 and Section 6.

A stock watering point and associated access track is located just to the south-west of the site (Figure 2.4). The access track and polypropylene pipeline to this watering point will be covered by

the proposed extension of the waste rock dump. The access track and pipeline (about 0.5 km in length) will be re-located to the west of the proposed waste rock dump extension.

Figure 2.3 – Beltana Surrounds

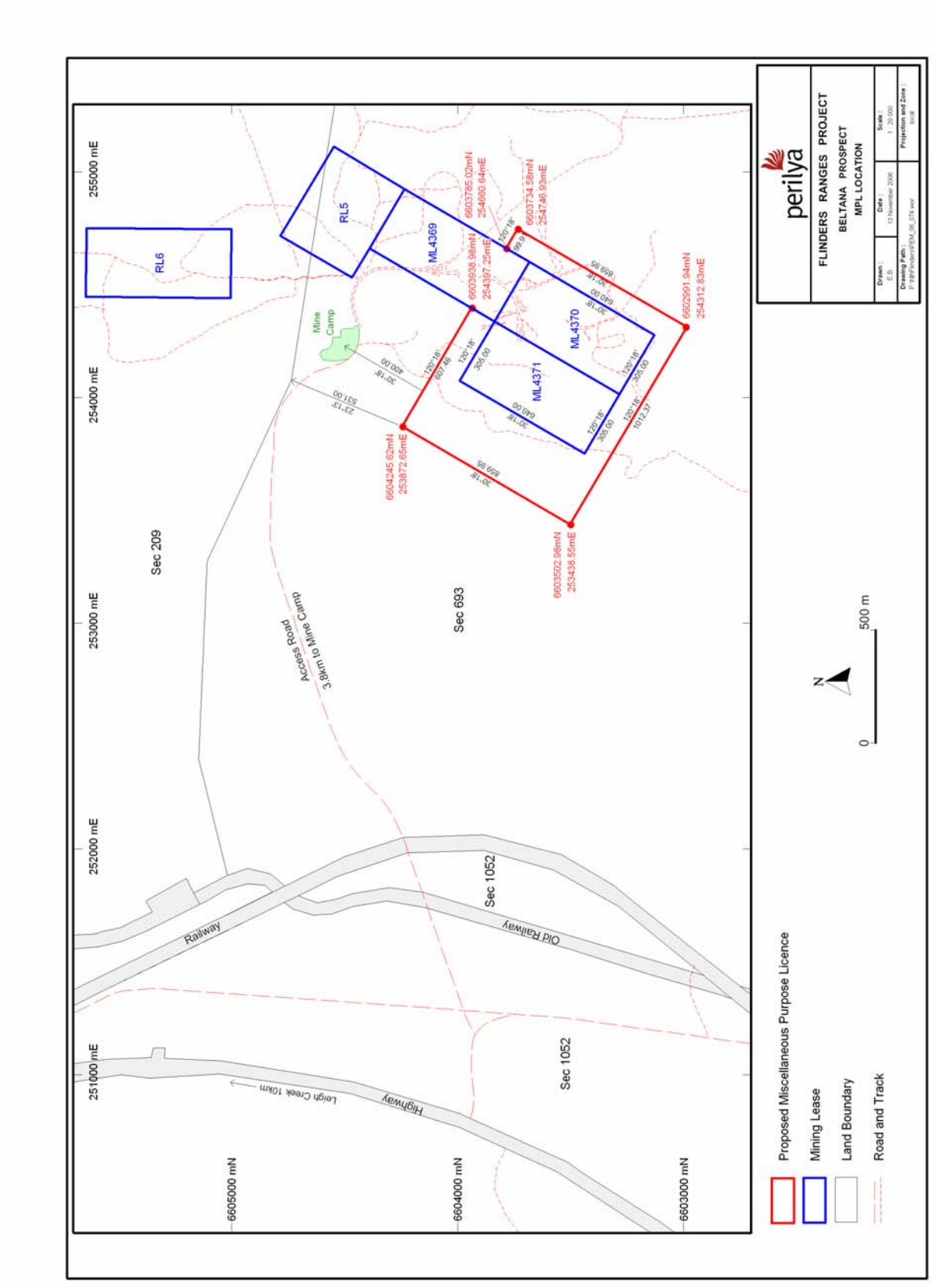


Figure 2.4 – Beltana Aerial Photo

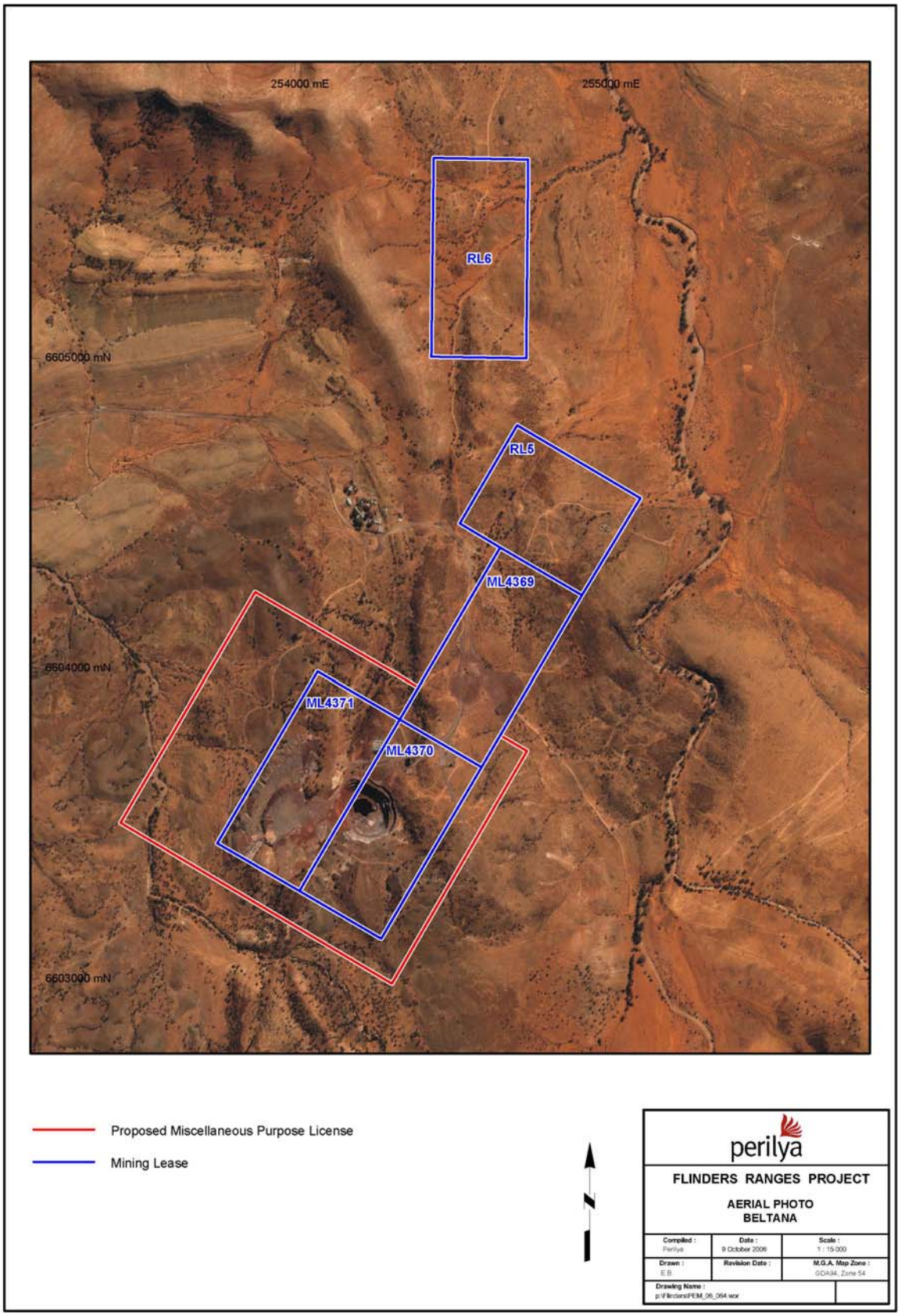


Figure 2.5 – Beltana Coordinates

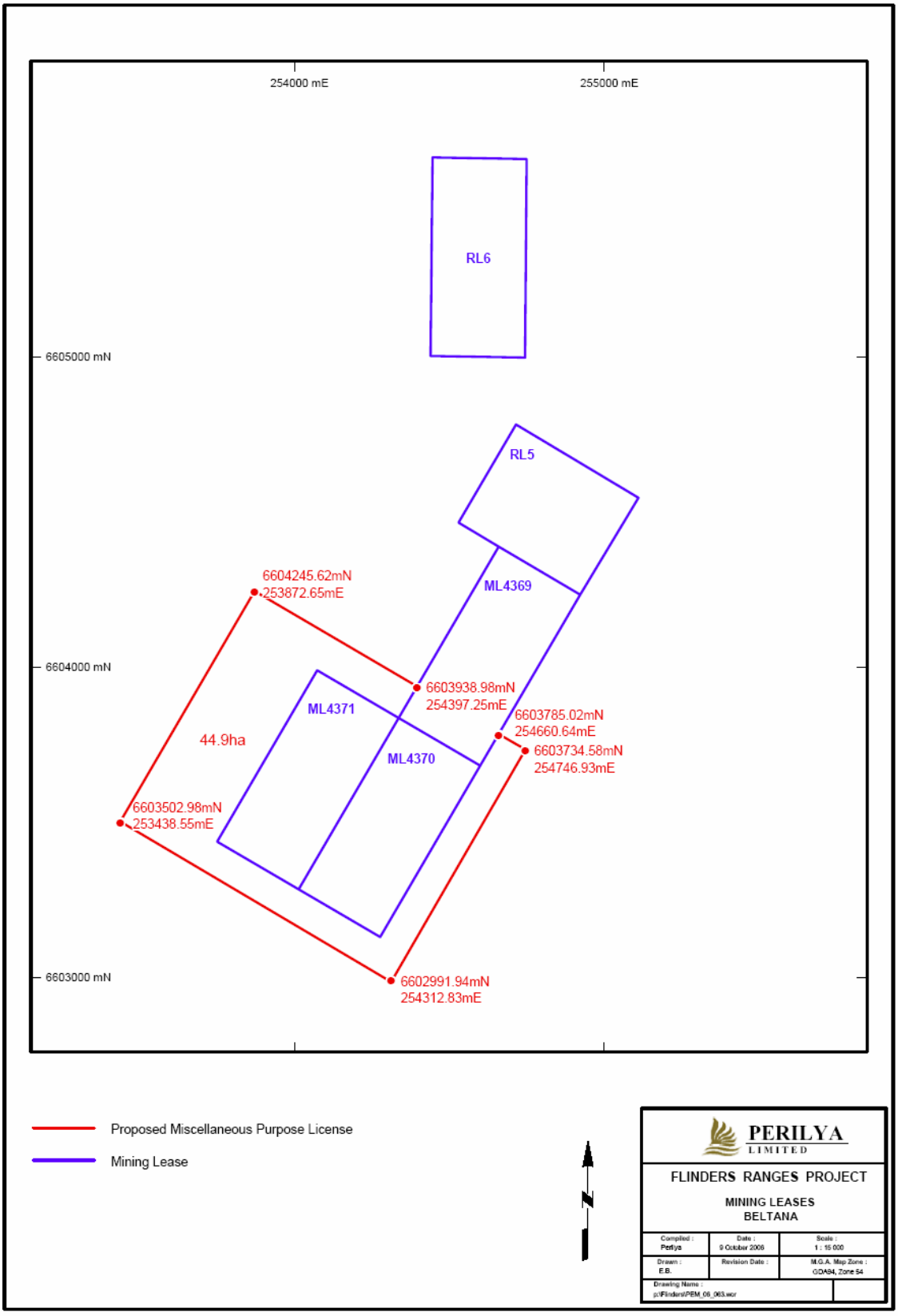
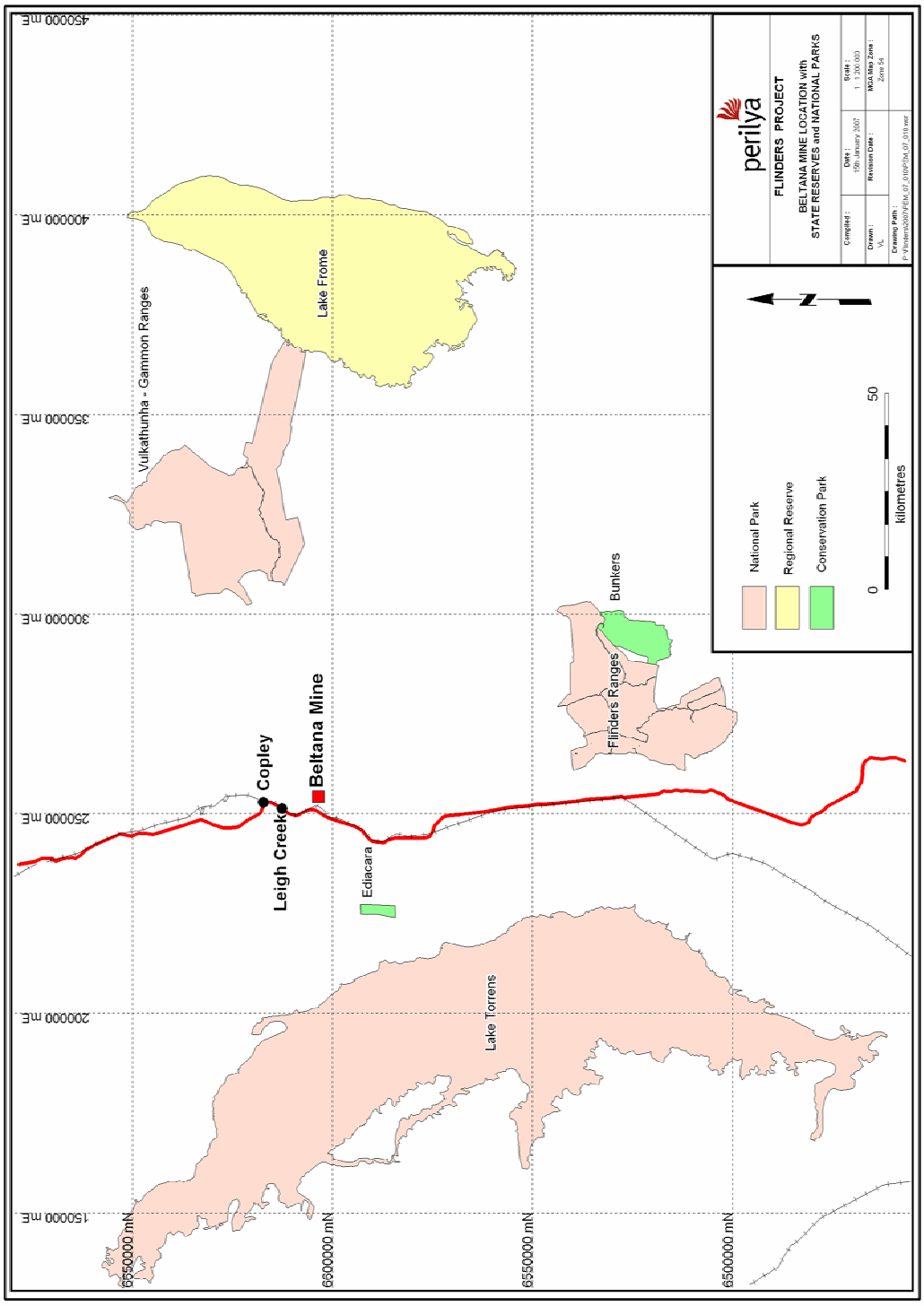


Figure 2.6 – Location of State Reserves & National Parks



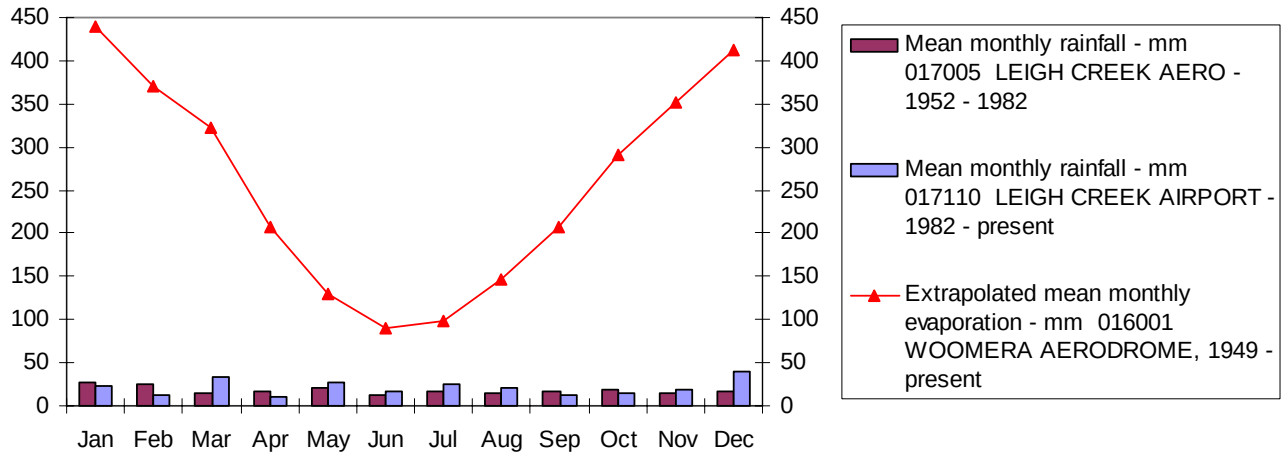
3.0 Land and Environment

3.1 Climate

Mean monthly rainfall data (Table 3.1) were obtained from the Bureau of Meteorology Station at Leigh Creek Airport Stations 017005 (1952 – 1982) and 017110 (1982 – present). No evaporation data is gathered by the Bureau of Meteorology at Leigh Creek, and the nearest station at which evaporation data is collected is Woomera Aerodrome.

The mean daily maximum temperatures (Table 3.1) suggest maximum evaporation will occur over the summer months. Mean monthly evaporation data are presented in Table 3.1, extrapolated from mean daily data at Bureau of Meteorology Station at Woomera Aerodrome Station 016001 (1949 - present), and plotted in Chart 3.1 as an indication of evaporation rates at Leigh Creek.

Chart 3.1 - Mean Monthly Rainfall and Evaporation



The climate is arid, with generally low and erratic rainfall. Evaporation (extrapolated mean monthly between 90 and 440 mm) exceeds rainfall at all times of the year, and in the summer months is an order of magnitude greater. Mean annual rainfalls of between 215 and 253 mm are indicated by the data sets.

The highest recorded daily rainfall (112.6 mm) since 1985 occurred in summer (December). Peak rainfall events such as these will cause major run-off events. The steep, deep drainage structures draining to Mount Deception Creek observed at the site surrounds, which are dry for most of the year, are testament to these high energy run-off events.

Table 3.1 Meteorological Data

	Climate averages for Station: 017005 LEIGH CREEK AERODROME Commenced: 1952; Last record: 1982; Latitude (deg S): -30.4667; Longitude (deg E): 138.4075; State: SA					016001 WOOMERA AERODROME			Climate averages for Station: 017110 LEIGH CREEK AIRPORT Commenced: 1982; Last record: 2004; Latitude (deg S): -30.5963; Longitude (deg E): 138.4219; State: SA				
	Mean daily maximum temperature (^{0} C)	Mean no. of rain days 017005 Leigh Creek Aerodrome, 1952 - 1982 (days)	Mean monthly rainfall 017005 Leigh Creek Aerodrome, 1952 - 1982 (mm)	Lowest monthly rainfall (mm)	Highest recorded daily rainfall (mm)	Mean daily evaporation (mm) 016001 Woomera Aerodrome, 1949 – present	days per month	Extrapolated mean monthly evaporation (mm) 016001 Woomera Aerodrome, 1949 – present	Mean daily maximum temperature (^{0} C)	Mean no. of rain days 017110 Leigh Creek Airport, 1982 – present (days)	Mean monthly rainfall 017110 Leigh Creek Airport , 1982 – present (mm)	Lowest monthly rainfall (mm)	Highest recorded daily rainfall (mm)
Jan	35.3	3.3	28.1	0.0	53.3	14.2	31	440.2	35.0	2.8	22.7	0.0	54.0
Feb	34.5	3.1	24.1	0.0	57.9	13.2	28	369.6	34.6	2.3	12.8	0.0	22.8
Mar	31.6	2.0	15.1	0.0	29.5	10.4	31	322.4	31.0	2.9	33.2	0.0	83.8
Apr	26.4	3.1	17.2	0.0	61.8	6.9	30	207.0	25.9	2.9	10.7	0.0	18.8
May	20.7	4.4	21.4	0.0	57.9	4.2	31	130.2	20.9	4.8	26.7	0.4	45.0
Jun	17.7	5.1	13.6	0.3	27.7	3.0	30	90.0	17.0	4.8	17.1	3.0	26.8
Jul	16.9	4.9	15.9	0.0	32.0	3.2	31	99.2	16.2	7.1	24.4	0.4	14.8
Aug	18.7	4.3	15.0	0.0	30.5	4.7	31	145.7	18.8	5.3	20.6	0.2	25.8
Sep	22.8	4.7	16.0	0.0	25.4	6.9	30	207.0	23.3	4.1	12.1	1.8	16.0
Oct	26.8	4.2	18.0	0.0	33.4	9.4	31	291.4	26.2	3.9	14.6	0.0	13.4
Nov	30.5	4.0	14.2	0.3	29.0	11.7	30	351.0	30.3	3.9	19.6	0.0	50.0
Dec	33.3	3.1	16.7	0.0	26.7	13.3	31	412.3	33.3	4.6	39.0	0.4	112.6
Annual		46	215.3			101.1	365	3066		49.2	253.4		

3.2 Topography and Drainage

The Beltana Mine lies at the western edge of the Northern Flinders Ranges. It is situated on a local plateau in an area of moderate relief, south of the drainage divide between the south-west flowing Mount Deception Creek and the north-flowing Ajax Creek.

Figure 3.1 is an excerpt from the Government of South Australia 1:50,000 Topographical Map for Copley, showing the mine location with respect to local drainage features. A topographical map of the Beltana Mine leases, including the MPL (in red) and Mooloolloo (RL 6), and immediate surrounds is provided in Figure 3.2.

The land slopes to the west from the mine and drains to tributaries of Mount Deception Creek. Mount Deception Creek in turn drains to the saline Lake Torrens Playa some 50 km to the southwest. Ajax Creek drains northwards to Emu Creek, which in turn drains north-westwards to Aroona Creek and the Aroona Dam, located some 10 km north-west of the mine.

3.3 Geology and Seismicity

3.3.1 Geology

The mineralisation at Beltana is hosted stratigraphically at the top of a Cambrian limestone unit. This unit has been subject to intense dolomitisation and ferruginisation. It is often brecciated, and displays varying degrees of manganese and limonite alteration.

A thin quartzite occurs to the east (hangingwall) of the ore.

A large diapir is thrust into a hangingwall position. This unit consists mainly of sedimentary breccia, characterised by thin dolomites and siltstones, quartz gravels and brecciated limestone material.

The ore has a strong structural affinity. Control appears to be a complex arrangement of north-south thrusts and east-west faults. The ore is predominantly willemite, occurring as both massive zones and matrix material within dolomite breccias. Lead occurs as coronadite, occurring as both a willemite associate and as a discrete entity. There are no sulphides associated with the orebody.

3.3.2 Seismicity

Earthquakes of magnitude greater than 5.0 are rare in the Mt Lofty and Flinders Ranges. The most significant earthquakes occurred in 1939 at Parachilna (magnitude 5.7), Wilpena Pound (magnitude 5.4), and quakes of magnitudes 5.5 and 6.0 nearer Adelaide in 1954 and 1992 respectively.

In general, it is expected that the Adelaide Geosyncline will receive a tremor of magnitude greater than 5.0 about once every 20 years. Tremors of magnitude less than 5.0 are more common. The area that receives the greatest number of tremors appears to be between Hawker and Parachilna, although quakes also occur between Parachilna and William Creek, several hundred kilometres north west of Beltana.

In terms of risk to infrastructure and personnel safety, it is considered that proposed ground structures, if built in accordance with Australian Standards, will not be significantly affected by tremors of magnitude less than 5.0.

Also, it appears as though there is little correlation between earthquake recordings and the mapped location of faults. This indicates that the position of the Beltana Mine along the Aroona Fault may not be more at risk than other locations within the Adelaide Geosyncline.

3.4 Groundwater

Figure 3.1 is a topographical map of Copley, and includes the Leigh Creek and Beltana areas and surrounds. A geological cross-section of the immediate area of the Beltana Mine is shown as Figure 4 of Rockwater (1984)[1], a copy of which is reproduced as Appendix B.

The area of the mine includes an overturned sequence of folded and faulted Cambrian - Proterozoic rocks dipping to the north-east. Geological units at the area of the mine from uppermost to lowermost include:

- Callana Beds – comprising siltstone and dolomitic limestone;
- Pound Quartzite – folded with clay-infilled joints; and
- Ajax Dolomite – massive red-brown dolomite with breccia and shear zones, host to the Beltana Willemite deposit.

Previous hydrogeological investigation undertaken by Rockwater (1984) indicated the following:

- Minor perched water occurs in the Pound Quartzite and the Callana beds and in fault zones, however these units are generally tight and not water bearing; and
- The main aquifer at the mine site corresponds to fractured rock and solution cavities (including caverns) in the Ajax Dolomite, with water often intersected at the quartzite – dolomite contact.

Recharge will occur naturally by the direct infiltration of rainfall.

[1] Rockwater, 1984, Test Results and Dewatering Assessment for Open Pit Mining, Beltana Mine, S.A. December 1984.

Figure 3.1 - Topographical Map for Copley

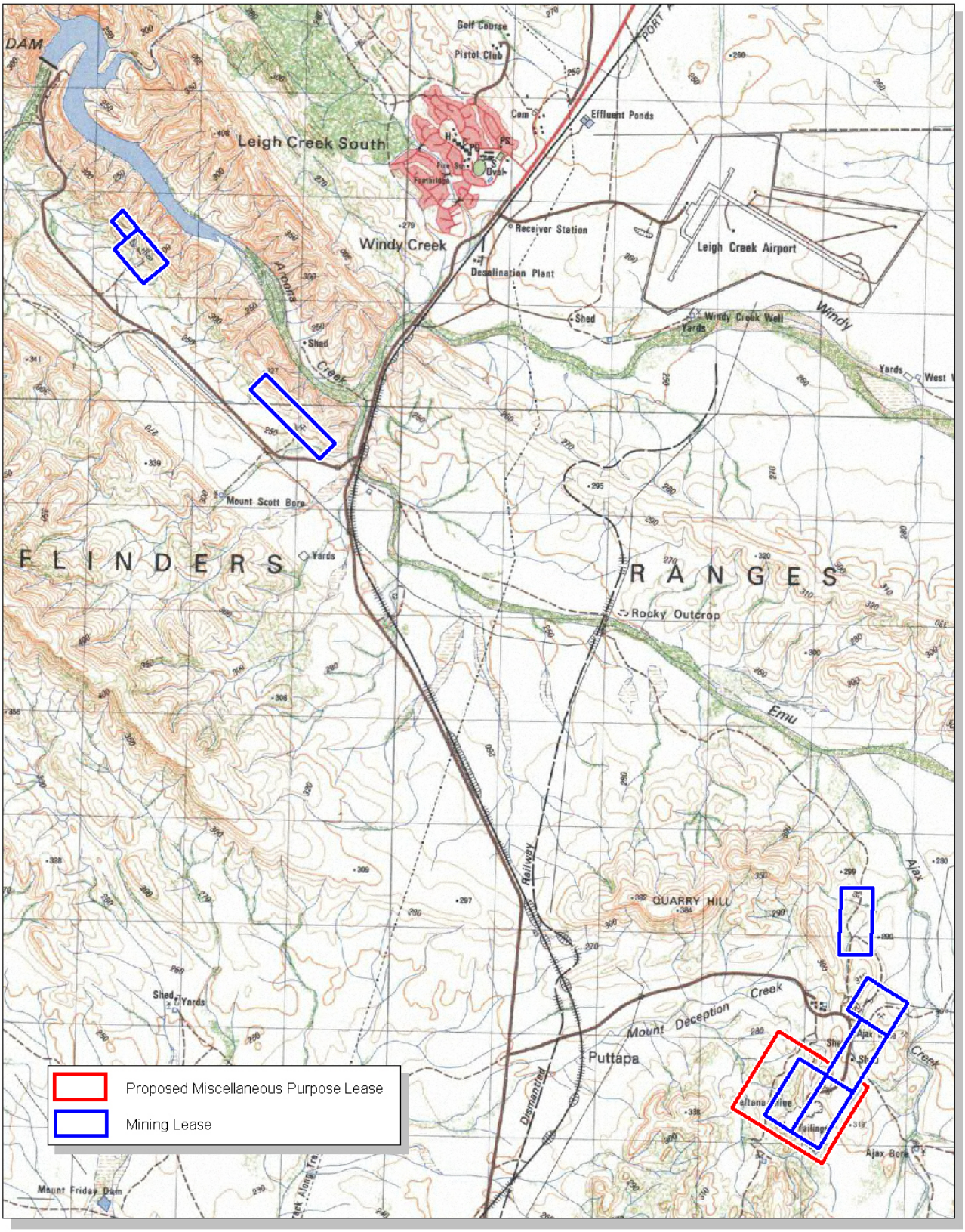
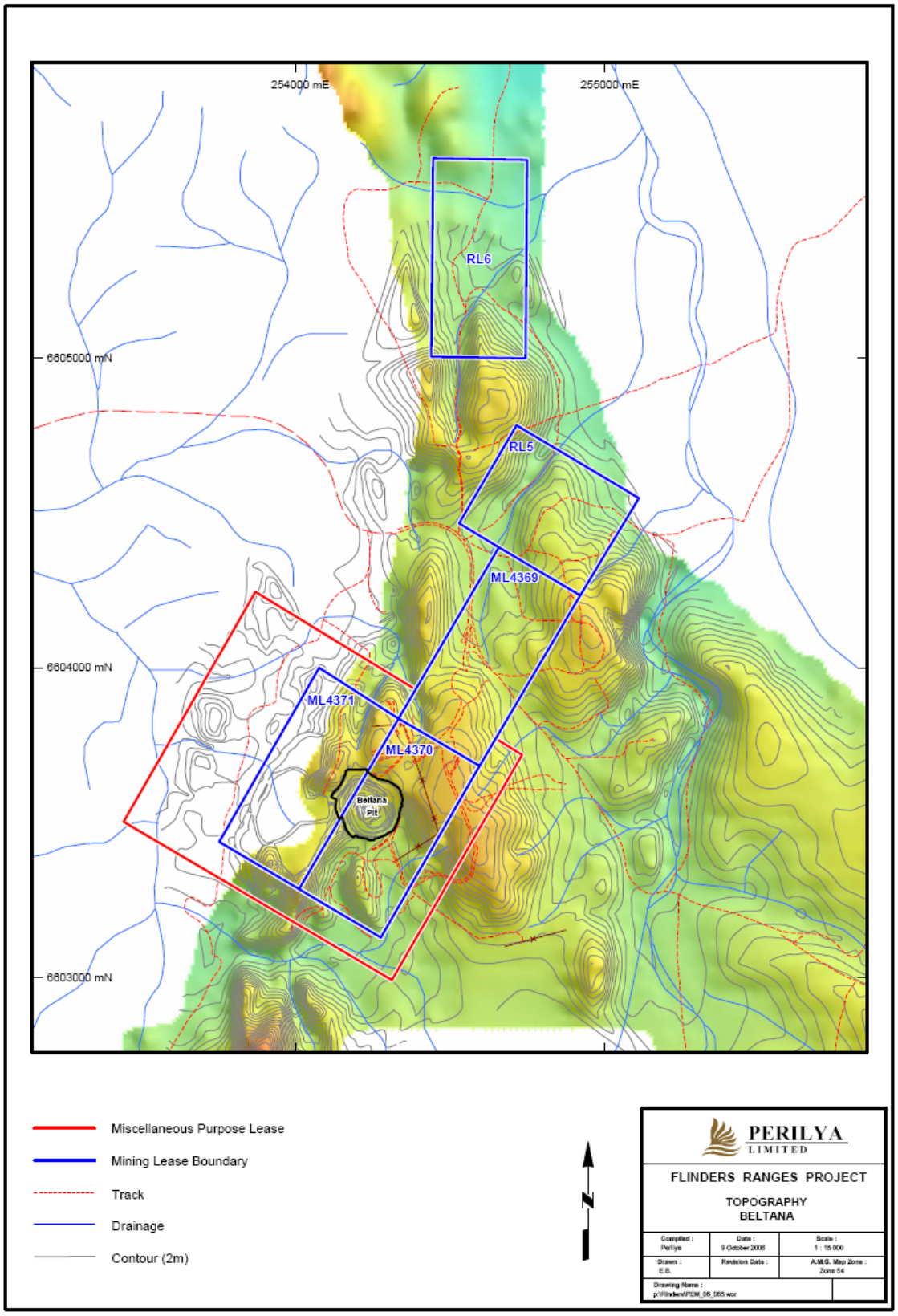


Figure 3.2 - Topographical Map of Mine Area



Appendix C includes a plan provided by PIRSA showing locations of groundwater bores in the vicinity of the Beltana Mine. Also included are printouts of available bore details for those bores as provided by PIRSA, and available historical chemical data.

3.4.1 Groundwater Data Obtained from PIRSA Records

A search of records of licensed groundwater bores maintained by PIRSA in the vicinity of the mine identified several tens of bores within an approximate 1 km radius of the mine, however no data or logs were available for any of those bores. The bore location plan provided by PIRSA is presented at Appendix C.

3.4.2 Groundwater Data from Previous Site Groundwater Investigations

A drilling program undertaken in 1984 (Rockwater, 1984) included drilling of five boreholes (W1, W2, W3, W4 and W5) intended for construction of groundwater bores, of which three struck water and were subsequently constructed (W1, W4 and W5), and reaming-out of six existing boreholes (P168, P205, P218, P252, P256 and P258) and construction of bores in those boreholes. Details of these bores and boreholes (W1, W4 and W5) are summarised in Table 3.2, modified after Rockwater (1984) to include more up to date status.

Several bores in addition to those listed in Table 3.2 were identified at the surrounds of the mine during inspection on 12 October 2004, including at least 5 outside the pit to its north, and three outside the pit to its south.

Of those to the north, one bore (indicated by an A-frame structure at the surface) has in the past been used for camp water supply, but became dry and is thought to be damaged, two other boreholes were dry and the status of the other two were not determined.

Of the three bores identified to the south, two contained water, and the other was not inspected.

Construction details for these above bores were not available from mine site records, and the bores were not in use at the time of the inspection.

Analyses (by Amdel NATA Laboratories) of samples collected by Rockwater from bores W1, W4 and W5 in November 1984 are included in the discussion of groundwater analytical results in Section 3.4.5.

Table 3.2 Details of boreholes and bores installed or Modified during Site Works in 1984

Bore	Drilled	Depth (m)	First water intersect	Casing diameter (mm)	Depth cased (m)	Slotted interval (m)	Lithology corresponding to Screened Interval or (saturated open hole)	Static water level (date)	Airlift supply (m³/d)	Casing diameter (mm)	Depth cased (m)	Slotted interval (m)	Status in1984	Pumping test rate (m3/d)	Current Status
W1	27/10/1984	83.5	48	153 ID	83.3	39.9-83.3	fractured (Ajax) dolomite	45.5	150	153 ID	83.3	39.9-83.3	Production well	1250	Exists - current camp supply well - operational
W2	8/10/1984	120	45 damp	-	3	open hole	(quartzite/siltstone/quartzite)	45.02 (7/11/84)	0	-	3	-	Observation well	-	thought by mine staff to have collapsed
W3	10/10/1984	138	78.5 damp	-	3	open hole	(quartzite/dolomite/quartzite)	40.55 (7/11/84)	0	-	3	-	Production well	-	Exists
W4	13/10/1984	101	61	157 ID	66.1	16.9-66.0 slotted : 66.0-101m open hole	fractured (Ajax) dolomite	36.2	610	157 ID	66.1	16.9-66.0	Production well	1290	thought by mine staff to have collapsed
W5	23/10/1984	100.9	43	153 ID	100.9	32.65-100.9	fractured (Ajax) dolomite	38.7	150	153 ID	100.9	32.65-100.9	Observation well	300	thought by mine staff to be lost
P168	open boreholes existing prior to 1984 were cleaned-out an cased in 1984	63.5	21.5*	50 UPVC**	63.5	9.5-63.5	logs not available	17.29 (23/10/84)	low	50 UPVC**	63.5	9.5-63.5	Observation well	-	destroyed (mined)
P205		69	67.5*	50 UPVC	45	0-45		31.17 (23/10/84)	mod. low	50 UPVC	45	0-45	Observation well	-	destroyed (mined)
P218		51	46.5*	51 UPVC	48	0-48		13.61 (23/10/84)	mod. low	51 UPVC	48	0-48	Observation well	-	destroyed (mined)
P252		73	72	52 UPVC	73.5	19.5-73.5		23.3 (23/10/84)	mod.	52 UPVC	73.5	19.5-73.5	Observation well	-	destroyed (mined)
P256		90	60	53 UPVC	65	11-65		37.68 (23/10/84)	high	53 UPVC	65	11-65	Observation well	-	buried/lost
P258		79.5	70	54 UPVC	79.5	31.5-79.5		36.51 (23/10/84)	mod.	54 UPVC	79.5	31.5-79.5	Observation well	-	destroyed (mined)

* from electrolytic zinc files

** UPVC has rivets protruding inside casing

Three pumping tests were conducted as part of the 1984 program: at bores W1, W4 and W5 respectively, and the summary results are provided in Table 3.3.

Table 3.3 Summary Data from 1985 Pumping Tests (after Rockwater 1985)

Results of Bore W1 Pumping Test

Bore	Transmissivity (m^3/d/m) Early	Transmissivity (m^3/d/m) Late			Distance from W1 (m)	Final Drawdown (m)
W1	3800	94			0	1.7
P258	-	97			109.4	1.38
W4	-	97			143.4	1.23
P252	-	111			123.4	0.81

Results of Bore W4 Pumping Test

Bore	Transmissivity (m^3/d/m) Early	Transmissivity (m^3/d/m) Late	Storativity * Early	Storativity * Late	Distance from W4 (m)	Final Drawdown (m)
P 256	244	13	1.6 x 10^-6	0.2	11.4	7.78
P258	263	79	0.7 x 10^-3	0.002	37.4	3.4
P252	36	5	13 x 10^-3	0.022	36.6	2.16
P168	-	-	-	-	102.2	0.24

Results of Bore W5 Pumping Test

Bore		Transmissivity Late Data (m^3/d/m)		Storativity * Late Data	Distance from W5 (m)	Final Drawdown (m)
W5		2		-	0	25.7
P168		38		0.01	56.4	0.82

* Storativity results indicated from pumping test results not considered to be an accurate guide to bulk storativity

The conclusions from the investigation are summarised (paraphrased) below:

- The majority of groundwater is contained in cavities and fractures in the Ajax Dolomite;
- Aquifers are non-homogenous according to structural constraints and fracture geometries, with the following implications:
  - There are strong variations in depth to groundwater, yields and the extent to which aquifers are connected according to the geometry of fractures and caverns;
  - Aquifer transmissivity is very variable, with intrinsic transmissivity (as indicated by early pump test data) being generally high (36 to 3,800 m^3/day/m), while effective transmissivity, incorporating boundary responses, was indicated to be in the range 2 to 100 m^3/day/m;
- Strong boundary effects were indicated from the pumping tests, and impermeable zones caused by folding and faulting within the generally water-bearing Ajax Dolomite were identified;
- In the area of the pit, the rock is hydraulically anisotropic, with higher transmissivity in the north-north-westerly direction due to the geological structure;

- Water levels in bores installed to the south-west of the pit showed little response to the pumping of adjacent bores, due possibly to poor connectivity of fractures, or the impact of a perched aquifer;

- Groundwater flow under natural conditions was indicated to be towards the south.

3.4.3 Pit Water and Spring Water at Mullock Dump (Pasminco 2003)

A letter from Pasminco to PIRSA (25 March 2003), and forwarded by Pasminco to Greg Hill of EPA (Manager Northern Region) describes an observed flow of water from a small seepage spring that developed in a natural creek line at the base of the mullock dump. The observation followed rainfall events totalling 50 mm over two days.

It was noted in the letter that the mullock that forms the base of the evaporation basin is "very porous, allowing the majority of water to soak in to the mullock dump, rather than evaporate". The maximum flow at the spring was 1-2 L/min following local heavy rainfall, apparent at the surface for some 50-100 m. It was determined by observations during variation in dewatering rates that infiltration through the base of the evaporation pond was having some effect on flow at the seepage spring.

Samples of pit water and the spring water were collected by Pasminco in 2003 and analysed for arsenic, cadmium, copper, lead, zinc, pH and EC (analytical laboratory not specified). The results are included in the overall summary data table (Table 3.6).

The results are generally consistent with data obtained from a 2004 (URS) sampling program (discussed below), although salinity was slightly greater; arsenic slightly lesser; and zinc slightly greater than the 2004 data. The spring water analysis results showed an arsenic concentration (0.7 mg/L) similar to that for the pit water (0.32 mg/L), and zinc (1.8 mg/L) slightly greater than mine water (1.2 mg/L). Lead was detected in the spring water sample (0.3 mg/L) while not detected in the mine water sample.

It is understood that the EPA conducted an inspection of the site in response to Pasminco informing the EPA of the observed small seepage. It is not known whether there was a response from the EPA to Pasminco following their inspection of the site. There were no records available of any response by the EPA to Pasminco.

3.4.4 Groundwater Data Obtained by URS 20 October 2004

Field Data

Field data collected by URS on 20 October 2004 from standing water in the Beltana Mine pit are summarised in Table 3.4.

Table 3.4 Field Water Quality Data (20 October 2004)

Location No. (location of pit and W1 shown in Appendix B)	Nature of Location	Depth of Bore/Depth of Excavation	Depth to water below surface (m)	Depth (m below water surface) at which reading was taken	EC (µS/cm)	pH	DO (mg/L)	Description and Samples Collected
Pit	Water at base of open cut mine	Depth of Mine understood to be approximately 65 m.	The estimated depth to the water surface at the base of the mine from unexcavated ground level was 50 m.	0.3	6,100	7.74	8.8	Standing water at base of open cut mine - the only active pumping at the time of sampling was from W1 for camp water supply. One sample (PitW-20/10/04) collected for laboratory analysis
				1.0	6,100	7.91	-	

Laboratory Analysis of Water Samples

Two water samples were collected on 20 October 2004 (Table 3.5), one from the Beltana Mine Pit, and one from groundwater bore W1 which at that time was being pumped for supply to the camp. Samples were analysed for pH, TDS, major ions and heavy metals by a NATA laboratory (ALS Melbourne).

Table 3.5 Groundwater Samples Collected by URS (20 October 2004)

Location No. (location of pit and W1 shown in Appendix B)	Sample	Nature of Location	Depth of Bore/Depth of Excavation	Depth to water below surface (m)	Description
Pit	PitW-20/10/04	Water at base of open cut mine	Depth of Mine understood to be approximately 65 m.	The estimated depth to the water surface at the base of the mine from unexcavated ground level was 50 m.	Standing water at base of open cut mine - the only active pumping at the time of sampling was from W1 for camp water supply.
W1	W1-20/10/04	Groundwater from bore W1	not measured in the field (understood to be 83.5 m)	not measured (pump was in operation). Pump understood to be set at 80 m depth (25 m below standing water level)	Downhole pump in bore was active for supply of water to camp. The sample was collected as running water from a tap at the bore head

3.4.5 Discussion of Groundwater Analytical Results

Table 3.6 presents the data in Table 3.4 collated with other historical data available from the pit and groundwater (Rockwater (1984) and Pasminco (2003)). These data are discussed below.

Table 3.6 Analytical Results for Pit water and Groundwater Samples

Location						PITW	PITW	W1	Mine Pit Water	Spring Water observed at Base of WRD (mg/L)	W1	W4	W5
Field ID						PITW_20/10/04	PITW_20/10/04CHK	W1_20/10/04	Mine Pit Water	Mine Pit Water			
Date Sampled						20/10/04	20/10/04	20/10/04	05-Feb-03	13-Mar-03	Nov-84	Nov-84	Nov-84
Sample Type						Primary Sample	Laboratory Duplicate		mg/L	mg/L			
						Data from URS Australia (October 2004)			Data collected by Pasminco following observation of water discharge (as a spring) at toe of the WRD following 50 mm of rainfall over a 2-day period. (Letter 25 March 2003 from Pasminco to PIRSA, forwarded to EPA).		Data from Rockwater (1984)		
Chemical	**LOR**	**MDL**	**Units**	**EPP Water Quality 2003 - Agriculture/ aquaculture - irrigation**	**EPP Water Quality 2003 - Agriculture/ aquaculture - livestock**								
GENERAL													
Actual (Anion / Cation) Difference	0.01		ME/L			4.78	NA	3.76					
Allowed (Anion / Cation) Difference	0.01		ME/L			1.39	NA	1.32					
pH	0.01			4.5-9		8.16	8.19	7.22	7.52	7.86	7.4	7.4	7.4
Sulphate	1		MG/L		1000	909	NA	856			235	390	130
EC	-		µS/cm						7470	4300	3450	5000	2300
TDS	1		MG/L			4900	5000	4660	*5602*	*3225*	*2415*	*3500*	*1610*
Total hardness (as CaCO3)	-										732	964	462
Total alkalinity (as CaCO3)	-										277	314	299
Total Anions	0.01		ME/L			82.8	NA	78.5					
Total Cations	0.01		ME/L			78	NA	74.7					
MAJOR IONS													
Calcium	1		MG/L			269	NA	273			140	180	81
Carbonate as CaCO3	1		MG/L			<1	<1	<1					
Chloride	1		MG/L			2100	2140	1900			832	1150	438
NO3 as N	-				30						27	27	58
MAJOR-IONS													
Bicarbonate as CaCO3	1		MG/L			230	229	352			338	38	364
METALS													
Arsenic	0.001		MG/L	0.1	0.5	**0.589**	**0.621**	**0.246**	**0.32**	**0.7**			
Barium	0.001		MG/L			0.051	0.048	0.05					
Beryllium	0.001		MG/L	0.1	0.1	<0.001	<0.001	<0.001					
Cadmium	0.0001		MG/L	0.01	0.01	0.0001	0.0002	<0.0001	<0.01	<0.01			
Chromium	0.001		MG/L	1	1	<0.001	<0.001	<0.001					
Cobalt	0.001		MG/L	0.05	1	<0.001	<0.001	<0.001					
Copper	0.001		MG/L	0.2	0.5	0.002	0.002	0.003	<0.01	<0.01			
Lead	0.001		MG/L	0.2	0.1	<0.001	<0.001	<0.001	0.005	**0.3**			
Magnesium	1		MG/L			217	NA	185			93	125	63
Manganese	0.001		MG/L	2		0.004	0.005	<0.001					
Mercury	0.0001		MG/L	0.002	0.002	<0.0001	<0.0001	<0.0001					
Nickel	0.001		MG/L	0.2	1	<0.001	<0.001	<0.001					
Potassium	1		MG/L			11	NA	10			3.5	4.5	3
Sodium	1		MG/L			1070	NA	1050			430	610	275
Vanadium	0.01		MG/L	0.1	0.1	0.06	0.06	0.07					
Zinc	0.005		MG/L	2	20	0.171	0.189	0.197	1.2	1.8			

LEGEND

italics **indicates TDS as mg/L estimated from EC data**

Greater than EPP Water Quality 2003 - Agriculture/aquaculture - irrigation

Greater than EPP Water Quality 2003 - Agriculture/aquaculture - livestock

NA - Not Analysed

Adopted Assessment Levels

Results from the analyses of the water samples were considered with respect to criteria in the Environment Protection (Water Quality) Policy (2003) (EPP). The EPP prescribes water quality criteria for a range of potential pollutants in South Australian waters, including underground water, based on nominated protected environmental values.

The average salinity of the groundwater beneath the site makes it generally unsuitable for potable use without treatment, or for irrigation, and is of limited use for stock watering.

The site groundwater quality has been considered against the criteria for irrigation and stock watering, and the corresponding EPP criteria are included in Table 3.6.

It is noted that groundwater was treated on-site by reverse osmosis to reduce salinity to within the potable range for use at the camp.

Analytical Results

Analytical results are shown in Table 3.6. The NATA result sheets from October 2004 are included as Appendix D.

The 2004 laboratory groundwater TDS results were in the range 4,660 to 4,990 mg/L (W1), generally confirming the field EC data from groundwater in the pit. The major ion concentrations indicate groundwater to be of a sodium-chloride-sulphate type. Groundwater hardness is high (as indicated by 1984 data) corresponding to Ca-Mg bicarbonate contents. TDS concentrations for November 1985 (2,415 mg/L at W1 based on EC data) were generally significantly less than for 2004, and laboratory data for major ions reflect the variation.

Other significant results from the 2004, 2003 and 1984 water analysis data, included in Table 3.6, are summarised as follows:

- 2004 concentrations of arsenic (average result of 0.6 mg/L in the pit water and 0.246 mg/L in groundwater from bore number W1) were above the EPP criteria specified for stock watering and irrigation of 0.5 mg/L and 0.1 mg/L respectively.
- One of the three 1984 nitrate as nitrogen concentrations in groundwater was above the EPP stock-water guideline level.
- The 2003 data for the pit water showed an arsenic level (0.32 mg/L) above the EPP irrigation guideline. The sample of water discharging from the mullock dump after heavy rain (data provided by Zinifex (formerly Pasminco) showed arsenic (0.7 mg/L) and a lead concentration (0.3 mg/L), which is above the livestock and irrigation guideline values.

The data identify some elevation of groundwater arsenic concentrations (above the irrigation guidelines, and in two instances marginally above the livestock guidelines), although zinc concentrations were within the guidelines. The lead concentration reported by Pasminco (March 2003) in a discharge from the mullock heap (after significant rain) was also above the irrigation and livestock guidelines. These concentrations reflect the nature of mineralisation at the area of the Beltana Mine.

3.4.6 Geochemistry and Water Quality

To test the potential for contamination of surface runoff, samples of ore and soil were taken from a number of locations, including drainage lines, for analysis. The descriptions of the sample sites are given in Table 3.7 and the locations are shown in Figure 3.3.

The following analytical work was undertaken:

- Mineralogy of two ore samples (crushed willemite and manganiferous ore) and three efflorescence samples (Table 3.8);
- Ore composition of the two ore samples (Table 3.9); and
- Water soluble contents of the two ore samples, the three efflorescence samples and in addition eight soil samples from a range of locations around the site (Table 3.10).

Information on the analytical techniques is provided in Appendix E.

Table 3.7 Sample Site Description

Sample No.	Description
01	Crushed Willemite Ore
02	Manganiferous ore
03	Salts from evaporation pond
04	Sediment in drainage line from WRD – proximal
05	Sediment in drainage line from WRD – distal
06	Salts from stream bank SW of WRD
07	Sediment in drainage line from evaporative pond – proximal
08	Sediment in drainage line from evaporative pond – distal
09	Sediment in drainage line from stockpile - proximal
10	Sediment in drainage line from stockpile - distal
11	Sediment in drainage line N from stockpile
12	Copley ore – grade material
13	Salt from outcrop N of stockpile

Figure 3.3 Ore and Soil Sample Location Plan

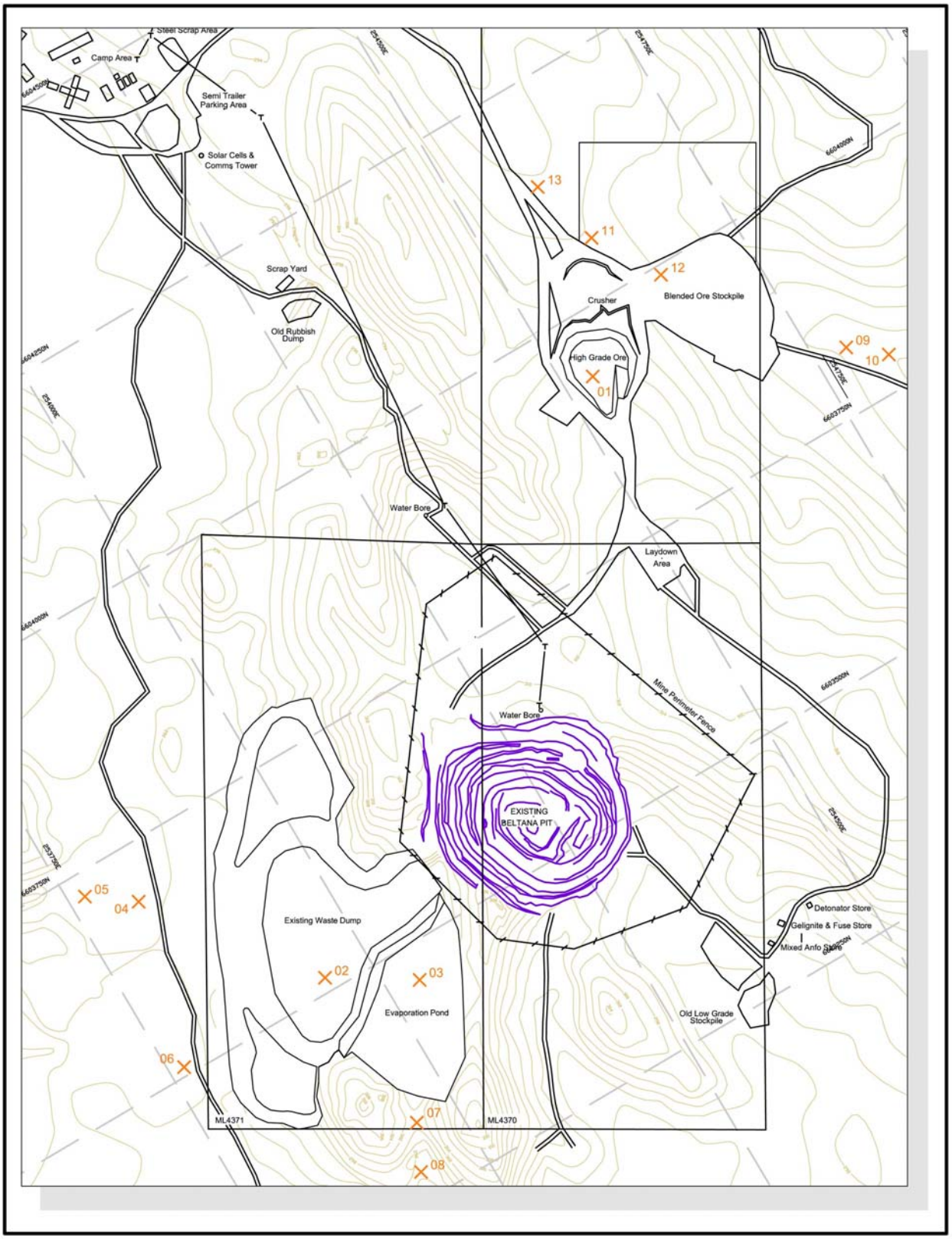


Table 3.8 Mineralogy of Ore and Efflorescence Samples (URS October 2004)

Mineral	Sample No. (from Table 3.7)				
	01	02	03	06	13
Quartz	Tr		CD	CD	CD
Willemite	D				A
K-feldspar	Tr		Tr	SD	Tr-A
Chlorite	Tr-A			A	Tr
Kaolinite			Tr		
Mica	Tr	Tr			Tr
Muscovite			A		
Unidentified clay				CD	
Dolomite	Tr-A	Tr-A	CD	?Tr	CD
Calcite	A		Tr		Tr-A
Hematite	Tr-A	Tr-A		Tr	Tr-A
Coronadite	A	D			
Halite			Tr	Tr-A	Tr
Gypsum				Tr	

Semiquantitative Abbreviations

D = Dominant. Used for the component apparently most abundant, regardless of its probable percentage level.

CD = Co-dominant. Used for two (or more) predominating components, both or all of which are judged to be present, in roughly equal amounts.

SD = Sub-dominant. The next most abundant component(s) providing its percentage level is judged above about 20.

A = Accessory. Components judged to be present between the levels of roughly 5 and 20%.

Tr = Trace. Components judged to be below about 5%.

Table 3.9 Ore Composition (URS October 2004)

Element	Unit	Sample No.	
		01	02
Al_2O_3	%	3.51	3.94
CaO	%	5.8	3.34
Fe_2O_3	%	8.87	11.4
K_2O	%	0.56	0.99
MgO	%	2.22	2.11
MnO	%	4.44	36.8
Na_2O	%	0.03	0.04
P_2O_5	%	0.3	0.09

Element	Unit	Sample No.	
		01	02
SiO_2	%	20.4	5.1
TiO_2	%	0.175	0.195
LOI	%	8.39	11.1
As	ppm	9200	1.06%
Bi	ppm	<50	<50
Cd	ppm	<10	<10
Pb	%	3.98	20.6
Zn	%	33.4	1.37
S	%	0.01	<0.01

Table 3.10 Water Soluble Geochemistry of Ore and Soil Samples (URS October 2004)

Element		Fe	Mn	S	Zn	Pb	As	Cd	Bi
Units		mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l
Detection Limit		0.03	0.1	0.1	0.02	0.05	0.03	0.02	0.05
	01	0.24	<0.10	0.7	0.21	<0.05	0.47	<0.02	<0.05
	02	1.56	<0.10	2.6	0.94	<0.05	6.8	<0.02	<0.05
	03	<0.03	0.3	550	0.24	<0.05	0.12	<0.02	<0.05
	04	0.03	<0.10	34.7	<0.02	<0.05	0.61	<0.02	<0.05
	05	<0.03	<0.10	150	<0.02	<0.05	0.48	<0.02	<0.05
	06	<0.03	<0.10	1620	<0.02	<0.05	<0.03	<0.02	<0.05
	07	0.42	<0.10	1.7	0.03	<0.05	0.06	<0.02	<0.05
	08	0.03	0.9	5.1	<0.02	<0.05	0.07	<0.02	<0.05
	09	<0.03	<0.10	26.6	<0.02	<0.05	0.24	<0.02	<0.05
	10	<0.03	<0.10	11	<0.02	<0.05	0.42	<0.02	<0.05
	11	0.52	<0.10	31.7	0.32	<0.05	1.25	<0.02	<0.05
	12	<0.03	0.1	230	4.9	<0.05	<0.03	0.05	<0.05
	13	<0.03	<0.10	840	0.16	<0.05	0.22	<0.02	<0.05

Because of the mineralogy and geochemistry of the ore and waste rock, contamination with Zn, Pb, Mn, As, and S is possible. Efflorescence in Samples 03, 06 and 13, which is indicative of potential contamination, was identified as traces of halite with accessory gypsum in Sample 06.

The sample from the evaporation pond (03) had elevated levels of readily soluble Mn, S, Zn and As. Samples from other working areas [01 (pre-crushed ore stockpile area), 02 (waste rock dump) and 12 (ore stockpile area)] also showed some elevation of metals levels.

Most of the drainage line sediment samples showed low soluble Zn, indicating little mobilisation of metals off the mine site. One of the soil sediment samples of stockpile drainage (11) showed some elevation of soluble Zn, indicating some movement off the ore stockpile area, however a little further down the drainage line (13) soluble Zn levels were again low. These results indicate there has been little mobilisation of metals off the general mine area.

Copley recovered ore grade material (12) together with ore (01 and 02) had elevated soluble Zn levels. The majority of samples showed some elevation of levels of water soluble As. There will thus be potential for contamination of both surface and groundwater unless precautions are taken.

Owing to the absence of sulfides in the ore and waste rocks, the potential for acid mine drainage (AMD) is considered to be low.

3.4.7 Potable Water

The current potable water supply is drawn from bore W1, with treatment by reverse osmosis. It is proposed to locate an alternative groundwater supply of potable water, likely to be within the areas of the mining leases, as part of the mine redevelopment.

3.4.8 Dewatering

Dewatering has been undertaken previously via a network of dewatering bores and /or via pumping from a sump at the base of the pit. In the 1980's the discharge was to Mount Deception Creek. However, in 1996, after consultation with the EPA, the dewatering process was revised for discharge to a 1.665 ha evaporation pond.

The base of the existing evaporation pond is understood to generally porous, although it is expected that the permeability of the base of the pond will have decreased somewhat since construction by deposition of fines deposited from the mine water pumped to date.

As part of the amended operations in this updated MARP, it is proposed that the dewatering operations will be upgraded, including increasing the size of the evaporation pond, and installing a liner. This is described in Section 4. The proposed groundwater management and monitoring program is described in Section 6.

3.4.9 Groundwater Investigation 2006

Rockwater conducted an additional groundwater investigation in 2006, as part of the assessment of dewatering requirements. Five investigation holes near the pit were sampled and analysed for water quality and test pumped. Groundwater modelling was then conducted and water balance conducted to assist in sizing the evaporation basin. All holes were located in fractured rock to depths of between 159 and 214 metres. Standing water levels were recorded as 42 to 55 metres below ground, whilst yields ranged from zero (i.e. dry) to over 1,300m^3/d. Transmivities obtained from test pumping ranged from over 5,000m^2/d at early time to less than 10m^2/d at late time. The results of sampling indicates

that salinity ranges from 2,900mg/l to 4,700mg/l and that pH is alkaline. Elevated metals concentrations were also detected in some samples. The Rockwater report is presented as Appendix F.

3.5 Top Soil

The typical soils of the area are lithosols and solodic soils. The lithosols are vestigial hematitic and dolomitic sands with a high proportion of rock fragments (Plate 3.1), and occur in areas of greater relief. Down-slope, in areas of gentler topographic relief, the lithosols grade into solodic soils. In drainage channels there is evidence of fine material washed from the stockpiles and the waste rock dump (WRD) (Plate 3.2). Some soils have a fine white efflorescence (Plate 3.3).

There has been no previous stockpiling of any topsoil from areas prepared for the WRD, ore stockpiles, evaporation dam and other areas of infrastructure. However weathered dolomitic wall rock will provide a potential source of cover for rehabilitation purposes.

Plate 3.1 Lithosol Exposed In Drainage Channel South Of Evaporation Pond

Plate 3.2 Fine-Grained Material Washed From Stockpile Area

Plate 3.3 White Efflorescence in Drainage Channel South of WRD

3.6 Flora

3.6.1 Regional Flora

The Beltana Mine lies in the North West Flinders Ranges, which supports a highly diverse range of plant and animal communities. The area is characterised by a number of different landforms including, rocky hills, outcrops and ranges; clay pans and hill slopes; wetlands, creeks and lakes; and sandy desert.

A field Biological Survey of the North West Flinders Ranges (Brandle 1998) was undertaken in 1997 and encompassed an area approximately 30 km around the township of Leigh Creek South, including the area surrounding the Beltana Mine. The aim of the survey was to characterise the ecological communities of this region by surveying the terrestrial invertebrate and vertebrate fauna, plant communities, and habitats of the area. Consequently, the ecological biodiversity of the area has been well described and correlated with various land forms. An excerpt from the survey, describing the dominant vegetation communities is included below:

> *On a broad level the high ranges support shrublands and Spinifex* Triodia irritans *hummock grasslands on the ridges which grade into woodlands (Native Pine* Callitris glaucophylla*, Blackoak* Casuarina pauper*), descending the slopes. The valleys of the central ranges support a mixture of woodland (Native Pine, Blackoak), mallee (Beaked Red-mallee* Eucalyptus gillii *[(NB this should state* Eucalyptus socialis*], low shrubland (Bladder Saltbush* Atriplex vesicaria*, twin-leaf* Zygophyllum *spp.), and grassland (Spear-grass* Stipa *spp., bottle-washers* Enneapogon *spp.)/herbland communities.*
>
> *Towards the edges of the ranges the rolling foothills mostly support chenopod shrublands sometimes with Blackoak woodland or Acacia spp. over* Eremophila *spp. tall shrublands on the slopes. Outliers of the central ranges sometimes support Spinifex hummock grassland on the ridge crests, but shrublands, dominated by Rock Emubush* Eremophila freelingii*/Brilliant Hopbush* Dodonaea microzyga *with Silver Mulla Mulla* Ptilotus obovatus *low shrubs and emergent* Senna *spp. and* Acacia *spp. are more typical. Mulga* Acacia aneura *is often an overstorey component of these assemblages.*
>
> *The footslopes and pediments of these last vestiges of the central ranges usually support chenopod low shrublands dominated by both Bladder Saltbush and Low Bluebush* Maireana astrotricha*. On the outwash plains chenopod shrubland (Bindyi* Sclerolaena *spp., Copperburr* Maireana *spp., saltbush* Atriplex *spp.) and grassland (bottle-washers, Mitchell-grass* Astrebla *spp., wallaby-grass* Danthonia *spp.) dominate. Where these plains act as floodout areas from drainage lines a sparse overstorey of Elegant Wattle* Acacia victoriae *over Blackbush* Maireana pyramidata *low shrublands is usual.*
>
> *Major drainage lines throughout the area are dominated by River Red Gums* Eucalyptus camaldulensis *woodland. Where there is insufficient moisture to maintain the gums, Inland Paper-bark* Melaleuca glomerata *or Elegant Wattle form the overstorey. Where the overstorey peters out Blackbush or Old Man Saltbush* Atriplex nummularia *ssp.* nummularia *shrubland dominate.*

*Small saline patches are usually dominated by samphire (*Halosarcia *spp.,* Sclerostegia *spp.) low shrublands. Sandy soil areas around drainage lines often support a shrubland of Nitre-bush* Nitraria billardierei. *In the west of the study area the stony pediments disappear under a dunefield dominated by a sparse overstorey of Umbrella Bush* Acacia ligulata *with a Sandhill Canegrass* Zygochloa paradoxa *understorey in the less degraded areas.*

3.6.2 On-Site Vegetation

Vegetation data relating to the Beltana Mine ML area and associated MPL has been sourced from:

- The Department for Water, Land and Biodiversity Conservation;
- Planning SA (Biodiversity Atlas SA);
- The *Biological Survey of the North West Flinders Ranges, South Australia;* and
- A site inspection undertaken by URS staff in October 2004.
- A site inspection of MLs 4369, 4370 and 4371 and the adjacent MPL area, and the nearby Moolooloo RL, undertaken by Dr Frank Badman of Badman Environmental on 9-10 October 2006.

The vegetation surrounding the Beltana Mine is characterised by two major associations:

- *Maireana pyramidata, Atriplex vesicaria* low Shrubland with emergent trees and tall shrubs; and
- *Atriplex vesicaria, Maireana astrotricha* low Shrubland with emergent Blackoak and Mallee.

Overstorey (or emergent) species included Elegant Wattle (*Acacia victoriae*), Blackoak (*Casuarina pauper*), Beaked Red-mallee (*Eucalyptus socialis*), False Sandalwood (*Myoporum platycarpum*) and Native Apricot (*Pittosporum angustifolium*).

The understorey species surrounding the mine were dominated by chenopods, namely Bladder Saltbush (*Atriplex vesicaria*), Black Bluebush (*Maireana pyramidata*), and Low Bluebush (*Maireana astrotricha*). Other understorey species included twinleaf (Zygophyllum sp.) Spiny Saltbush (*Rhagodia spinescens*) Ruby Saltbush (*Enchylaena tomentosa*) and Bindyi (*Sclerolaena* spp.).

Table 3.11 lists the species observed during the 2006 field visit and those identified in the immediate area during previous URS and DEH biological surveys of the area. Plates 3.4 to 3.6 show typical views of the plant communities surrounding the mine.

Table 3.11 Plant species identified adjacent Beltana Mine

(* denotes introduced species)

Species	Common Name	URS and DEH Surveys	Badman Environmental Survey	Mooloolo o Area
Abutilon fraseri ssp. *diplotrichum*	Dwarf Lantern-bush	✓		
Acacia aneura	Mulga	✓	✓	
Acacia tetragonophylla	Dead Finish	✓	✓	✓
Acacia victoriae	Elegant Wattle	✓		
Alectryon oleifolius ssp. *canescens*	Bullock Bush	✓	✓	✓
Atriplex angulata	Fan Saltbush	✓		
Atriplex vesicaria	Bladder Saltbush	✓	✓	✓
Brachycome ciliaris	Woolly Variable Daisy	✓		
**Carrichtera annua*	Ward's Weed	✓	✓	✓
Casuarina pauper	Black Oak	✓	✓	✓
**Centaurea melitensis*	Malta Thistle		✓	
Chamaesyce drummondii	Caustic Weed	✓	✓	✓
Cymbopogon ambiguus	Lemon-grass	✓	✓	
Dissocarpus paradoxus	Ball Bindyi	✓		
Dodonaea microzyga	Brilliant Hop-bush	✓		
Enchylaena tomentose	Ruby Saltbush	✓	✓	
Eremophila alternifolia	Narrow-leaf Emubush		✓	✓
Eremophila duttonii	Harlequin Emubush		✓	
Eremophila freelingii	Rock Emubush		✓	✓
Eremophila oppositifolia ssp. *oppositifolia*	Opposite-leaved Emubush		✓	
Eremophila spp.	Emubush	✓		
Eucalyptus camaldulensis	River Red Gum	✓		
Eucalyptus socialis	Beaked Red-mallee		✓	
Exocarpos aphyllus	Leafless Cherry	✓	✓	✓
Frankenia serpyllifolia	Thyme Sea-heath			
Gnephosis arachnoidea	Spidery Button-flower	✓		
Gramineae sp.	Grass Family	✓		
Lawrencia squamata	Thorny Lawrencia		✓	
Maireana astrotricha	Low Bluebush	✓	✓	✓
Maireana pyramidata	Black Bluebush	✓	✓	✓
Maireana erioclada	Rosy Bluebush		✓	
Maireana sedifolia	Bluebush/Pearl Bluebush		✓	✓
Maireana sp.	Bluebush/Fissure-plant	✓		
Minuria cunninghamii	Bush Minuria	✓	✓	
Myoporum platycarpum	False Sandalwood	✓	✓	✓
Osteocarpum acropterum var. acropterum	Tuberculate Bonefruit	✓		
Pimelea microcephala ssp. *microcephala*	Shrubby Riceflower	✓		
Pimelea simplex	Desert Riceflower		✓	✓
Pittosporum angustifolium	Native Apricot	✓	✓	
Plantago drummondii	Dark Plantain	✓		
Prostanthera striatiflora	Striated Mintbush		✓	
Ptilotus obovatus	Silver Mulla Mulla	✓	✓	✓
Rhagodia spinescens	Spiny Saltbush	✓	✓	
Salsola kali	Buckbush	✓		
Sclerolaena brachyptera	Short-wing Bindyi	✓		

Species	Common Name	URS and DEH Surveys	Badman Environmental Survey	Mooloolo o Area
Sclerolaena divaricata	Tangled Bindyi	✓		
Sclerolaena longicuspis	Long-spine Bindyi		✓	✓
Sclerolaena obliquicuspis	Oblique-spined Bindyi	✓	✓	✓
Sclerolaena parallelicuspis	Western Bindyi	✓		
Sclerolaena sp.	Bindyi	✓		
Sclerolaena ventricose	Salt Bindyi	✓	✓	✓
Senecio magnificus	Showy Groundsel	✓	✓	
Sida petrophila	Rock Sida		✓	
Sida sp.	Sida		✓	✓
Sida trichopoda	High Sida	✓		
Solanum ellipticum	Velvet Potato-bush	✓	✓	✓
Solanum sturtianum	Sturt's Nightshade	✓		
Teucrium racemosum	Grey Germander	✓		
Wurmbea sp.	Nancy	✓		
Zygophyllum prismatothecum	Square-fruit Twinleaf		✓	
Zygophyllum sp.	Twinleaf	✓		

Plate 3.4 Patch of mallee (*Eucalyptus socialis*) south of the exploration camp

Plate 3.5 Blackoak low Woodland with Chenopod Shrubland understorey

Plate 3.6 Blackoak low Woodland with Chenopod Shrubland understorey

3.6.3 Crushed Ore Stockpile Area

As noted in Section 1.5, it is understood that Zinifex has submitted a proposal to PIRSA for relocation of its stockpile, within ML4369, across the access road and to the north of the existing location. As also noted in Section 1.5, this relocation is covered in this document for completeness and information only. Freehold also proposes to locate its crushed ore stockpile to this area. The stockpile locations are shown in Figure 4.2.

The vegetation in the area of the proposed relocation was surveyed on 9 October 2006. The vegetation of this area was found to be typical of surrounding vegetation described above and to be dominated by a low shrubland of *Maireana astrotricha* and *Atriplex vesicaria*. *Casuarina pauper* occurs on the western side of this area, but will not be affected by placement of the new stockpile.

No threatened species were found at this site. The introduced *Carrichtera annua* was recorded growing alongside the road that passes between the existing stockpile and the proposed new stockpile area.

3.6.4 The Mooloolloo Prospect

The Mooloolloo prospect area (RL 6), situated about a kilometre to the north of the Beltana Mine leases, was also surveyed by Badman Environmental (refer Figures 2.3 to 2.5). Vegetation was found to be very similar to vegetation at the Beltana Mine. The species recorded in this area are also shown in Table 3.11. As noted in Section 1.4, the mining of Mooloolloo will be the subject of a separate MARP application, plus other required approvals.

3.6.5 Threatened Species

No threatened plant species were discovered during any of the surveys.

Three species of interest were identified for the area including the Beltana Mine. These species are:

- *Codonocarpus pyramidalis* F. Muell. (Slender Bell-fruit)
- *Maireana melanocarpa* Paul G.Wilson (Black-fruit Bluebush) and
- *Swainsona murrayana* Wawra (Slender Darling-pea).

All three are listed as Vulnerable under the EPBC Act (www.deh.gov.au\epbc\index.html), and the first is listed as Endangered, and the others as Rare, under SA legislation. The status of each species in this area is discussed further in the Native Vegetation Management Plan in Appendix G.

During the 2006 survey, a special watch was kept for *Maireana melanocarpa* (Black-fruit Bluebush), which is known from the general area. The closest known records to the Beltana Mine area are from Puttapa, Beltana and Copley (AVH 2006), but it was not seen near the Beltana Mine site or at the Mooloolloo prospect.

3.6.6 Introduced Species

The incidence of introduced species at both the Beltana Mine site and the Mooloolloo prospect is very low. Only two species, *Carrichtera annua* and *Centaurea melitensis* have been recorded at the two sites and neither was particularly common.

3.7 Fauna

As with the vegetation communities, the fauna of the North West Flinders Ranges is particularly diverse. During the Biological Survey of this region (Brandle 1998), twenty-two mammal species (thirteen of which are native), fifty reptiles, and at least 159 species of bird, were identified as being present in the region.

A full listing of fauna identified is not given here, but can be found in Brandle (1998). A list of species identified by the Department of Environment and Heritage, from a survey site within 2 km of the mine is presented in Table 3.12.

Table 3.12 Animal species identified within 2 km of Beltana Mine

Species	Common Name
Lerista punctatovittata	Spotted Slider
Macropus robustus	Euro
Macropus rufus	Red Kangaroo
Pogona vitticeps	Central Bearded Dragon
Pseudonaja nuchalis	Western Brown Snake
Acanthagenys rufogularis	Spiny-cheeked Honeyeater
Acanthiza uropygialis	Chestnut-rumped Thornbill
Aphelocephala leucopsis	Southern Whiteface
Artamus cinereus	Black-faced Woodswallow
Cacatua roseicapilla	Galah
Cacatua sanguinea	Little Corella
Corvus sp.	
Egernia stokesii	Gidgee Skink
Gehyra purpurascens	Purple Dtella
Gymnorhina tibicen	Australian Magpie
Lichenostomus virescens	Singing Honeyeater
Malurus lamberti	Variegated Fairy-wren
Malurus leucopterus	White-winged Fairy-wren
Mus musculus	House Mouse
Petroica goodenovii	Red-capped Robin
Podargus strigoides	Tawny Frogmouth
Pyrrholaemus brunneus	Redthroat
Sminthopsis macroura	Stripe-faced Dunnart
Tiliqua rugosa	Sleepy Lizard

Source: Department of Environment and Heritage.

Of the species identified in the region, three bird species and one mammal (Yellow-footed Rock-wallaby) have a national conservation status. The Yellow-footed Rock-wallaby has been re-introduced to the area surrounding the Aroona Dam and is the subject of a monitoring program by the Adelaide Zoo.

A fauna survey of the Beltana Mine area was undertaken for Freehold by EB Services in late November 2006.

A total of four sites representing the dominnat habitat typew within the project area were surveyed for fauna species following the standard biological survey methodology developed by the Department for Environment and Heritage (Owens 2000). The dominant habitat type within the project area was a Maireana astroticha (Low Bluebush) and Atriplex vesicaria (Bladder Saltbush) Low Shrubland with emergent Casuarina pauper (Black Oak).

The major findings of the survey were:

Mammals – A total of 78 observations of 13 mammal species were made, of which only four are considered to be introduced. An additional five bat species could be present but this could not be confirmed from their recorded calls.

Reptiles – A total of 40 observations of reptile species were made, all of which were native species. No amphibian species were observed however little suitable habitat was observed within the project area for amphibian species.

Birds – A total of 160 observations of 27 bird species were made, with only one of these an introduced species.

No species of national conservation significance were observed during the survey. However, one species of state conservation significance, Pyrrholaemus brunneus (Redthroat) was recorded within the project area. Three individuals of this rare bird species were recorded during the field survey. An additional five species of national significance and 14 species of state significance have been recorded previously in close proximity t the project site. A lack of suitable habitat within the project area for the majority of these species indicates that they are unlikely to occur within the project area. However, several species could possibly occur within the project site.

The EB Services report is presented as Appendix G.

3.8 Implications Under the EPBC Act

A search was undertaken using Environment Australia's Online Database for flora and fauna implications under the *Environment Protection and Biodiversity Conservation Act, 1999* (EPBC Act). The following species and/or their habitat are listed as potentially occurring in the vicinity of the project area (Table 3.13).

Table 3.13 EPBC Online Database Species

	Scientific Name	Common Name	Conservation Status
Birds	*Acanthiza iredalei iredalei*	Slender-billed Thornbill (western)	Vulnerable
	Amytornis texilis modestus	Thick-billed Grasswren	Vulnerable
	Rostratula australis	Australian Painted Snipe	Vulnerable
Mammals	*Petrogale xanthopus xanthopus*	Yellow-footed Rock-wallaby	Vulnerable
Plants	*Codonocarpus pyramidalis*	Slender Bell-fruit	Vulnerable
	Swainsona murrayana	Slender Darling Pea	Vulnerable

Discussion on the status of each of these species in this area is discussed further in the Native Vegetation Management Plan (Appendix H).

3.9 Aboriginal Heritage

There are no known sites of Aboriginal heritage significance at the mine site. Surveys undertaken in the area include:

- Report of an Inspection for Perilya Limited of Mineral Tenements in the Beltana and Aroona Mine Area, North Flinders Ranges, South Australia; prepared in association with Researchers Nominated by Adnyamathanha Title Applicant Group SG 6001/98; May 2001;
- Area Inspection Survey; Parachilna – Leigh Creek Area, South Australia; Undertaken by the Kuyani Association; 30th April to 2nd May 2001; and
- Work Area Clearance; Archaeologist's Report for Barngarla Aboriginal Consultative Council; June 2001.

Should any evidence of Aboriginal artefacts or heritage be identified on site, the relevant authorities will be notified in accordance with the *Aboriginal and Heritage Act 1988*.

4.0 DESCRIPTION OF PROPOSED MINING OPERATIONS

4.1 Mode of Operation

4.1.1 Previous Mining Operations

Beltana Mine has a history of being mined in short campaigns. Mine infrastructure, presently under care and maintenance, is located within leases ML4369, ML4370 and ML4371, and comprises:

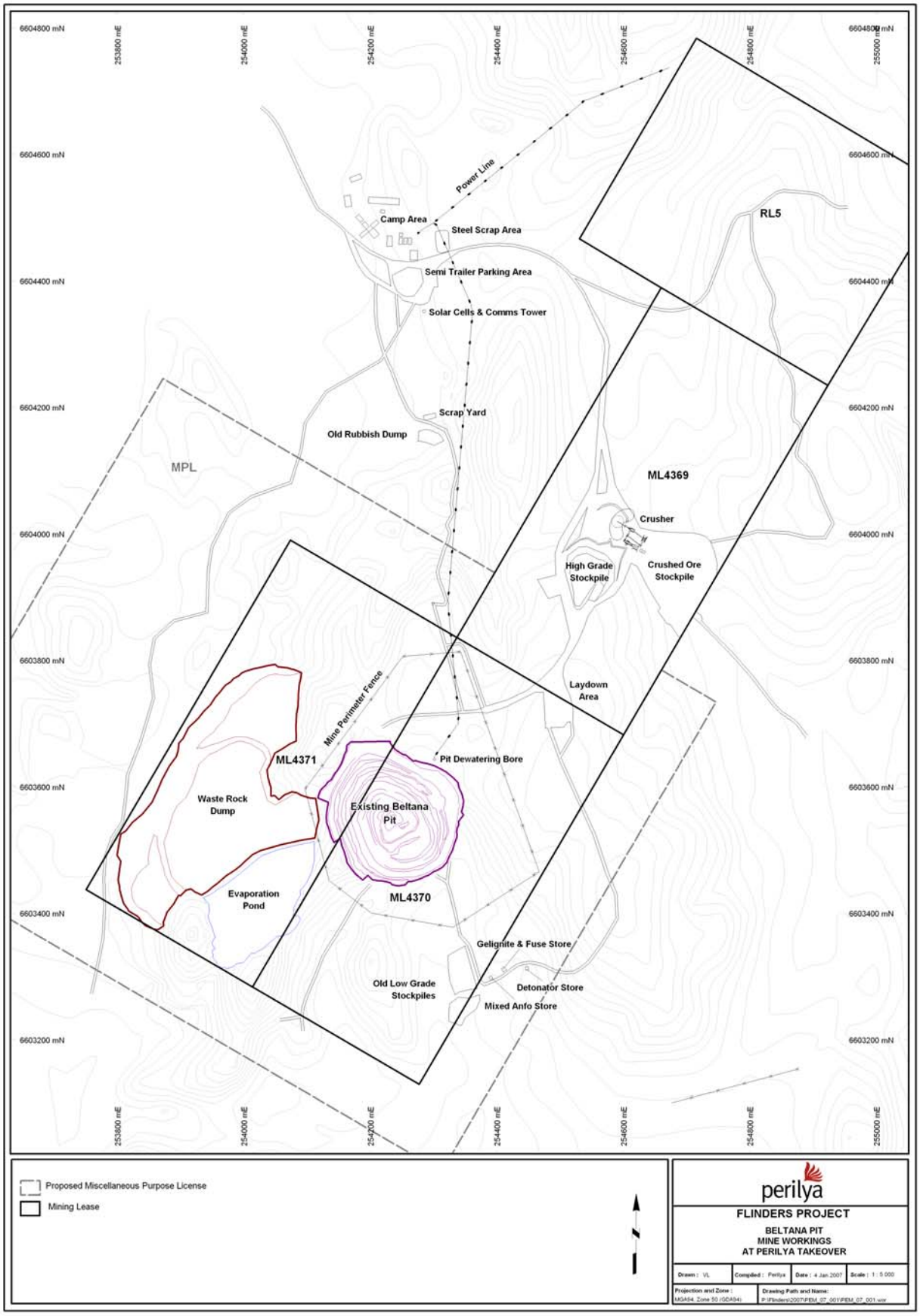
- An open pit mine, approximately 60 m deep, currently inactive
- An active Waste Rock Dump (WRD)
- An inactive Crushed Ore stockpile area
- An evaporation pond, area 1.665 ha
- A Pre-crushed Ore stockpile area, presently used for the Zinifex crushed ore stockpile
- One active and several inactive water bores
- Laydown areas
- A series of connecting roads and tracks.

The mining-associated infrastructure, located outside of leases ML4369, ML4370 and ML4371 includes:

- Detonator, fuse and ANFO magazines
- Mine camp and offices
- An inactive landfill
- Scrap yards
- Public and mine roads.

The existing mine layout is shown in Figure 4.1, and is also appended as an A3 size plan in Appendix I. The previous ore crusher and screening equipment has been removed.

Figure 4.1 – Existing Mine Layout



4.1.2 Operations Currently Approved

The activities currently approved, in the previous MARP Amendment (URS January 2005) for leases ML4369, ML4370 and ML4371 are, in summary:

- Reactivation of the open pit mine, cutting back the pit walls, to a depth of about 210 m RL (an increased depth of about 30 m) taking the pit to approximately 90 m deep
- Continued building the WRD, within the confines of the existing MLs
- Continued use of the existing stockpile area, and to extend the stockpile area if required
- Continued use of the evaporation pond, with some modification to operation
- Re-establish water bores if required
- Use of a mobile crushing plant
- Transport of the ore to Port Pirie using either road trains or rail, or a combination of these.

4.2 Intended Operations

4.2.1 Summary of Intended Changes

As noted in Section 1.4, this submission addresses:

- A change to the configuration and layout of the WRD, in particular enlarging and changing its footprint to achieve a less obtrusive final landform. The MPL will accommodate this extended waste rock dump, and also incorporate other mine infrastructure.
- A minor enlargement and change to the geometry of the pit, to incorporate a small additional identified area of mineralisation, and also minor changes to stockpile locations;
- Relocation of the Zinifex stockpile to another location within the mine lease. It is understood that Zinifex has submitted a proposal for this separately; this document covers the relocation of the Zinifex stockpile for information and completeness only; and
- Crushing and sorting of ore from the Moolooloo prospect (RL 6), which is a small deposit close to the Beltana Mine (refer Figures 2.3 to 2.5). It is noted that the proposed mining of the Moolooloo prospect, and the upgrading of the existing track to serve as a haul road, will be covered in a separate MARP application, plus other required approvals.
- Relocation of the evaporation pond to the south of the pit.

The proposed mine layout during operation is shown in Figure 4.2 (also presented as an A3 size plan in Appendix I) and a cross-section of the proposed cut-back extension of the pit is shown in Figure 4.3.

Figure 4.2 – Proposed Mine Layout During Operations

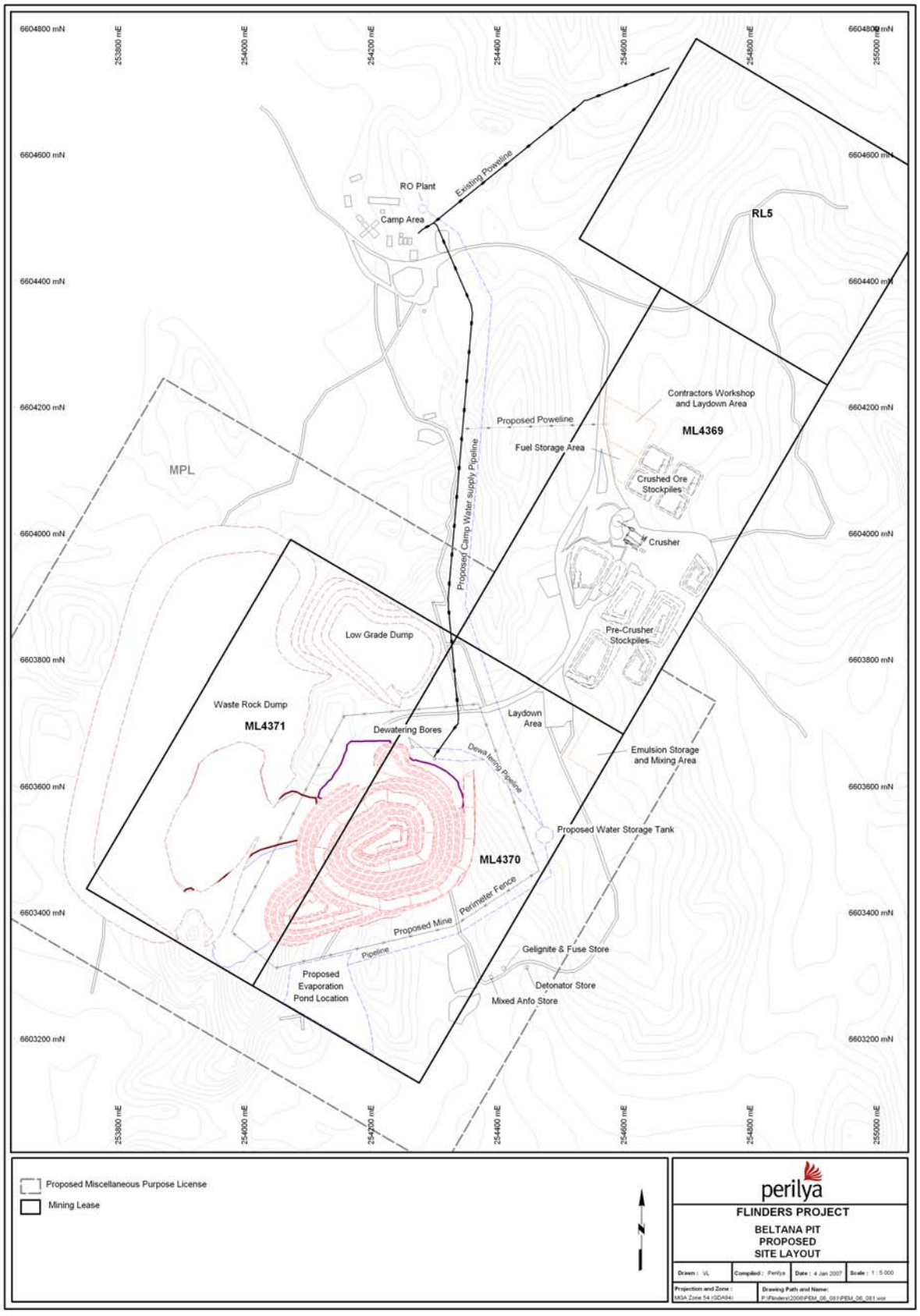
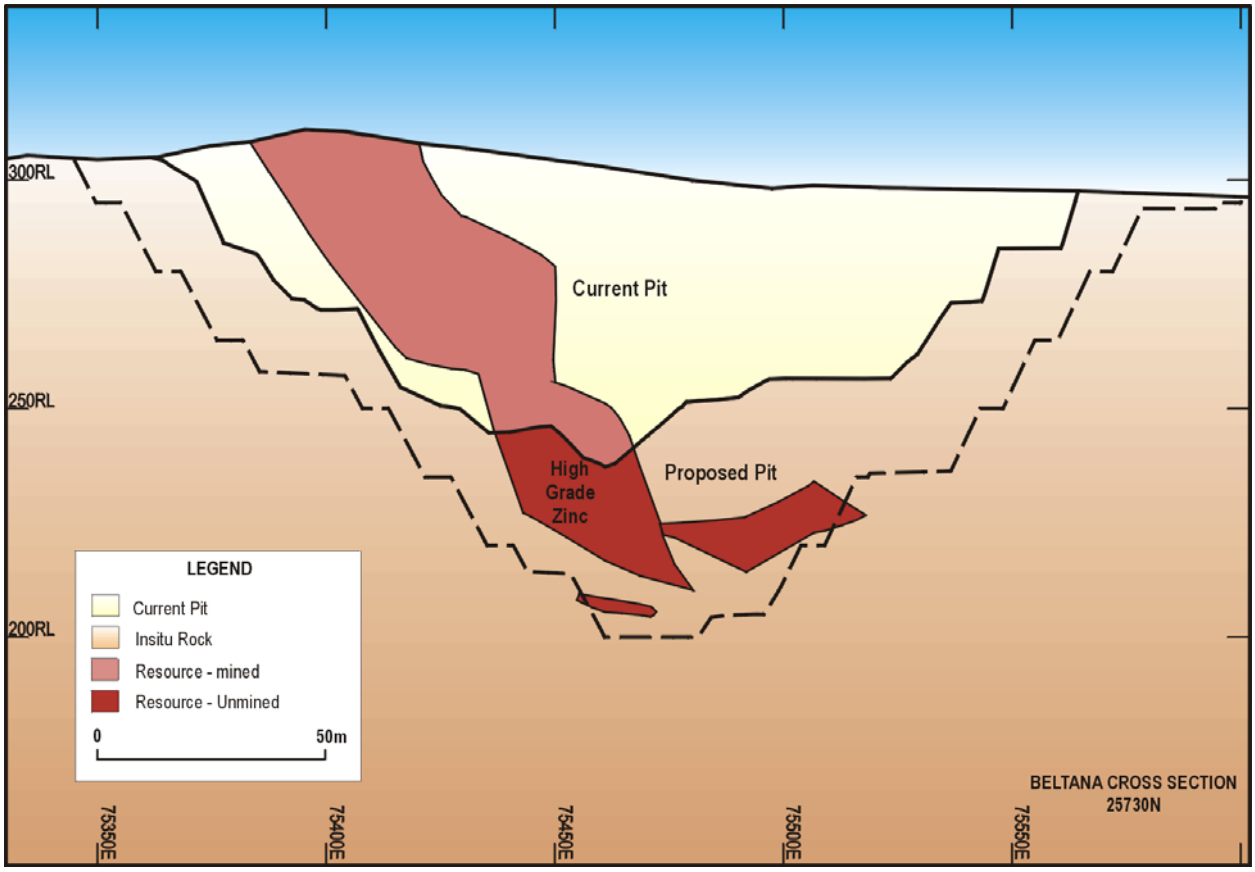


Figure 4.3 – Cross-section of Proposed Pit Extension



Following recovery of the remaining ore reserves, it is proposed to rehabilitate the mine for closure, in accordance with the Department of Industry Tourism and Resources documents Mine Closure and Completion (2006), and Mine Rehabilitation (2006). The rehabilitation of the ore stockpile area and remaining access roads will be undertaken following final load-out of ore from the mine, which is expected to take some years. Rehabilitation is discussed in Section 6.

The above changes are discussed further below.

4.2.2 MPL

The approved MARP No. 48/86 constrains the Beltana operations on mining leases ML 4369 – ML 4371. The recently approved MPL will enable the footprint of the waste rock dump to be enlarged by extending it to the west and to the south, which will reduce the face slope in this area. This outline will be lower and much more sympathetic to the surrounding landscape than using the existing approved waste rock outline; because the existing waste rock dump footprint is quite constrained, it would result in a high, steep landform.

Previously, some mine infrastructure was not contained within mining leases ML 4369 – ML 4371. The infrastructure includes the magazine and detonator storage and associated access roads, and a portion of a low grade/lead ore waste dump. The MPL addresses this anomaly.

4.2.3 Pit Geometry

It is proposed to change the pit outline and geometry, in particular to take ore from an identified small additional area of mineralisation on the south side of the pit.

This change in geometry will make the pit tear-drop in shape, rather than circular. This change is shown in plan view in Figure 4.2.

4.2.4 Relocation of Zinifex Stockpile

The lease handover agreement with Zinifex provides for storage of the existing Zinifex crushed ore stockpile (presently approximately 80,000 t and owned by Zinifex) to be retained at the Beltana Mine site on a sub-lease for the area on which it is stored. The crushed ore stockpile is located in the area that Freehold requires for Run of Mine (ROM) ore.

Zinifex is currently reducing the stockpile by about 10,000 to 15,000 t/a, although it has advised that approximately 30,000 t may be placed on the spot market. The required stockpile area may thus be for a stockpile of between about 40,000 and 80,000 t. The crushed Zinifex ore will be held in the area of the Freehold crushed ore stockpile (as shown in Figure 4.2). The flora in that area has been surveyed by Dr Frank Badman of Badman Environmental, and is described in Section 3.6.3.

4.2.5 Mooloolloo Deposit

As noted in Section 1.4, it is also proposed to mine the nearby Mooloolloo deposit (RL 6), and truck the ore to Beltana for crushing, a distance of approximately 2 km (refer Figures 2.3 to 2.5). Mooloolloo is a small deposit, and mining will be completed within a few months. The mining of the Mooloolloo deposit and the trucking of ore to Beltana, will be subject to a separate MARP application, plus other required approvals.

If approval was obtained, the crushing and sorting of Mooloolloo ore at Beltana will be undertaken following the completion of mining at Beltana. Thus crushing will be undertaken at Beltana for a period of about twelve months. Crushed Mooloolloo ore will also be stockpiled at Beltana pending transport to Port Pirie.

4.3 Sequence of Operations

The entire operation will be by open cast mining techniques, similar to the previous operations. The operations are summarised as follows:

1. Ore block definition (grade control) will be carried out using a reverse circulation drill rig. Sample holes will be backfilled so as not to interfere with future blasthole drilling and shotfiring. Samples will be transported off site for analysis.

2. Blasting of ore and waste will be required from the surface down. The upper levels of the mine will be broken using ANFO, and lower levels will be broken using packaged emulsion.

3. Material will be loaded and hauled from the pit using an hydraulic excavator and dump trucks. Waste rock will be transported to the WRD, and ore grade rock will be transported to the pre-crushed ore stockpile.

4. All dump areas, tip heads and stockpiles will be maintained using a suitable sized track dozer.

5. Ore transported to the pre-crushed ore stockpile will be crushed and sorted and then transferred to the crushed ore stockpile in preparation for removal from site. The crusher and ore sorter will be mobile units, mobilised to site on a needs basis.

6. Dust suppression will be achieved using a water cart to apply mine water on roads, ramps and benches, during dry and windy weather. All roads and ramps will be graded and maintained. Mine water will be used in the crushing and sorting plants for dust suppression.

4.4 Hours of Operation

It is proposed to use a continuous roster to finalise the recovery of ore from the mine, operating the mine 24 hours a day. With this roster, the mining operations are expected to be complete within approximately twelve months.

4.5 Material to be Mined

The ore is predominantly willemite, a zinc silicate. A particular sample of willemite is shown in Plate 4.1. Associated mineralogy includes coronadite (manganese lead oxide), mimetite (lead arsenate), hedyphane (calcium lead arsenate) and smithsonite (zinc carbonate).

Gangue minerals include calcite, dolomite and quartz.

Wallrock dilution comes from hematite altered dolomites and limestones, and cemented breccias with siltstone, sandstone and dolomite clasts.

The elemental and compound breakdown of the ore is listed in Table 4.1.

Plate 4.1 Willemite (Zn_2SiO_4) Sample

Table 4.1 Willemite Composition

Zn	%	38.9
SiO_2	%	22.5
CaO	%	5.2
Fe_2O_3	%	4.9
Pb	%	3.1
MnO	%	2.5
Al_2O_3	%	1.9
MgO	%	1.8
C	%	1.4
As	%	1.1
K_2O	%	0.2
P_2O_5	%	0.2
TiO_2	%	0.2
Sr	ppm	250
Ba	ppm	140
V	ppm	117
Zr	ppm	40
Be	ppm	9
Se	ppm	2

4.6 Geotechnical Considerations

Detailed mapping has been carried out to assess geotechnical conditions and evaluate slope performance along 600m of haul road faces, spiralling down to the lowest bench level to assist with design of the proposed pit expansion. An assessment of geohazards has been undertaken, and is described below.

4.6.1 Existing Geometry

- The pit top is approximately RL 305 m, and the lowest accessible bench is RL 256 m, which is close to the pit pond level. The pit depth is to approximately RL 232 m.
- The overall pit slope angles as measured by inclinometer are West wall=43^{o}; East wall=30^{o}; North wall=38^{o}; South wall=42^{o}.
- Existing haul road widths typically vary between 8 and 12m;
- Bench face heights vary between 6 and 12m, at 65 to 80^{o} face angles.

4.6.2 Existing Geotechnical Performance

- The pit has been separated into a number of structural domains based on rock type and rockmass quality;
- Existing pit slopes have performed well in the last 20 years with no evidence of large scale instability;
- Only one (small scale) slope failure has occurred, in a discrete 35m section of the east wall that took out part of the haul road and the benches below. This occurred within a north-easterly fault zone clay breccia zone after heavy rain;
- The rock mass throughout the pit is variably and often closely fractured. The potential modes of failure for the various slopes are expected to be controlled by the general interlocking properties of the rock mass, rather than discrete structurally controlled failures along well defined defect planes.

4.6.3 Proposed Design and Ongoing Slope Risk Management Program

A consulting geotechnical engineer has assessed the proposed design. Based on the above considerations and the short duration of mining, the proposal of overall slope angle of 43^{o}, 15 m high benches faces, bench widths of 5 m, and a 16 m wide haul road were considered acceptable, to the final pit level of approximately RL 200 m.

4.6.4 Ongoing Slope Risk Management

Ongoing slope risk management will be a critical element of the mining operations to ensure that there is no compromise in mine safety. The slope risk management will include:

- Routine geotechnical inspections as faces are exposed, and after rainfall;

- Internal surface drainage control of the pit perimeter, and internally;
- Routine mechanical scaling of batters that pose a risk to operations, using appropriate equipment;
- Construction of (windrow) bunds along the toe of batters adjacent to haul roads, as a protection against falls;
- Ongoing monitoring of groundwater levels;
- Establishment of survey prisms at key locations throughout the pit to monitor for potential for large scale movement within particular structural regions.

4.7 Estimated Reserves

Beltana has an estimated ore reserve of 150,000 t at 38.3% zinc, containing approximately 57,400 t of zinc metal. In addition, the Beltana pit will also produce over 242,000 t of intermediate material at an average grade of over 21% zinc, containing approximately 52,000 t of zinc metal.

The recovery of this material will require the movement of 1,032,000 BCM (bank cubic metres) of waste and low grade material, for a total movement of 1,083,000 BCM.

4.8 Ore Transport

The crushed ore will be transported from site using appropriately sized semi-trailers. The destination of the crushed ore destination is Port Pirie, and there are two proposals to achieve this end:

- The first proposal is to move the ore directly from the site to the Ore Shed in Port Pirie using conventional B-double road trains.
- The second is to move the ore to a loading siding and rail the ore to Port Pirie.

A combination of the above proposals will be used during the life of mine.

The rail siding at Copley has previously been used for intermediate storage and transhipping of ore from Beltana to Port Pirie, and this option remains an on-going possibility, as does the use of a temporary siding at Puttapa..

4.9 Silt Retention

The generally crystalline nature of the ore and waste presents a low risk of generation of significant silt fractions during mining and stockpiling operations.

Measures to manage silt are discussed in Section 6.3.6.

4.10 Top Soil Stripping and Management

All new areas to be cleared will be stripped of topsoil and this material will be stockpiled for rehabilitation purposes. Areas to be stripped of topsoil and vegetation include:

- The pit extension area;
- The extension of the WRD and low grade ore dup (predominantly to the west, north and south faces);
- The area for the relocation of the Zinifex Crushed Ore Stockpile, and for Freehold's Crushed Ore Stockpile; and
- A minor extension of the Pre-crushed Ore stockpile area.
- The new evaporation pond area
- The emulsion mixing area
- The workshop area

Recovered topsoil will be temporarily stored in stockpiles adjacent to the areas of clearance and also on the top of the waste rock dump.

All available topsoil will be stockpiled in mounds no more than 2 m high to maintain seed viability within the topsoil.

It should be noted that in the past no topsoil has been stored for future rehabilitation work, and as such topsoil will be in short supply at mine closure. Freehold proposes to also recover and store oxidized material from the pit extension to be used in conjunction with the topsoil. Additionally, oxidized material identified on the current WRD will be set aside or moved to the topsoil stockpile for rehabilitation purposes.

4.11 Stockpiles

Excavated rock will be stored in the following locations:

- The Pre-crushed Ore Stockpiles
- The Crushed Ore Stockpiles
- The Oversize Stockpile
- The old Low Grade Stockpiles, which are to be removed, and the area use for the Topsoil Stockpile
- The Low Grade Ore Stockpile
- The Waste Rock Dump (WRD).

The locations of these stockpiles are shown in Figure 4.2.

4.11.1 The Pre-crushed Ore Stockpiles

The pre-crushed ore stockpiles are situated between the pit and the crusher.

Following the completion of mining at Beltana, and also at Moolooloo (subject to separate approval), and upon total depletion of all pre-crushed ore stock, the pre-crushed ore stockpile area will be rehabilitated.

4.11.2 The Crushed Ore Stockpiles

Freehold proposes to mine the pit over a short timeframe, and that the remaining ore reserves will be extracted and stockpiled in the crushed ore stockpile area over approximately twelve months. It is unlikely that this material will be depleted at a rate exceeding 80,000 t/a. This means that Freehold's crushed ore stockpile area is likely to be active for around 2.5 to 3 years after mining of the cut-back is completed. As described above, it is proposed that the Zinifex stockpile will be relocated to the Freehold crushed ore stockpile area.

Upon total depletion of all stock, crushed ore stockpile areas will be rehabilitated.

4.11.3 The Oversize Stockpile Area

The oversize stockpile area is a small area located to the west of the pre-crushed ore stockpiles. Its purpose is to temporarily store any material that cannot fit into the mobile crusher's hopper. During mining activity this material will be broken down to a manageable size, crushed and transported from site. Any remaining material at the conclusion of pit mining will be transported to the Low Grade arm of the WRD.

When the oversized material is removed, the oversize stockpile area will be rehabilitated.

4.11.4 The Old Low Grade/Lead Ore Stockpiles

These stockpiles are located in the south-east corner of Mining Lease 4370. The eastern corner of the stockpile extends beyond the boundary of ML 4370 (Figure 4.1). The area is currently used for the permanent storage of low grade material. Freehold proposes to:

- Remove this material and blend with high grade material or transfer it to the WRD.
- Rehabilitate the area outside of the Mining Lease.
- Use the resulting cleared area for the topsoil stockpile and for stockpiling oxidised material for rehabilitation purposes at mine closure.

4.11.5 The Low Grade Ore Dump

Low grade ore, which is presently sub-economic, will be stored in the northern part of the WRD, where it will be available should economic conditions in the future warrant the recovery of this material.

The location of the low grade ore dump is shown in Figure 4.2.

4.11.6 The Waste Rock Dump

The WRD is used for the permanent storage of uneconomic material extracted from the pit. It is proposed to change the configuration and layout of the WRD, to achieve a final landform more sympathetic to the surrounding area.

The footprint of the waste rock dump is to be enlarged, as shown in Figure 4.4 (also included as an A3 figure in Appendix I), by extending it to the west and to the south into the area of the recently approved MPL. This will allow the slope of the western face of the WRD less steep than at present (see also Plate 6.1). The profile of the final WRD is shown in Figures 4.5 and 4.6, both of which are presented as A3 sections in Appendix I. This outline is much more sympathetic to the surrounding landforms than using the previous approved waste rock outline, which, having quite a constrained footprint, would result in a high, steep and more visually intrusive landform if used as the repository for additional waste rock from the expanded mining operations.

A stock watering point and associated access track is located just to the south-west of the current WRD. The access track and polypropylene pipeline to this watering point will be covered by the proposed extension of the waste rock dump. The access track and pipeline (about 0.5 km in length) will be re-provided to the west of the proposed waste rock dump extension.

4.12 Crushing Plant

There are no plans to beneficiate the ore on site. Post-mining treatment of the ore will be restricted to crushing, ore sorting, blending and storage.

Crushing, ore screening and sorting will be undertaken by the use of mobile crushing, screening and ore sorting plants to be established in the same location of the previous crushing and screening plant.

The mobile plants will be removed from the site as soon as crushing, ore screening and sorting operations are complete. This is expected to be within approximately twelve months of resuming mining operations at the mine, or approximately eighteen months if permission is obtained to undertake mining of the Moolooloo deposit.

4.13 Services

The site is well-served by an all-weather road nearby. In addition the railway line to the Leigh Creek coalfield passes nearby (Figures 2.2 and 2.3).

The water supply for the operation has been and will be provided from water bores near the pit.

Other services to the site include power and telephone. The site also has a back-up power generator, located at the office/construction camp area.

Figure 4.4 Proposed Waste Rock Dump Outline

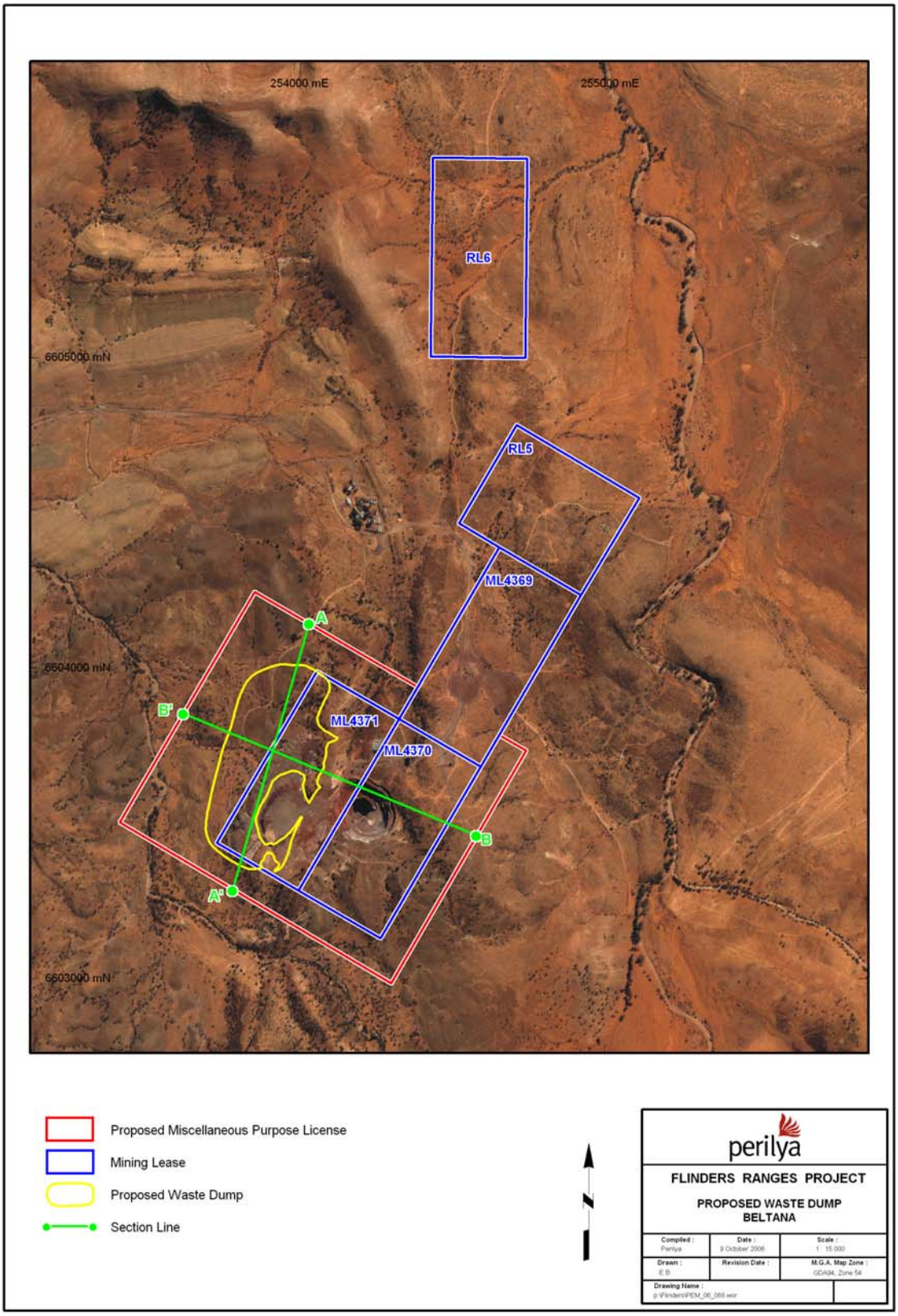


Figure 4.5 Proposed Waste Rock Dump Cross Section A-A'

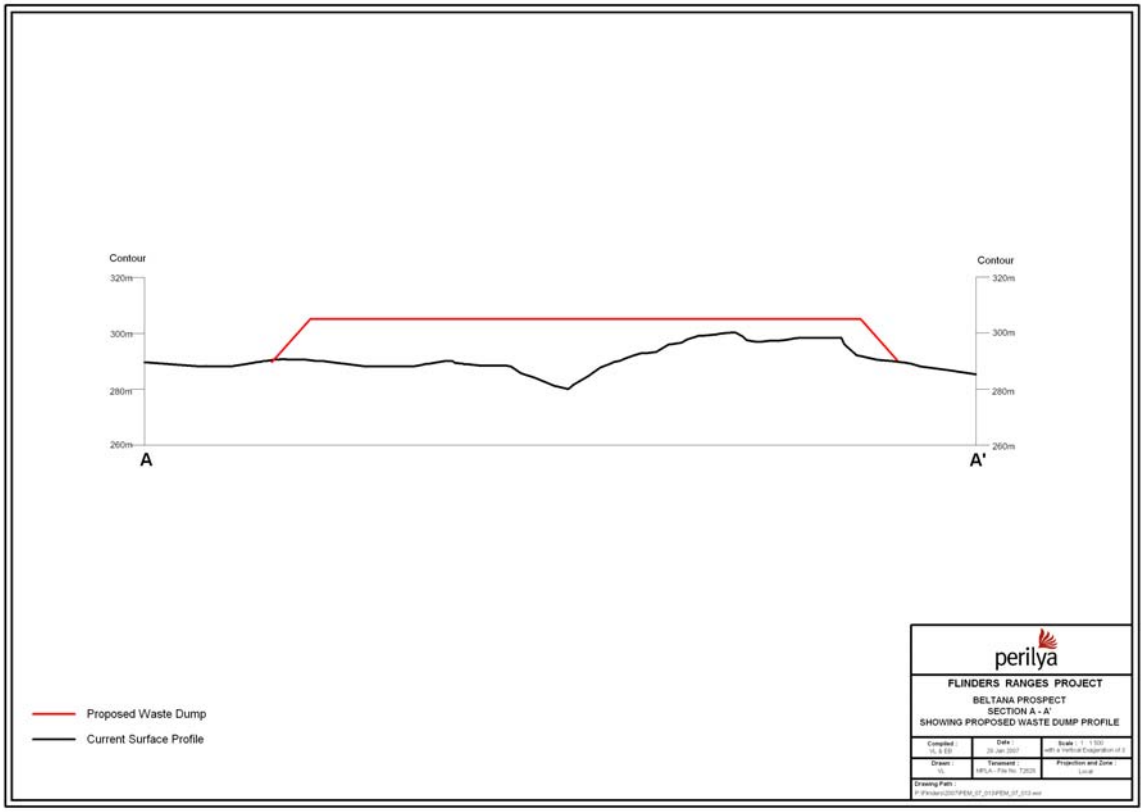
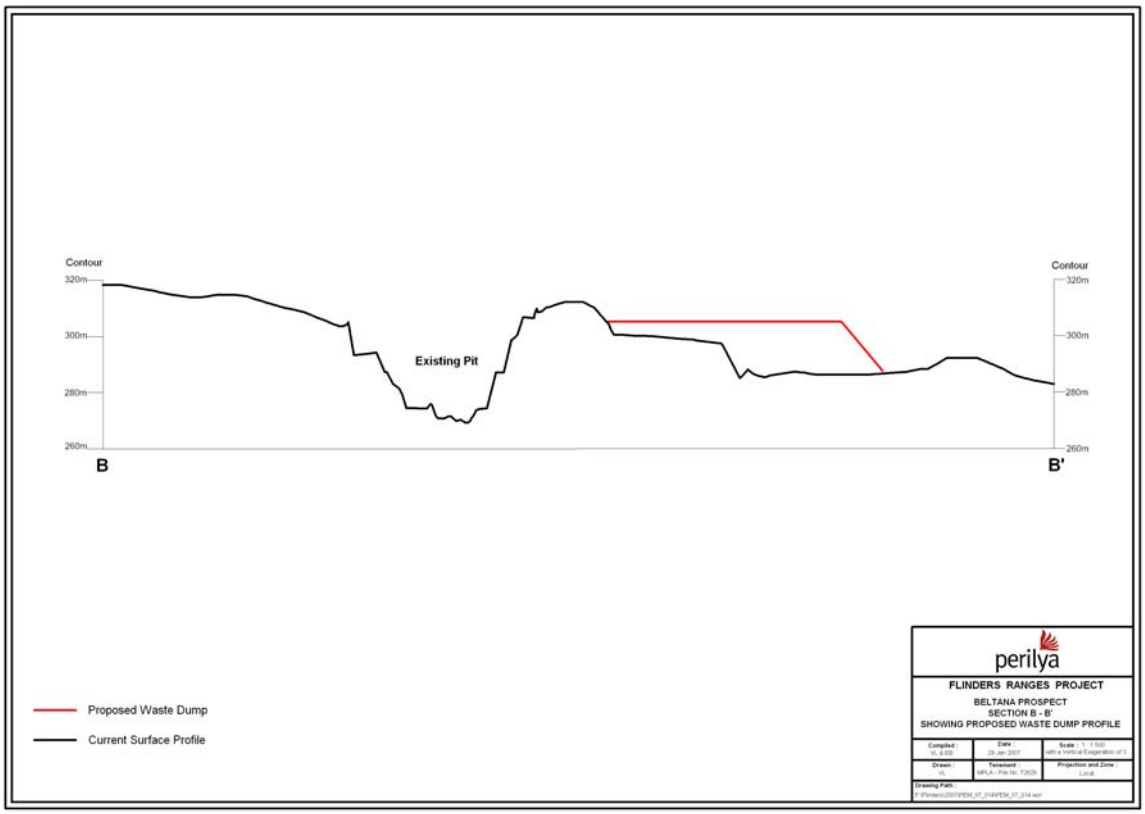


Figure 4.6 Proposed Waste Rock Dump Cross Section B-B'



4.14 Mine Camp and Office Facilities

The mine camp is well established in a pleasing living environment. The camp is situated off the Mining Leases, and is also used to service exploration activity in the general area. Upon cessation of mining at Beltana, the camp and offices will be used to service other Freehold mines in the area and ongoing exploration.

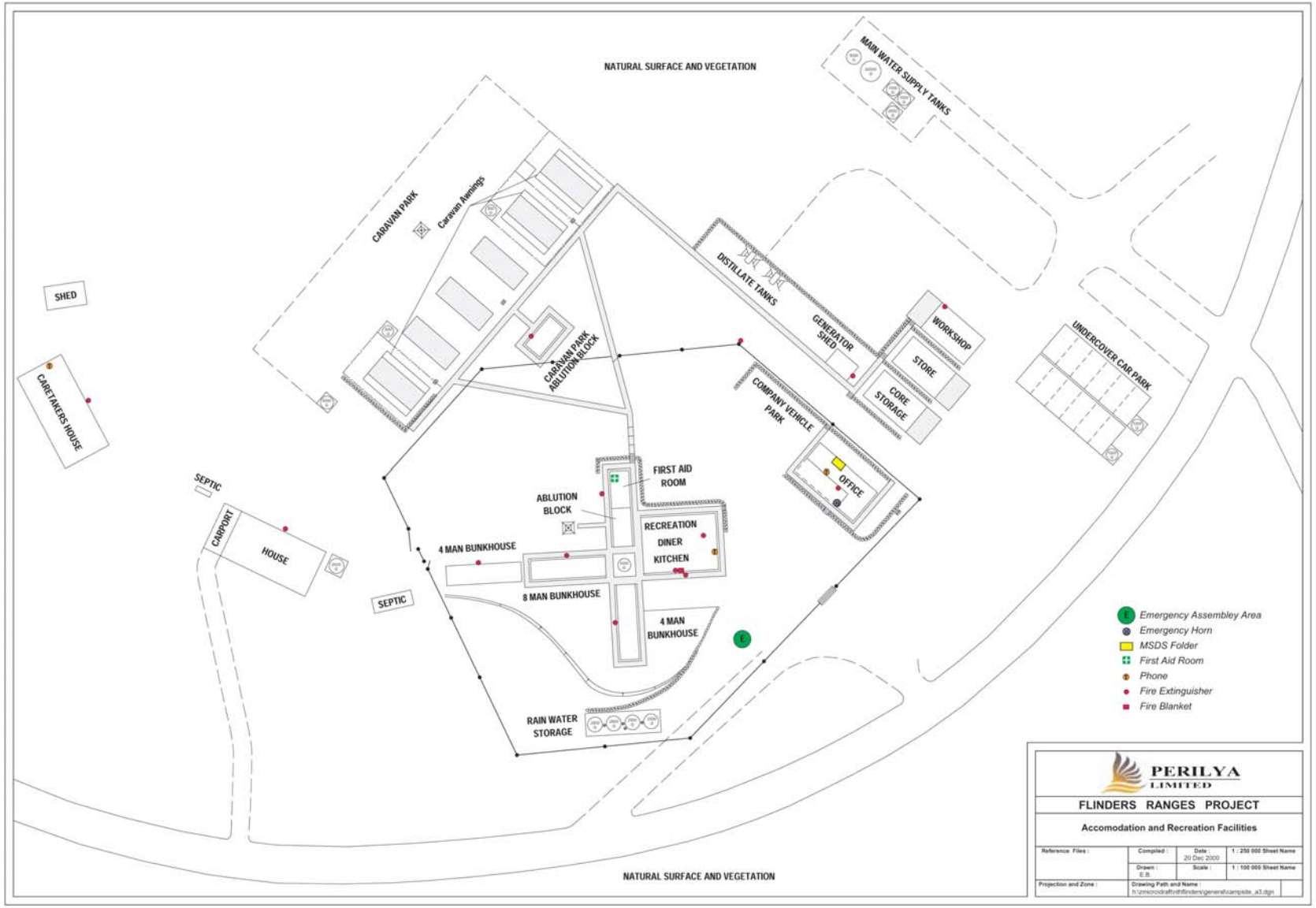
Ultimately, on completion of mining in the region, Freehold will either clear and rehabilitate the camp area, or enter into an agreement with the pastoral lease holder to leave it in an agreed condition. The camp could be quite suitable for use by a school, church or community group for use as a school holiday camp, etc.

The facilities include:

- A well equipped kitchen and mess area;
- Two houses, one used to house the on-site caretaker;
- Living quarters for approximately 20 personnel including in single quarter accommodation and in one of the houses on site;
- A caravan parking area;
- An office;
- A workshop;
- Emergency generator;
- Water head tank for circulation to the camp area;
- Power distribution;
- Solar powered telecommunications.

Figure 4.7 shows the facility layout of the camp area, and Plates 4.2 and 4.3 show the camp area.

Figure 4.7– Camp and Office Layout



1.

Plate 4.2 Camp Area – Kitchen, Living Quarters

Plate 4.3 Camp Area - Workshops, Office, Generator

4.15 Type of Equipment Used

The proposed equipment to be used for the resumed mining operation is as follows:

- 3 x 50 t or 85 t dump trucks;

- Hydraulic excavator to suit truck fleet;
- 1 x D7 or D9 size track dozer;
- 1 x blasthole drill rig;
- 1 x water cart;
- 1 x grader;
- 1 x front end loader;
- Mobile crushing plant as required; and
- Reverse circulation drill rig as required.

4.16 Dewatering and Evaporation Pond

4.16.1 Previous Dewatering Practices

Dewatering via a network of dewatering bores and /or via pumping from a sump at the base of the pit, as proposed in the original MARP (letter of 27 August 1986) submitted to MESA by Electrolytic Zinc Company of Australasia Limited for Beltana Mine, was approved by MESA (letter of 19 September 1986), with the proviso that discharge was to Mount Deception Creek, and not Ajax Creek, in order that the discharge which contained heavy metals did not impact Aroona Creek.

It was acknowledged by MESA that the dewatering program will not affect surrounding groundwater users. It was recommended that any dieback of River Red Gums at Mount Deception Creek be monitored. In accordance with the MARP at that time, mine dewatering was undertaken by pumping from a sump at the base of the pit, and discharge was to Mount Deception Creek.

In 1996, the dewatering process was revised in response to the ratification of the Environment Protection Act of 1993. In consultation with the EPA, it was considered that water pumped the pit sumps will not be suitable for direct discharge to the Mount Deception Creek due to high salinity and heavy metal content; and will need to be discharged to an evaporation pond.

An evaporation pond of approximately 1.665 ha was subsequently constructed to the south of the area between the pit and the operational overburden dump (WRD) area, on the south-east corner of ML4371, on top of the previous overburden dump (Figure 4.1). Groundwater pumped from a sump at the base of the pit was directed to the evaporation pond.

Pasminco observed groundwater inflow to the pit to be 25 m^3 per day when the dewatered pit floor was at 256 m AHD, 7 m below the static water table, then at 263 m-AHD.

4.16.2 Proposed Evaporation Pond

The Evaporation Pond will be sized to accommodate the anticipated dewatering volumes. It is proposed that the evaporation pond will be appropriately lined and constructed to the south of the pit on the southern part of ML4370 (refer Figure 4.2).

The evaporation pond has been relocated away from the open pit and the waste rock dump due to safety and environmental considerations. The new location takes account of the natural topography to build an appropriately constructed 1.2 ha evaporation pond using a bund (with at least 0.5 metre

freeboard) on the south west side to retain the water. A drain will be used to catch any downslope seepage, which will be pumped back into the evaporation pond. This design negates any risk of the water flowing into the working pit or seeping through the waste rock dump

4.16.3 Proposed Dewatering Practices

Dewatering investigation programs are currently in progress to provide estimates of groundwater inflows into the deeper planned mining extent of the Beltana pit. Based on the results of the groundwater investigations, dewatering rates are currently being established. The static water table is now observed to be at approximately 246 m AHD. The current pit design is to 210 m AHD.

Groundwater inflow to the open pit will be controlled during mining by either in-pit or outside-the-pit dewatering bores and in-pit sumps.

Dewatering bores outside the pit will be powered by submersible electric pumps and powered by diesel powered mobile generator located adjacent to the bore. Dewatering water will be fed via polyethylene pipeline to the evaporation pond.

In-pit dewatering bores and in-pit sumps will utilise a pump line extension. The pump will be a diesel powered mobile unit located on the pit floor.

It is proposed to use the water extracted by dewatering for:

- Dust suppression across the site.
- Water injection at the crusher (dust suppression of the crushed ore).
- Feed to the RO plant for use at the camp.

5.0 STAKEHOLDER CONSULTATION

This section provides an overview of the consultation process conducted to date and also the proposed ongoing community consultation.

The consultation process has been developed on the basis that the Beltana mine project is a small scale extension of a pre existing activity and this MARP proposal is for a minor variation to an already approved MARP.

5.1 Results of Stakeholder Consultation

Freehold has, during the process of gaining approval to re-open the Beltana Mine, identified and consulted with the following stakeholders and interested parties, as part of this application:

- Residents and town management of Leigh Creek, and residents of Copley and Beltana;
- State Government departments and instrumentalities;
- NRG Flinders;
- Aboriginal parties;
- Zinifex and port authorities at Port Pirie; and
- Pastoralists.

Stakeholders were briefed and advised that it is the intention to mine the remaining ore at Beltana over a short period, stockpile the crushed ore and truck it out over a period extending up to and perhaps beyond 2010. This will require the retention of existing infrastructure and transport resources as well as a nominal site presence. Signage will be placed on the public road and at the control point at the mine site.

The key issues raised in these consultations were:

- Desire for employment opportunities for residents in the Leigh Creek area and at Port Pirie;
- Need to ensure that the Leigh Creek water supply is unaffected;
- The use of rail transport would be preferred;
- That rail (if used) does not affect the current transport of coal to Port Augusta;
- Aboriginal sites will not be impacted; and
- That the mine will be left in an acceptable condition at closure.

Freehold personnel with a key role in community engagement for the project comprise Perilya's General Manager Sustainable Development, the Sustainable Development Advisor, the Beltana Project Manager and the Beltana Liaison Officer.

An access and compensation agreement has been negotiated with the pastoral land holder.

The ongoing community consultation for the project will include:

- Meeting with key stakeholders during the mining operations and regarding closure, including with the management and residents of Leigh Creek and Copley, local pastoralists and Aboriginal groups;

- Undertaking other specific communications with stakeholders as necessary and appropriate, including correspondence and updates;
- Posting sustainable development reporting on the Beltana Mine via the Perilya website; and
- Providing reporting to PIRSA and other government agencies as required.

5.2 Ongoing Community Consultation

Ongoing community consultation for the project will include:

- Meeting with key stakeholders during the mining operations and regarding closure, including with the management and residents of Leigh Creek and Copley, local pastoralists and Aboriginal groups;
- Undertaking other specific communications with stakeholders as necessary and appropriate, including correspondence and updates;
- Posting sustainable development reporting on the Beltana mine via the Perilya website;
- Providing monitoring and other reports to PIRSA as required

6.0 MEASURES TO MANAGE ENVIRONMENTAL IMPACTS

This section identifies potential environmental impacts and describes how the risks associated with these impacts were assessed and the control measures proposed for each of the critical risks. Environmental objectives and management plans are also outlined.

6.1 Potential Impact Events

Actual or credible potential impact events associated with the proposed activities that could pose a threat to the environment are considered to be.

- Dust
- Visual impact
- Traffic
- flora and fauna
- Groundwater pumping and disposal
- Surface Runoff
- Waste management
- Fuel storage
- Weed and feral animals
- Aboriginal and European heritage.
- Blasting
- landscape stability

Other aspects considered include

- Sensitive area impacts (impacts to parks etc)
- Noise
- Disturbance of natural resources of other industries
- Altering existing land use

However, these were considered to be of very low risk due to the nature of the operation and the remote location, and have not been considered further.

6.2 Risk Assessment

To determine the level of risk associated with impact events, the likelihood and severity of consequences of impact events listed above has been considered. Proposed control strategies have been taken into consideration when assessing and assigning the likelihood and consequences of the various impacts.

Event risk assessments for each of the identified credible potential impact events are provided below and are carried out based on Australian Standard AS/NZS 4360:2004 Risk Management and the information contained in this MARP.

AS/NZS 4360:2004 assesses environmental risks based on both the likelihood and the consequence of a particular impact occurring, and compares the results to a pre-defined qualitative matrix to ascertain significance.

The likelihood and consequence ratings applied in the risk assessment process were assessed on five-point scales. Consequences were assessed on a scale of 1 to 5 and likelihood was assessed on a scale from A to E. The likelihood and consequence categories were specifically tailored to relate to the activities proposed, and are described in Tables 6.1 and 6.2.

Table 6.1 Risk Assessment Criteria for Consequence

Level	Descriptor	Example Detail Description		
		Environment	**Safety**	**Cultural**
1	Insignificant	Minor non-conformance – no impact, minor breach in procedure.	Minor lost time injury	None to minimal impact on heritage sites or values.
2	Minor	Minor impact – minimal impact outside the local area.	Moderate lost time injury. Medical attention required	Minor impact on heritage sites or values (e.g. restricted access to recreation areas).
3	Moderate	Moderate impact external to local area, generally contained on site.	Permanent disabling injury or illness	Moderate impact on heritage sites, which can be managed under normal procedures.
4	Major	Major impact or environmental harm off site, or breach of operating conditions or obligations.	Fatality	Major disturbances to significant heritage sites or values. Major breach of statutory obligation.
5	Catastrophe	Significant long term environmental harm, significant legal implications and potential to affect the community.	Multiple Fatalities	Major disturbances to a number of significant heritage sites or values. Major breach of statutory obligations.

Table 6.2 Criteria for Likelihood of Events

Level	Measure	Description	Guide
E	Rare	Issue has not occurred in the past and there is a low probability that it may occur in exceptional circumstances.	Once per life of facility.
D	Could Occur	Issue may have occurred in the past and there is a moderate probability that it could occur at some time.	Once per 10 years
C	Should Occur	Issue may have arisen in the past and there is a high probability that it should occur at some time.	Once per year
B	Likely to occur	Issue has been a common problem in the past and there is a high probability it will occur in most circumstances.	Once per month
A	Will Occur	Issue will occur, is currently a problem or is expected to occur in most circumstances.	Weekly

The combination of the likelihood and consequence ratings was then compared to the qualitative risk analysis matrix, providing an indication of the magnitude or significance of the impact (ranging from low to high priority). The adopted risk level matrix is presented in Table 6.3 below.

Table 6.3 Risk Matrix

	CONSEQUENCE				
LIKELIHOOD	**1 – Insignificant**	**2 – Minor**	**3 – Moderate**	**4 – Major**	**5 – Critical**
A – Virtually Certain	S	S	H	H	H
B – Likely to Occur	M	S	S	H	H
C – Should Occur	L	M	S	H	H
D – Could Occur	L	L	M	S	H
E – Rare	L	L	M	S	S

Risk Definitions (AS/NZS 4360:1999)

High	Detailed research and management planning required at senior levels. Immediate action required
Significant	Senior management attention needed.
Moderate	Management responsibility and integration into management plans required.
Low	Manage by routine procedures.

6.3 Assessment of Critical Environmental Impacts and/or Event Risks

Each of the critical environmental impacts and event risks has been assessed and a management control program developed as follows. With the exception of traffic and blasting risks, which have a medium risk level, the level of risk for all other environmental impacts is assessed as low.

6.3.1 Dust

Context

Environment:

The mine is located in a remote area with the nearest town being about 16 km distant by road. Vegetation is sparse, rainfall is low and the mine pit, stockpile areas and associated roads and tracks are pre existing features. Land use outside the area of mining is pastoral, with overgrazing by stock, native and feral animals leading to dust generation and negative affects on vegetation abundance and condition.

Stakeholders:

Stakeholders who have expressed concern over potential dust impacts from site activities include PIRSA and Planning SA. Both have been in the form of general comments relating to the potential need to manage dust impacts for environmental reasons. No concerns have been expressed by the local landholder and residents of Leigh Creek.

Industry

The mine is a reworking of an existing pit. It is a small scale operation, with the winning of ore to occur in a period of about 8 months. Stockpiling and transport of ore will occur for up to 5 years. The workforce for the mine is small and will be based in Leigh Creek. The mining contractor has OH&S plans already developed.

Potential Impact Event:

Dust generated may harm flora and fauna

The proposed development has the potential to increase the amount of dust generated on the site. The main sources of dust generation are:

- vegetation clearance (refer to Figure 6.1)
- mining activities (blasting, hauling, crushing, stacking of ore)
- waste rock dumping
- loading operations
- traffic movements
- wind erosion form waste rock dumps and stockpiles

Failure to effectively control dust emissions may result in:

- the deposition of dust on vegetation reducing visual amenity
- damage to flora and habitat

Control and management strategies

The impact of dust generation can be significantly reduced by the adherence to the dust management plan developed for the project. Control strategies include:

- minimizing the areas of clearance and disturbance. Progressive rehabilitation will be carried out to reduce the area available for wind erosion
- using dust control devices such as sprinkler systems and water tankers will be used and maintained in sound working order
- carrying out daily inspections regarding dust emissions
- limiting vehicle movements to areas where dust suppression can be used
- limiting vehicle speeds to those that will not generate excessive dust

Likelihood and Severity of Consequences

The probability of dust being generated from these activities is high and will be generated for the duration of the project (up to 5 years). Control measures will be used to minimize dust emissions.

Due to the significant distance between the mine and the nearest residence, it is unlikely that residents will be affected by dust from the project at any time.

The mine is located in a remote area, and largely out of view of the public, so public health and amenity are unlikely to be affected by dust generated from this project.

Damage to flora and habitat is likely to occur, but will be localized and reduced through the use of dust suppression measures.

Risk Levels

The results of the risk analysis for dust are presented in the following table.

Risk Event	Risk Prior to Implementation of Controls		Primary Control Measures	Residual Risk After Implementation of Controls		Level of Risk	ALARP
	Likelihood	Consequence		Likelihood	Consequence		
Damage to flora and fauna	likely	minor	Dust control measures as outlined above	rare	negligible	low	Yes
Visual amenity due to dust on vegetation	likely	minor	Dust control measures as outlined above	rare	negligible	low	Yes

Risk Acceptance

From the above risk analysis, it would appear that the most significant risk from dust is to native vegetation. Given the short period of mining, the sporadic nature of ore transport, and the control measures proposed, it is expected that impacts will be temporary and no worse than currently occurring due to the current conditions on site and surrounding land use.

As a consequence of this analysis, vegetation will be monitored for dust impacts and the risk and control measures reviewed during the ore transport phase of the project.

Outcome/Objective

No permanent loss of vegetation due to dust generated by the mining operations.

Measurement Criteria

Photo monitoring of vegetation adjacent to operational areas will show similar vegetation abundance and diversity to corresponding vegetation points at the end of the mining period.

Monitoring Program

Vegetation photo monitoring points adjacent to mine pit, waste rock dump, ore stockpile and along the road transport corridor (refer to Table 6.4 and Figure 6.2) will be initially monitored and recorded by the environmental officer on a 3 monthly basis for the first year and then 6 monthly until mine closure.

6.3.2 Visual Impact

Context

Environment:

The mine is located in the western Flinders Ranges south of Leigh Creek and to the east of the historic Copper King mine. Soils are shallow and vegetation is sparse, which has resulted in the landscape being dominated by the rock formations that have formed the Flinders Ranges. The site is currently one of recent mining, with an open pit, waste rock dump, magazine, lay down areas and stockpile areas dominating the local landscape. (As stated elsewhere in this document it is Freehold's intention to minimize additional visual impact through a range of measures)

Land use outside the area of mining is pastoral, with overgrazing by stock, native and feral animals contributing to the degradation of the landscape.

Stakeholders:

Stakeholders who have expressed concern over potential visual impacts include PIRSA and Planning SA. Both have been in the form of general comments relating to the granting of a Miscellaneous Purpose Licence (MPL) in the vicinity of the mine to enable the footprint of the waste rock dump to remain at or below the horizon when viewed from the main Leigh Creek road.

No concerns have been expressed by the local landholder and residents of Leigh Creek.

Industry

The mine is a reworking of an existing pit. It is a small scale operation, with the winning of ore to occur in a period of about 8 months. Stockpiling and transport of ore will occur for up to 5 years. The footprint of the waste rock dump will be expanded to enable the height of waste rock dump to remain at or below the horizon when viewed from the main Leigh Creek road.

Potential Impact Event:

Operations may lead to negative visual impact

The proposed development has the potential to lead to a negative visual impact through:

- vegetation clearance for stockpile and WRD construction
- the stockpiling of ore and waste rock
- loading operations

Failure to effectively manage activities may result in:

- the loss of visual amenity when viewed from the Leigh creek road
- increased visual degradation of the landscape on a local scale
- the loss of visual amenity when viewed from the Copper King Mine road

Control and management strategies

The impact of operations on visual amenity can be significantly reduced by the implementation of the following control strategies:

- minimizing the areas of clearance and disturbance.
- progressively rehabilitating areas (including revegetation) to reduce the visual impact of the waste rock dump, stockpile areas, and roads and tracks no longer required
- increasing the footprint of the waste rock dump to enable its height to be lower than would otherwise occur
- using dust control devices such as sprinkler systems and water tankers to reduce the visual impact of dust generation

Likelihood and Severity of Consequences

The probability of visual impact being negatively affected by the mining and stockpiling of ore is high and will be occur at least during the project life and some of the closure period.

Control measures will be used to minimize dust emissions.

Due to the significant distance and undulating topography between the mine and the nearest residence, it is unlikely that residents will be affected by visual impact of the mine at any time.

The mine is located in a remote area, and largely out of view of the public, and is barely visible from the Leigh Creek road. Expanding the footprint of the waste rock dump will enable its height to be maintained at about the current elevation, thereby reducing the potential for negative effects.

Travellers on Copper King Mine road will notice the mine. However, as the mine is an existing feature of the landscape, proposed stockpile locations are not significantly different from at present, the waste rock dump outline will remain subdued in the landscape (and batter angles will be less than 25 degrees), and revegetation will occur in a progressive manner, impacts from this vantage point will remain low. In addition, travellers to the Copper King mine are likely to be interested in mining, will be going there out of (mining) interest, and are therefore unlikely to object to the operation of an existing mine near the access track.

Risk Levels

The results of the risk analysis for visual impact are presented in the table below.

Risk Event	**Risk Prior to Implementation of Controls**		**Primary Control Measures**	**Residual Risk After Implementation of Controls**		**Level of Risk**	**ALARP**
	Likelihood	**Consequence**		**Likelihood**	**Consequence**		
The loss of visual amenity when viewed from the Leigh creek road	Likely	Negligible	WRD to remain at or below horizon when viewed from this road	Rare	Negligible	Low	Yes
Increased visual degradation of the landscape on a local scale	Likely	Minor	Dust control measures, progressive restoration including revegetation as outlined above	Rare	Negligible	Low	Yes
The degradation of the landscape on a local scale the loss of visual amenity when viewed from the Copper King Mine road	Likely	Minor	Dust control measures, progressive restoration including revegetation as outlined above	Rare	Negligible	Low	Yes

Risk Acceptance

From the above risk analysis, it would appear that the most significant risk in terms of visual impact will be local scale visible degradation. Given the short period of mining and the control measures proposed, it is expected that impacts will be temporary and no worse than currently occurring due to the current conditions on site and surrounding land use.

As a consequence of this analysis, the landscape will be monitored for visual impacts and the risk and control measures reviewed after the final ore has been won from the pit.

Outcome/Objective

No increase in visual impact of mining compared with visual impact prior to the commencement of Freehold's activities.

Measurement Criteria

Photo monitoring of vegetation adjacent to operational areas will show similar vegetation abundance and diversity to corresponding vegetation points at the end of the closure period.

Photo monitoring of the profile of the waste rock dump will occur from the main Leigh Creek road and will be compared with photographs taken prior to the commencement of operations

Monitoring Program

Vegetation photo monitoring points adjacent to mine pit, waste rock dump, and ore stockpile plus the road traffic corridor (refer to Figure 6.2) will be initially monitored and recorded by the environmental officer on a 3 monthly basis for the first year and then 6 monthly until closure.

A photo monitoring point will also be established on the Leigh Creek road near its junction with the Beltana historic town road (refer to Table 6.4 and Figure 6.2). Photographs will be taken prior to the commencement of operations and thereafter at 3 monthly intervals until final closure.

6.3.3 Traffic

Context

Environment:

The mine is located in a remote area with the nearest town (Leigh Creek) being about 16 km distant by road. Traffic movements on the Leigh Creek to Hawker are documented as 200 per day. Other roads in the vicinity of the mine are the old Leigh Creek to Beltana historic town road and the Copper King Mine road. Access to the mine will utilise all three of these roads, as personnel will be residing in Leigh Creek, and the mine is accessed from the Leigh Creek road via a short stretch of the old Leigh Creek to Beltana historic town road and then the Copper king mine road. Traffic movements on both of these roads is likely to be significantly less than on the main road, and could be in the range 0 to 20 vehicles per day. Vehicle movements to and from the mine are expected to be 42 per day, comprising B-double trucks, light vehicles, buses and courier vehicles.

Stakeholders:

Stakeholders who have expressed concern over potential traffic impacts from site activities include PIRSA and Planning SA. Both have been in the form of general comments relating to the potential need to manage dust impacts for environmental reasons and also safety of other road users. No concerns have been expressed by the local landholder and residents of Leigh Creek.

Industry

The mine is a reworking of an existing pit. It is a small scale operation, with the winning of ore to occur in a period of about 8 months. Stockpiling and transport of ore will occur for up to 5 years. No other industrial activities are nearby and none use the Copper King Mine road and the road to Beltana historic town.

Potential Impact Event:

Traffic movements may pose a safety risk to human health and fauna

The proposed development has the potential to pose a safety risk to humans and fauna due to additional vehicle movements on public roads.

Failure to effectively control traffic may result in:

- Death or injury to members of the public
- Death or injury to fauna

Control and management strategies

The impact of traffic movements can be significantly reduced by the implementation of the following control strategies:

- minimizing the number of vehicles entering and leaving the site
- precluding public access to the mine
- maintaining roads in sound condition
- ensuring site vehicle drivers observe road rules and regulations
- limiting vehicle speeds on the Copper King Mine road and the Beltana Historic Town road

Likelihood and Severity of Consequences

The probability of traffic movements posing a risk to members of the public and fauna are low.

Due to the low traffic volumes to be generated by the project, and the low to very low traffic volumes on nearby public roads, it is unlikely that the public will be affected by traffic from the project at any time. Likewise, fauna impacts will be low due to the low traffic volumes to be generated by the project and the low animal populations in this pastoral area.

Risk Levels

The results of the risk analysis for traffic are presented in the table below.

Risk Event	**Risk Prior to Implementation of Controls**		**Primary Control Measures**	**Residual Risk After Implementation of Controls**		**Level of Risk**	**ALARP**
	Likelihood	**Consequence**		**Likelihood**	**Consequence**		
Death or injury to members of the public	Rare	Major	Control measures as outlined above	Virtually impossible	Major	Medium	Yes
Death or injury to fauna	Rare	Major	Control measures as outlined above	Virtually impossible	Major	Medium	Yes

Risk Acceptance

From the above risk analysis, it would appear that the most significant risk from traffic is to public users of the Copper King Mine road and the road to Beltana Historic township. Given the short period of mining, the sporadic nature of ore transport, and the control measures proposed, it is expected that impacts will be temporary and no worse than current.

As a consequence of this analysis, an incident register will be kept for use during the period of mining and ore transport.

Outcome/Objective

No death or injury to members of the public or fauna as a result of the mining operations.

Measurement Criteria

An incident register will show no recorded death or injury to the public and fauna due to mining operations.

Monitoring Program

An incident register to be kept and entries made if injury or death occurs to the public or fauna due to the mining operations during the period of mining and ore transport.

6.3.4 Land Clearance

Context

Environment:

The mine is located in the remote northern Flinders Ranges. Vegetation is sparse, and consists mainly of chenopod low shrubland on flats and hillsides and black Oak low scattered woodland along drainage lines. Eucalyptus socialis (Beaked red mallee) also occurs in some areas. Understorey grasses may have once occurred, but have been removed by grazing.

Rainfall is low and the mine pit, stockpile areas and associated roads and tracks are pre existing features that have been cleared of vegetation. Land use outside the area of mining is pastoral, with overgrazing by stock, native and feral animals leading to negative affects on vegetation abundance and condition. Trees with hollows suitable for use as nesting site are few if any. No threatened flora species have been identified in the mine lease areas. Thirteen mammal species were identified in field surveys (4 of which are introduced) and 10 reptile species were identified, none of which are amphibian. Twenty seven bird species were identified. No species identified in the fauna surveys are listed as national conservation significance. Areas of proposed land clearance have already been identified and will occur adjacent or in close proximity to existing cleared areas. Large areas with similar flora and habitat occur around the lease areas.

Stakeholders:

Stakeholders who have expressed concern over potential impacts of vegetation clearance on flora and fauna from site activities include PIRSA and Planning SA. Both have been in the form of general comments relating to the potential need to manage impacts for environmental reasons. No concerns have been expressed by the local landholder and residents of Leigh Creek.

Industry

The mine is a reworking of an existing pit. It is a small scale operation, with the winning of ore to occur in a period of about 8 months. Stockpiling and transport of ore will occur for up to 5 years. Activities will occur in an area that has previously been used for mining. Personnel and contractors will be required to adhere to Freehold environmental management requirements.

***Potential Impact Event*:**

Land clearance for mining may harm flora and fauna

The proposed development has the potential to impact flora and fauna by the clearance of vegetation. Areas to be cleared are shown on Figure 6.1 and include:

- the waste rock dump (WRD)
- ore stockpile areas
- access tracks and roads
- the extension to the pit (south western corner)

Failure to effectively control vegetation clearance may result in:

- reduction in vegetation abundance
- loss of fauna habitat

Control and management strategies

The impact of land clearance on flora and fauna can be significantly reduced by the implementation of the following control strategies:

- removing fauna prior to land clearance
- minimizing the areas of clearance and disturbance.
- restricting land clearance to the areas defined
- progressively rehabilitating disturbed areas including topsoil replacement, sowing with locally sourced seed stock and the placement of logs on the WRD landform.
- restricting vehicle access to designated roads and tracks
- providing escape routes from trenches and pits for fauna

Likelihood and Severity of Consequences

The probability of impacts to flora and fauna due to land clearance is high during the mining phase. Control measures will be used to minimize impacts.

Due to the lack of endangered plant and animal species and the presence of large areas of similar floristic composition and habitat, a loss of biodiversity is unlikely to occur

Damage to flora and habitat is likely to occur, but will be localized and reduced by the removal of fauna prior to mining, the collection of local seed stock, topsoil replacement (WRD), and re sowing of disturbed areas.

Risk Levels

The results of the risk analysis for flora and fauna are presented in the table below

Risk Event	**Risk Prior to Implementation of Controls**		**Primary Control Measures**	**Residual Risk After Implementation of Controls**		**Level of Risk**	**ALARP**
	Likelihood	**Consequence**		**Likelihood**	**Consequence**		
Reduction in vegetation abundance	Likely	Minor	Minimizing areas of clearance	Rare	Negligible	Low	Yes
Loss of fauna habitat	Likely	Minor	Removal of fauna, restoration measures	Rare	Negligible	Low	Yes

Risk Acceptance

From the above risk analysis, it would appear that the most significant risk from land clearance loss of habitat. Given the abundance of similar vegetation and habitat nearby, the intention to remove fauna prior to mining, and measures to progressively restore, it is expected that impacts will be temporary and little worse than currently occurring due to the current conditions on site.

As a consequence of this analysis, operations will be monitored to ensure land clearance is restricted to designated areas, fauna is removed prior to the commencement of mining, escape routes are provided in trenches and pits (if constructed), and restoration occurs as proposed.

Outcome/Objective

No loss of flora and fauna species due to Freehold's mining operations.

Measurement Criteria

Flora and fauna surveys at mine closure will show similar abundance and diversity as identified by surveys prior to the commencement of Freehold's mining activities.

Monitoring Program

Flora and fauna surveys are to be carried out within 6 months of mine closure.

6.3.5 Extraction and Disposal of Water from the Pit and Aquifer (Groundwater Pumping and Disposal)

Context

Environment:

The mine is located in a remote area with the nearest town being about 16 km distant by road. Vegetation is sparse, rainfall is low and the mine pit, stockpile areas and associated roads and tracks are pre existing features. Land use outside the area of mining is pastoral, with stock watering provided from bore W1, located adjacent to the existing mine pit. Groundwater occurs in fractured basement rocks of Cambrian and Proterozoic age. Ajax Bore, to the east of the mine also provides stock water from these rocks. Groundwater has been used to provide water for the mine camp, but there are no other domestic or industrial users of groundwater for several kilometres. Groundwater quality is non potable, with salinity in the range 3500 mg/L to 6000 mg/L and is contaminated with metals including lead, zinc, copper, iron and manganese. Groundwater has entered the existing pit and is now about 20m above the base of the pit.

It is intended that water pumped from the pit and the bores surrounding it be used for dust suppression and camp/office water supply (with treatment by reverse osmosis), with any surplus water being directed to an appropriately lined evaporation pond to be constructed to the south of the pit.

Stakeholders:

Stakeholders who have expressed concern over potential impacts to aquifers due to groundwater pumping include PIRSA, Planning SA and DWLBC. However, concerns have been in the form of general comments relating to the potential need to ensure other groundwater uses are not compromised and that the environment is not harmed by groundwater pumping and disposal. No concerns have been expressed by the local landholder and residents of Leigh Creek.

Industry

The mine is a reworking of an existing pit. It is a small scale operation, with dewatering to facilitate the winning of ore to occur in a period of about 8 months. No other industry exists in the vicinity of the mine, apart from pastoral, which uses water from the mine for supply.

Potential Impact Event:

Pumping and disposal may impact water availability from the aquifer and contaminate groundwater

The proposed development has the potential to reduce the availability of water from the aquifer for other users and could lead to the contamination of aquifer water.

The main sources of pumping are:

- Dewatering from the pit
- Dewatering from perimeter bores

The main produced water disposal mechanisms are:

- Dust suppression
- Camp/office water supply (with treatment)
- Disposal to evaporation basin

Failure to effectively manage pumping may result in:

- the loss of availability of water for other users

Failure to effectively manage disposal may result in

- leakage through the base of the evaporation basin, waste rock dump and possible contamination of groundwater
- discharge of leaked water to watercourses

Control and management strategies

The impact of pumping from the mine and dewatering bores and leakage from the evaporation basin can be significantly reduced by the implementation of the following control strategies:

- using the water for dust supression
- minimizing the volume of water removed from the aquifer
- maintaining stock water supplies from the pit and or dewatering bores
- installing an appropriate liner in the evaporation basin to control leakage
- installing a drain at the base of the evaporative pond wall to capture any leakage

Likelihood and Severity of Consequences

The probability of water being removed from the pit and aquifer is almost certain and will occur throughout the active mining phase (but not the stockpile removal stage).

Due to the significant distance between the mine and the nearest groundwater user (Ajax Bore), it is unlikely that other groundwater users will be affected by pumping from the pit or groundwater bores at any time.

There are no groundwater dependent ecosystems in this part of the Northern Flinders Ranges, so damage to ecosystems is unlikely to occur.

The probability of water seeping from the base of the evaporation basin is high and will be ameliorated by the use of control measures, specifically the use of an appropriate liner.

Risk Levels

The results of the risk analysis for groundwater pumping and disposal are presented in the table below.

Risk Event	Risk Prior to Implementation of Controls		Primary Control Measures	Residual Risk After Implementation of Controls		Level of Risk	ALARP
	Likelihood	Consequence		Likelihood	Consequence		
Loss of availability of water for other users	Unlikely	Minor	Supply of stock water to pastoralist	Rare	Negligible	Low	Yes
Leakage through the base of the evaporation basin leading to contamination of groundwater	Likely	Minor	Installation of liner	Rare	Negligible	Low	Yes
Discharge of leaked water to watercourses	Likely	Minor	Installation of liner	Rare	Negligible	Low	Yes

Risk Acceptance

From the above risk analysis, it would appear that the most significant risk from the pumping of water from the pit and aquifer is the loss of supply to the local pastoralist. However, the pastoralist currently obtains a supply from the mine and it is intended that a similar supply be made available during and after mining. The most significant risk due to the disposal of pumped water is leakage from the pond and contamination of groundwater and watercourses. Given the short duration of mining and hence pit and groundwater pumping plus the use of an appropriate liner, it is expected that impacts will be minor to insignificant.

As a consequence of this analysis, groundwater levels will be monitored during the mining phase of the project and the area down slope from the evaporative basin will be monitored for signs of discharge.

Outcome/Objective

No loss of water supply to pastoralist.

No contamination of groundwater by leakage of water through the base of the evaporation pond.

Measurement Criteria

Groundwater monitoring and pumping records show supply is available for pastoralist during active mining and until end of closure period.

Visual inspection shows no sign of seepage from the base of the evaporative basin.

Monitoring Program

Measurement of depth to water to occur in selected bores near the mine pit on a six monthly basis from the commencement of mining until closure. Groundwater is also to be analysed prior to the commencement of mining and also on completion of mining excavation for metals, common ions, ph and salinity.

The area down slope of the evaporative basin (refer to Table 6.4 and Figure 6.2) is to be visually inspected on a 3 monthly basis for signs of leakage.

6.3.6 Surface Runoff

Context

Environment:

The mine is located in a remote area with the nearest town being about 16 km distant by road. Vegetation is sparse, and the mine pit, stockpile areas and associated roads and tracks are pre existing features. Topography is undulating, The mine is located on a ridge that separates the Ajax Creek catchment from the Mt Deception Creek catchment. Surface catchments up gradient of the mine are essentially non existent. Water entering the current mine pit is retained within the pit structure. Rainfall is low and occurs sporadically, but rainfall intensity can be high, so there is the potential for surface runoff to occur. Surface runoff from the waste rock dump and stockpile areas are currently uncontrolled and can enter the watercourses and hence has the potential to introduce contaminants (metals) to the catchments. The mineralisation is silicate based, which has effectively precluded the formation of acidic mine waters.

Stakeholders:

Stakeholders who have expressed concern over potential impacts of surface runoff generated from the extension to the mine and associated activities include PIRSA and Planning SA. Both have been in the form of general comments relating to the potential need to manage runoff for environmental reasons. No concerns have been expressed by the local landholder and residents of Leigh Creek.

Industry

The mine is a reworking of an existing pit. It is a small scale operation, with the winning of ore to occur in a period of about 8 months. Currently, surface runoff (when occurring) discharges in an uncontrolled manner to the Mt Deception and Ajax Creek catchments. A small amount of runoff may discharge to the mine pit. No other industries are present within many kilometres of the site, except broad acre pastoral activities.

Potential Impact Event:

Surface runoff may cause environmental damage

The proposed development has the potential to cause:

- pollution of watercourses
- soil erosion.

The main sources of surface runoff that could cause erosion or contaminate watercourses are:

- The waste rock dump
- Ore stockpiles
- The mine pit

Failure to effectively control surface runoff may result in:

- the contamination of watercourses
- soil erosion

Control and management strategies

The impact of the transport of contaminants in surface runoff can be significantly reduced by the implementation of the following control strategies:

- directing runoff where practicable toward the pit
- installing spoon drains to intercept and channel runoff
- directing runoff to retention basins constructed immediately down gradient of the waste rock dump and ore stockpiles
- contouring the WRD to an angle of less than 25 degrees to promote the infiltration of rainfall
- progressive revegetation of WRD and stockpile areas to reduce erosion and sediment mobilisation

Likelihood and Severity of Consequences

The probability of surface runoff being generated from these activities is high and will be generated both during operations and post closure. Control measures will be used to minimize runoff.

Due to the position of the mine and infrastructure at the top of the catchments, disruption to other watercourses is unlikely to occur. Effects to flora and fauna are not expected to be severe due to the sparse vegetation and low fauna numbers (carrying capacity).

Effects to human health and infrastructure are expected to be low, due to the position of the mine at the top of the catchment and the relatively inert mineralisation.

Risk Levels

The results of the risk analysis for surface runoff are presented in the table below

Risk Event	**Risk Prior to Implementation of Controls**		**Primary Control Measures**	**Residual Risk After Implementation of Controls**		**Level of Risk**	**ALARP**
	Likelihood	**Consequence**		**Likelihood**	**Consequence**		
Contamination of watercourses	Rare	Minor	Control measures as outlined above	Rare	Negligible	Low	Yes
Soil erosion	Unlikely	Minor	Control measures as outlined above	Rare	Negligible	Low	Yes

Risk Acceptance

From the above risk analysis, it would appear that the most significant risk from surface runoff is contamination of watercourses and erosion. Given the low frequency of rainfall events and the control

measures proposed, it is expected that impacts will be nil to minor and no worse than currently occurring due to the current conditions and continuing trend of low rainfall.

As a consequence of this analysis, surface runoff will be monitored for contaminants and soils will be monitored for erosion.

Outcome/Objective

No contamination of watercourses due to the proposed mining activities, no erosion of soils due to surface runoff.

Measurement Criteria

Analysis of surface water samples show that water leaving the site is of a quality no worse than previously assessed.

Photo monitoring of soils adjacent to the WRD, workshop area , emulsion mixing area and stockpile areas will show no additional loss of soil cover or gullying at the end of the closure period when compared with reference photographs taken of the same locations prior to the commencement of mining

Monitoring Program

Soils erosion photo monitoring points adjacent to the WRD, workshop area, emulsion mixing area and ore stockpiles (refer to Table 6.4 and Figure 6.2) will be initially monitored and recorded by the environmental officer on a 6 monthly basis or immediately after rainfall events of 10mm or greater during the period of mining and then 6 monthly until closure.

Surface water samples are to be collected and analysed for metals, common ions, ph and salinity if runoff occurs from rainfall events of 10mm or greater at the locations shown in Figure 6.2.

6.3.7 Waste Management

Context

Environment:

The mine is located about 16 km distant by road from Leigh Creek. At present, infrastructure includes the mine pit, stockpiles, WRD, and a group of camp and office buildings. Operations to be carried out will include mining, screening, crushing and stockpiling, loading and transport. These will occur 24 hours per day, with personnel being stationed at Leigh Creek and travelling to and from site on a daily basis. Some contract personnel may be temporarily house on site. The camp and office facilities will hence be populated every day the operations are active, and hence will generate waste including sewerage, putrescible (eg food) wastes, hard rubbish and vehicle servicing fluids and containers.

Stakeholders:

Stakeholders who have expressed concern over potential waste impacts from site activities include PIRSA and Planning SA. Both have been in the form of general comments relating to the potential need to manage waste impacts for environmental reasons. No concerns have been expressed by the local landholder and residents of Leigh Creek.

Industry

The mine is a reworking of an existing pit. It is a small scale operation, with the winning of ore to occur in a period of about 8 months. Stockpiling and transport of ore will occur for up to 5 years. The workforce for the mine is small and will be based in Leigh Creek.

Potential Impact Event:

Discharge of wastes may cause environmental damage

The proposed development will increase the amount of wastes generated from the site. The main types of waste likely to be generated are:

- Hard rubbish from the office and camp facilities
- Putrescibles wastes from the office and camp facilities
- sewerage
- packaging wastes from vehicle servicing areas
- spent oils and lubricants from vehicle servicing areas

Failure to effectively control waste may result in:

- the generation of litter, reducing visual amenity
- increases in feral animal populations
- contamination of soils, groundwater and watercourses

Control and management strategies

The impact of waste can be significantly reduced by the implementation of the following control strategies:

- placing all hard waste substances (putrescible and packaging) in appropriate bins for disposal at Leigh Creek
- maintaining septic waste system in an acceptable working order
- collecting spent lubricants and fuels for disposal at Leigh Creek
- workforce training and awareness

Likelihood and Severity of Consequences

The probability of waste being generated from these activities is high and will be generated for the duration of the project (up to 5 years). Control measures will be used to minimize the effects of the generation of waste.

Due to the significant distance between the mine and the nearest residence, it is unlikely that residents will be affected by waste generation at this site. Likewise, the site is a restricted area, so public health and amenity are unlikely to be affected by waste management during the mining and closure periods.

Damage to soils, watercourses and groundwater could occur but will be reduced through the use of waste collection and disposal measures.

Risk Levels

The results of the risk analysis for waste are presented in the table below.

Risk Event	Risk Prior to Implementation of Controls		Primary Control Measures	Residual Risk After Implementation of Controls		Level of Risk	ALARP
	Likelihood	Consequence		Likelihood	Consequence		
The generation of litter, reducing visual amenity	Likely	Minor	Waste collection and disposal measures as outlined above	Rare	Negligible	Low	Yes
Increase in feral animal populations	Likely	Minor	Waste collection and disposal measures as outlined above	Rare	Negligible	Low	Yes
Contamination of soils, groundwater and watercourses	Unlikely	Major	Waste collection and disposal measures as outlined above	Virtually impossible	Minor	Low	Yes

Risk Acceptance

From the above risk analysis, it would appear that the most significant risk from waste generation is reduced visual amenity, increases in feral animal populations and contamination of soils, watercourses and groundwater. Given the short period of mining, the small workforce on site at any one time, the significant depth to groundwater (greater than 50m), small number and footprint of waste storage bins, offsite waste disposal and workforce training, it is expected that impacts will be minor to insignificant.

As a consequence of this analysis, waste management will be monitored for impacts to the environment.

Outcome/Objective

No litter and waste debris due to the mining operations left on site.

No contamination of soil and groundwater to be caused by putrescible waste, packaging waste, spent lubricants and waste oil relating to Freehold's mining operation.

Measurement Criteria

Photo monitoring of areas adjacent to camp and office facilities and at vehicle refuelling and service areas are to show no litter.

Records of waste disposal are to show that putrescibles, packaging and lube wastes are disposed off site.

Feral animal populations not increased du to Freehold's mining operations

Monitoring Program

Photo monitoring points adjacent to camp and office area, the emulsion mixing area and at the vehicle refuelling and service area (refer to Table 6.4 and Figure 6.2) will be initially monitored and recorded by the environmental officer on a 3 monthly basis for the first year and then 6 monthly until closure.

A fauna survey will be carried out within 6 months of mine closure.

6.3.8 Fuel Storage

Context

Environment:

The mine is located in a remote area with the nearest town being about 16 km distant by road. Vegetation is sparse, rainfall is low and the mine pit, stockpile areas and associated roads and tracks are pre existing features. Land use outside the area of mining is pastoral, with overgrazing by stock, native and feral animals leading to dust generation and negative affects on vegetation abundance and condition.

Diesel fuel will be used to power drilling rigs, graders, trucks, excavators and crushing plant. Fuel tanks previously used have been removed, and new tanks will be installed near the stockpile area.

Groundwater occurs at depths of more than 50 metres beneath the site. Soils are shallow and underlain by low permeability rocks. Watercourses (drainage lines) are generally dry and do not support aquatic ecosystems. Terrestrial vegetation is sparse.

Stakeholders:

Stakeholders who have expressed concern over potential impacts of fuel storage include PIRSA and Planning SA. Both have been in the form of general comments relating to the potential need to manage fuel storage for environmental reasons. No concerns have been expressed by the local landholder and residents of Leigh Creek.

Industry

The mine is a reworking of an existing pit. It is a small scale operation, with the winning of ore to occur in a period of about 8 months. Stockpiling and transport of ore will occur for up to 5 years. Fuel will most likely be sourced from Leigh Creek. This will not impinge on other industrial users.

Potential Impact Event:

Fuel Leakage may cause environmental damage

The leakage and spillage of fuel has the potential to cause environmental damage. Leakage and spills of fuel could occur from:

- Refuelling activities
- Rupture of storage tanks
- Leakage of vehicular fuel tanks

Failure to effectively store fuel may result in:

- Contamination of soils
- Contamination of groundwater
- Contamination of watercourses

Control and management strategies

The impact of fuel storage can be significantly reduced by the implementation of the following control strategies:

- Refuelling to occur at a single designated location outside the pit
- Fuel tanks on vehicles to be checked regularly for leaks
- Fuel storage to be above ground, mounted over a gravel bed over a 2mm HDPE liner and bunded with containable volume to be 120% of maximum storage volume
- Comparing fuel volumes used with fuel volumes brought into the site

Likelihood and Severity of Consequences

The probability of significant spills and leakage occurring is low. Control measures will be used to minimize fuel leakage and spillage.

Due to the significant distance between the mine and the nearest residence, it is unlikely that residents will be affected by fuel leakage. Likewise, public health and amenity are unlikely to be affected by fuels spills and leakage at the mine.

Contamination of soils, surface water and groundwater could occur, but will be localised and reduced through the use of control and management strategies.

Risk Levels

The results of the risk analysis for fuel storage are presented in the table below

Risk Event	**Risk Prior to Implementation of Controls**		**Primary Control Measures**	**Residual Risk After Implementation of Controls**		**Level of Risk**	**ALARP**
	Likelihood	**Consequence**		**Likelihood**	**Consequence**		
Contamination of soils	Unlikely	Minor	Control measures as outlined above	Rare	Negligible	Low	Yes
Contamination of groundwater	Rare	Minor	Control measures as outlined above	Rare	Negligible	Low	Yes
Contamination of watercourses	Rare	Minor	Control measures as outlined above	Rare	Negligible	Low	Yes

Risk Acceptance

From the above risk analysis, it would appear that the most significant risk from fuel storage is to soils, groundwater and watercourses. Given the short period of mining, the small size of the operation and relatively few vehicles to be operated, and the control measures proposed, it is expected that impacts (if any) will be minor and no worse than previously currently occurring on site.

As a consequence of this analysis, fuel storage will be monitored for leakage and spillage during the active mining phase of the project.

Outcome/Objective

No permanent contamination due to leakage or spillage of fuel during the mining operations.

Measurement Criteria

Photo monitoring of soils adjacent to refuelling area will show no staining or obvious signs of contamination. Vehicle service records to show no leaks identified in fuel tanks of vehicles working on site. Fuel records will indicate that the volume of fuel supplied to the site is reasonably comparable with the volume of fuel used by machinery.

Monitoring Program

A photo monitoring point established at the refuelling area (refer to Table 6.4 and Figure 6.2) will be initially monitored and then recorded by the environmental officer on a 3 monthly basis for the first year and then 6 monthly until the end of mining operations to monitor soils staining by leakage and refuelling.

Vehicle service records will be retained and fuel leaks recorded

Fuel supply to the site and use by vehicles will be monitored monthly.

6.3.9 Weeds and Feral Animals

Context

Environment:

The mine is located in a remote area with the nearest town being about 16 km distant by road. Vegetation is sparse, rainfall is low and the mine pit, stockpile areas and associated roads and tracks are pre existing features. Land use outside the area of mining is pastoral, with overgrazing by stock, native and feral animals leading to dust generation and negative affects on vegetation abundance and condition. Due to the regionally dry conditions (low rainfall), weeds are currently not widely spread on site nor in great abundance. Four introduced animal species (camel, goat, rabbit, sheep) were identified in a recent fauna survey.

Stakeholders:

Stakeholders who have expressed concern over potential weed and feral animal impacts from site activities include PIRSA and Planning SA. Both have been in the form of general comments relating to the potential need to manage weed and feral animal impacts for environmental reasons. No concerns have been expressed by the local landholder and residents of Leigh Creek.

Industry

The mine is a reworking of an existing pit. It is a small scale operation, with the winning of ore to occur in a period of about 8 months. Stockpiling and transport of ore will occur for up to 5 years. The workforce for the mine is small and will be based in Leigh Creek. Impacts of feral animals and weeds at this site will not affect other industrial operations.

Potential Impact Event:

Weeds and feral animals may cause environmental damage

The proposed development has the potential to increase weed and feral animal populations on the site. The main opportunities for increases in weed and feral animal numbers are the:

- Introduction of new weed species by carriage on vehicles entering the site
- Increased growth or population due to water leaks, ponding, or discharge of water

- Introduction of new weed or animal species as domestic plants or pets by personnel working on site.

Failure to effectively control weed and feral animal populations may result in:

- damage to flora and habitat by competition by feral weeds and animals

Control and management strategies

The impact of weeds and feral animals can be significantly reduced by the implementation of the following control strategies:

- Minimizing the areas of clearance and disturbance to provide less opportunity for seed growth.
- Vehicle washdown / cleaning to preclude the introduction of weeds from incoming vehicles
- The revegetation of disturbed areas with locally derived seed stock to act as competition against weeds
- The banning of domestic pets from site
- Adhering to waste management policies including the deposition of all putrescibles wastes in secured bins and off site waste disposal
- The spraying or removal of weeds and pest plants when identified
- The fencing of the MPL boundary to exclude large animals

Likelihood and Severity of Consequences

The probability of weed and feral animal numbers increasing is high and will be generated for the duration of the project (up to 5 years). Control measures will be used to minimize weed and feral animal impacts.

Due to the significant distance between the mine and the nearest residence, it is unlikely that residents will be affected by weed and feral animal populations or control measures at the site.

Damage to flora and habitat could occur, but will be localized and reduced through the use of control measures.

Risk Levels

The results of the risk analysis for weed and feral animals are presented in the table below

Risk Event	**Risk Prior to Implementation of Controls**		**Primary Control Measures**	**Residual Risk After Implementation of Controls**		**Level of Risk**	**ALARP**
	Likelihood	**Consequence**		**Likelihood**	**Consequence**		
Damage to flora and habitat by competition by feral weeds and animals	Likely	Minor	Control measures as outlined	Rare	Negligible	Low	Yes

Risk Acceptance

From the above risk analysis, it would appear that the most significant risk from weed and feral animals is damage to flora and habitat. Given the short period of mining and the control measures proposed, it is expected that impacts will be minor and no worse than currently occurring due to the current conditions on site and surrounding land use.

As a consequence of this analysis, weed and feral animals will be monitored for population and distribution prior to the commencement of mining, during mining and transport phases, and in the closure period.

Outcome/Objective

No increase in weed and feral animal species and population due to the mining operations.

Measurement Criteria

Photo monitoring of vegetation adjacent to operational areas will show similar vegetation abundance and diversity to corresponding vegetation points at the end of the closure period.

A fauna survey conducted at the end of closure shows similar feral animal populations to that identified in a survey conducted prior to the commencement of mining.

Monitoring Program

A flora survey is to be carried out within 6 months of the completion of mining operations.

A fauna survey is to be conducted within 6 months of the completion of mining operations

6.3.10 Heritage

Context

Environment:

The mine is located in a remote area with the nearest town (Leigh Creek) being about 16 km distant by road. Vegetation is sparse, rainfall is low and the mine pit, stockpile areas and associated roads and tracks are pre existing features. Land use outside the area of mining is pastoral.

The nearest tourist destination of interest near the mine site is the historic Copper King Mine, several kilometres to the east of the Beltana mine. The track to the Copper King Mine shares the same track to the Beltana Mine from the main road for part of the way, diverting after the Beltana mine camp, just before the Beltana mine site.

The only other listed European heritage sites are the Beltana Historic Reserve, Beltana Homestead and the Beltana Post Office. These sites are located at the former township of Beltana approximately 17 km south of the mine.

There are no known sites of Aboriginal heritage significance at the mine site, and the mining leases have been extensively disturbed by previous pastoral and mining activities.

Stakeholders:

Stakeholders who have expressed concern over potential heritage impacts from site activities include PIRSA and Planning SA. Both have been in the form of general comments relating to the potential need to manage heritage impacts. No concerns have been expressed by the local landholder and residents of Leigh Creek.

Industry

The mine is a reworking of an existing pit. It is a small scale operation, with the winning of ore to occur in a period of about 8 months. Stockpiling and transport of ore will occur for up to 5 years. The

historic Copper King Mine is the nearest heritage site, and this site is several kilometres distant from the Beltana Mine. It is a tourist attraction and is not operational.

Potential Impact Event:

Operations may impact heritage sites

The proposed development has the potential to impact heritage sites by:

- mining activities (blasting, hauling, crushing, stacking of ore)
- traffic movements

Failure to effectively control heritage impacts may result in:

- damage or destruction of sites of heritage significance

Control and management strategies

The impact of operations on heritage sites can be significantly reduced by the implementation of the following control strategies:

- minimizing the areas of clearance and disturbance
- Following the requirements of the Aboriginal Heritage Act 1988 if new sites of aboriginal heritage are identified.
- Providing site staff and contractor training and induction that includes heritage considerations and procedures to be followed if a heritage discovery is made.

Likelihood and Severity of Consequences

The probability of heritage sites being impacted by mining operations is low and could only occur during the mining phase, as all other areas to be used have already been disturbed by previous mining activities. Control measures will be used to minimise impacts.

Risk Levels

The results of the risk analysis for heritage are presented in the table below

Risk Event	**Risk Prior to Implementation of Controls**		**Primary Control Measures**	**Residual Risk After Implementation of Controls**		**Level of Risk**	**ALARP**
	Likelihood	**Consequence**		**Likelihood**	**Consequence**		
Damage or destruction of sites of heritage significance	Rare	Minor	Control measures as outlined above	Rare	Minor	Low	Yes

Risk Acceptance

From the above risk analysis, it would appear that the most significant risk to heritage is damage or destruction of sites of heritage significance. Given the short period of mining, the distance of the site from areas or sites of known heritage significance, the highly disturbed nature of the leases, and the control measures proposed, it is expected that impacts will be nil to minor. However, risks to heritage sites will be monitored during the mining phase of the project.

Outcome/Objective

No damage or destruction of previously unknown sites of heritage significance due to the mining operations.

Measurement Criteria

A register of sites recorded and damage/events to sites. The register is to demonstrate that no damage has occurred to sites of heritage significance identified to the end of the mining phase. Processes required by the Heritage Act will be adhered to.

Monitoring Program

Monitoring will consist of a register of heritage sites discovered and a traceable set of actions including disclosure, documentation, stakeholder consultation, management and regular monitoring to ensure that disturbance to identified sites does not occur. Should any evidence of Aboriginal artefacts or heritage be identified on site, the relevant authorities will be notified in accordance with the *Aboriginal and Heritage Act 1988*. Procedures followed post discovery are to be recorded and outcomes documented.

6.3.11 Blasting

Context

Environment:

The mine is located in a remote area with the nearest town being about 16 km distant by road. Land use is pastoral, with the nearest homestead about 18km distant near Beltana historic town. The nearest major road is the Leigh Creek to Hawker road, about 3km to the west of the mine. The road to Beltana historic town is about 2 km to the west and the road to Copper king mine passes within several hundred metres of the mine. The Leigh Creek to Port Augusta coal train rail line also passes within about 2km of the mine.

Traffic movements on the roads are about 200 per day on the main Leigh Creek road, and probably less than 20 on the Beltana historic town road and possibly less than 1 per day on the Copper King Mine road.

No explosives will be retained on site after the end of the mining phase.

Stakeholders:

Stakeholders who have expressed concern over potential blasting impacts from site activities include PIRSA. This has been in the form of general comments relating to the potential need to manage blasting hazards for travellers passing along the Copper King Mine road. No concerns have been expressed by the local landholder and residents of Leigh Creek.

Industry

The mine is a reworking of an existing pit. It is a small scale operation, with the winning of ore to occur in a period of about 8 months. There are no other working mines within many kilometres of the site.

Potential Impact Event:

Blasting may impact travellers on Copper King mine road.

The proposed development has the potential to impact travellers going to and from the historic Copper King Mine by:

- causing distress to individuals due to noise and possibly blast debris
- damage to vehicles due to blast debris

Failure to effectively control blasting emissions may result in:

- death or injury to members of the public
- damage to private property

Control and management strategies

The impact of blasting can be significantly reduced by the implementation of the following control strategies:

- all blasting to be carried out as per the requirements of Safework SA
- explosives to be stored in magazines that meet the standards set by Worksafe SA
- closure of the Copper King Mine road during blasting
- explosives are not to be stored on site after mining ceases.

Likelihood and Severity of Consequences

Due to the significant distance between the mine and the nearest residence, it is unlikely that residents will be affected by blasting at any time.

The mine is located in a remote area, and largely out of view of the public, so public health and amenity are unlikely to be affected by blasting except perhaps if travelling along Copper King Mine Road. Even then, the probability of blasting causing injury or damage to the public is low. Control measures will be used to further reduce the risk to the risk to the public.

Flora and fauna are unlikely to be affected by blasting.

Risk Levels

The results of the risk analysis for blasting are presented in the table below

Risk Event	**Risk Prior to Implementation of Controls**		**Primary Control Measures**	**Residual Risk After Implementation of Controls**		**Level of Risk**	**ALARP**
	Likelihood	**Consequence**		**Likelihood**	**Consequence**		
Death or injury to members of the public	Virtually impossible	Major	Control measures as outlined above	Virtually impossible	Major	Medium	Yes
Damage to private property	Virtually impossible	major	control measures as outlined above	Virtually impossible	negligible	medium	Yes

Risk Acceptance

From the above risk analysis, it would appear that the most significant risk from blasting is to travellers on the Copper King Mine road. Given the short period of mining, the sporadic frequency of

blasting, the extremely small traffic movements and the control measures proposed, it is expected that impacts will be minimal.

As a consequence of this analysis, complaints relating to blasting will be recorded during the mining phase of the project.

Outcome/Objective

No injury to members of the public or damage to private property due to blasting during the mining operation.

Measurement Criteria

No complaints, death, injury or damage to property of those travelling along the Copper King Mine road during the period of mining due to blasting.

Monitoring Program

Register of complaints, damage, injury and death for travellers along the Copper King Mine road during the period of mining due to blasting.

6.3.12 Landscape Stability/Slope Failure

Context

Environment:

The mine is located in a remote area with the nearest town being about 16 km distant by road. Vegetation is sparse, rainfall is low and the mine pit, stockpile areas and associated roads and tracks are pre existing features. The mine pit is currently approximately 70m deep and will be deepened by another 30m, and also extended to the south west. The rocks that host the deposit have been separated into a number of structural domains based on rock type and rock mass quality. The existing pit slopes have remained stable apart from one small failure along the eastern wall of the pit. Detailed geological and geotechnical investigations have bee carried out for this and previous mining phases, and there is a sound understanding of the structural geology and geotechnical properties of the pit and host rocks.

The current waste rock dump (WRD) is located near the pit, but are separated from it by competent rock. The thickness of material comprising the WRD increases with distance from the pit, with the thinnest section of the dump occurring nearest the pit but still separated from it by undisturbed (in situ) rock. The slopes of the batters of the WRD currently vary, but are generally greater than 30^0.

The mining contractor has OH&S plans already developed to ensure public safety at this site during mining.

Stakeholders:

Stakeholders who have expressed concern over landscape stability include PIRSA and Planning SA. Both have been in the form of general comments relating to the potential need to ensure public safety at the site on relinquishment of the leases.

No concerns have been expressed by the local landholder and residents of Leigh Creek.

Industry

Landscape stability associated with the mine will not impact other industrial activities due to the significant distance between it and the nearest industrial site (over 10 km).

Potential Impact Event:

The landscape may become unstable

The proposed development has the potential to reduce landscape stability on the site. The main sources of instability are:

- The pit
- The waste rock dump

Failure to effectively manage landscape stability may result in:

- Failure of the WRD batters
- Risks to public safety due to the collapse of the pit walls

Control and management strategies

The impact of instability can be significantly reduced by the implementation of the following control strategies:

- Conducting operations in accordance with the engineering design and relevant standards
- Reducing the batter angles of the WRD to less than 25^0
- revegetating WRD
- providing drainage to remove water from WRD toe
- restricting public access to the pit and WRD

Likelihood and Severity of Consequences

The probability of slope failure is low, but risks will be present during and after the mining and closure periods.

Control measures will be used to minimize landscape instability.

Due to this being a pre existing operation and significant distance between the mine and the nearest residence, it is unlikely that residents will be attracted to the site.

The mine is located in a remote area, and is largely out of view of the public, so casual visitors are unlikely to be attracted to the site.

Damage to flora and habitat could occur in the event of slope failure, but will be localized and occur only in areas subject to vegetation clearance.

Risk Levels

The results of the risk analysis for slope failure are presented in the table below.

Risk Event	Risk Prior to Implementation of Controls		Primary Control Measures	Residual Risk After Implementation of Controls		Level of Risk	ALARP
	Likelihood	Consequence		Likelihood	Consequence		
Risks to public safety	Rare	Minor	Fencing, signage	Rare	Negligible	Low	Yes

R*isk Acceptance*

From the above risk analysis, it would appear that the most significant risk from slope failure is to human health. Given the level of detail in terms of geological mapping, engineering design and site construction control, it is expected that risks of slope failure will be low. In addition, the remoteness of the site plus measures to preclude public access are expected to further diminish risks to public safety.

As a consequence of this analysis, the mine pit and WRD will be monitored for slope failure on completion of mining and waste rock placement.

Outcome/Objective

No death or injury to public due to Freehold's mining operations during mining and after closure.

Measurement Criteria

- No unauthorised public access to the site during operations
- The placement of fencing, signage and bunding at the end of mining operations

Monitoring Program

Monitoring shall include the recording of unauthorised access (surveillance) and adherence to the closure plan at the end of mining operations.

6.4 Compliance Monitoring and Reporting Strategy

A compliance and monitoring plan has been developed for the site. This includes the monitoring actions described above for each credible potential impact event. These monitoring elements are summarised below. Monitoring locations are shown on Figure 6.2. Eastings and northings of monitoring locations are presented in Table 6.4. The term "loc" refers to the numbered monitoring location as shown on Figure 6.2 (also presented as an A3 figure in Appendix I). Photos of each site are in Appendix J.

***Dust*:** Vegetation photo monitoring points adjacent to mine pit (loc 17), waste rock dump (loc 12), ore stockpile (loc 6) and along the road transport corridor (loc 2) will be initially monitored and recorded by the environmental officer on a 3 monthly basis for the first year and then 6 monthly until operations close.

***Visual Impact*:** Vegetation photo monitoring points adjacent to mine pit (loc 16), waste rock dump (locs 14 and 15), and ore stockpile (loc 7) plus the road traffic corridor (loc 2) and a location on the Leigh Creek road (loc 1) will be initially monitored and recorded by the environmental officer on a 3 monthly basis for the first year and then 6 monthly until operations close.

***Traffic*:** An incident register to be kept and entries made if injury or death occurs to the public or fauna due to the mining operations during the period of mining and ore transport.

***Flora and Fauna*:** Flora and fauna surveys to be conducted within 6 months of the completion of mining.

Pumping and Disposal of Pit water and Groundwater: Measurement of depth to water to occur in selected bores near the mine pit on a six monthly basis from the commencement of mining until the completion of mining. Groundwater is also to be analysed prior to the commencement of mining and also on completion of mining excavation for metals, common ions, ph and salinity.

The area south of the evaporative pond (loc 19) is to be visually inspected on a 3 monthly basis for signs of leakage.

Surface Runoff: Soils erosion photo monitoring points adjacent to the waste rock dump (loc 13), workshop area (loc 9), emulsion mixing area (loc 10) and ore stockpiles (loc 5) will be initially monitored and recorded by the environmental officer on a 6 monthly basis or immediately after rainfall events of 10mm or greater during the period of mining and then 6 monthly until closure.

Surface water samples are to be collected and analysed for metals, common ions, ph and salinity if runoff occurs from rainfall events of 10mm or greater.

***Weeds and Feral Animals*:** Flora and fauna surveys are to be carried out within 6 months of the completion of mining.

***Waste Management*:** Photo monitoring points adjacent to the camp and office area (loc 3), the emulsion mixing area (loc 11) and at the vehicle refuelling and service area (loc 8) will be initially monitored and recorded by the environmental officer on a 3 monthly basis for the first year and then 6 monthly until closure.

A fauna survey will be carried out within 6 months of the completion of Freehold's mining activities.

***Fuel Storage*:** A photo monitoring point established at the refuelling area (loc 4) will be initially monitored and then recorded by the environmental officer on a 3 monthly basis for the first year and then 6 monthly until closure to monitor soils staining by leakage and refuelling.

Vehicle service records will be retained and fuel leaks recorded

Fuel supply to the site and use by vehicles will be monitored monthly.

***Heritage*:** maintaining a register of heritage sites discovered and a traceable set of actions including disclosure, documentation, stakeholder consultation, management and regular monitoring to ensure that disturbance to identified sites does not occur. Should any evidence of Aboriginal artefacts or heritage be identified on site, the relevant authorities will be notified in accordance with the *Aboriginal and Heritage Act 1988*. Procedures followed post discovery are to be recorded and outcomes documented.

Blasting: maintaining a register of complaints, damage, injury and death for travellers along the Copper King Mine road during the period of mining.

***Landscape Stability/Slope Failure*:** monitoring shall include the recording of unauthorised access and adherence to the closure plan at the end of mining operations.

Freehold will provide the collected data as required by PIRSA.

All data presented will be collected and reviewed in accordance with Perilya quality management system requirements.

Table 6.4 Monitoring Location Coordinates and Descriptions

Location Number	Monitoring Location	Monitoring Type	Monitoring Reason	Easting mga Zone 54	Northing mga Zone 54
1	Leigh Creek Rd	Visual/Photo	Visual impact	251212	6605243
2	On road between railway line and camp	Visual/Photo	Dust effects on vegetation/Flora and Fauna/Weeds and Feral animals	252316	6604391
3	West of Camp site	Visual/Photo	Visual impact	254127	6604477
3b	West of Camp site	Visual/Photo	Waste management	254127	6604477
4	Fuel storage and refuelling area	Visual/Photo	Fuel storage/Visual impact for spillage	254611	6604107
5	Crusher Stockpiles	Visual/Photo	Surface runoff	254619	6604032
6	Crusher Stockpiles	Visual/Photo	Dust effects on vegetation	254619	6604032
7	Crusher Stockpiles	Visual/Photo	Flora and Fauna/Weeds and Feral animals	254619	6604032
8	Workshop yard	Visual/Photo	Waste management	254608	6604163
9	Workshop yard	Visual/Photo	Surface runoff	254605	6604136
10	Emulsion Mixing area	Visual/Photo	Surface runoff	254589	6603591
11	Emulsion Mixing area	Visual/Photo	Waste management	254597	6603499
12	West of Waste Dump	Visual/Photo	Dust effects on vegetation	253690	6603761
13	West of Waste Dump	Visual/Photo	Surface runoff	253690	6603761
14	South West of Waste Dump	Visual/Photo	Landscape stability/Slope failure	253709	6603350
15	South West of Waste Dump	Visual/Photo	Flora and Fauna/Weeds and Feral animals	253709	6603350
16	Eastern crest of Pit	Visual/Photo	Flora and Fauna/Weeds and Feral animals	254398	6603550
17	Eastern crest of Pit	Visual/Photo	Dust effects on vegetation	254380	6603592
18	Top of Pit ramp	Visual/Photo	Visual impact	254268	6603691
19	South East of Evaporation Pond	Measurement	Dewatering disposal measurement for Seepage	254299	6603143

6.5 Native Vegetation Management Plan

The Native Vegetation Management Plan is presented in Appendix H. As stated in the plan, about 21 hectares of land will be cleared of vegetation. None of the vegetation to be cleared is of special significance and similar vegetation occurs nearby. Revegetation strategies are presented, and Significant Environmental benefit (SEB) is calculated. Payment of SEB will be to the Native Vegetation Management Fund. Areas of native vegetation clearance are shown in Figure 6.1 (also presented as an A3 figure in Appendix I).

Figure 6.1 Areas of Native Vegetation Clearance

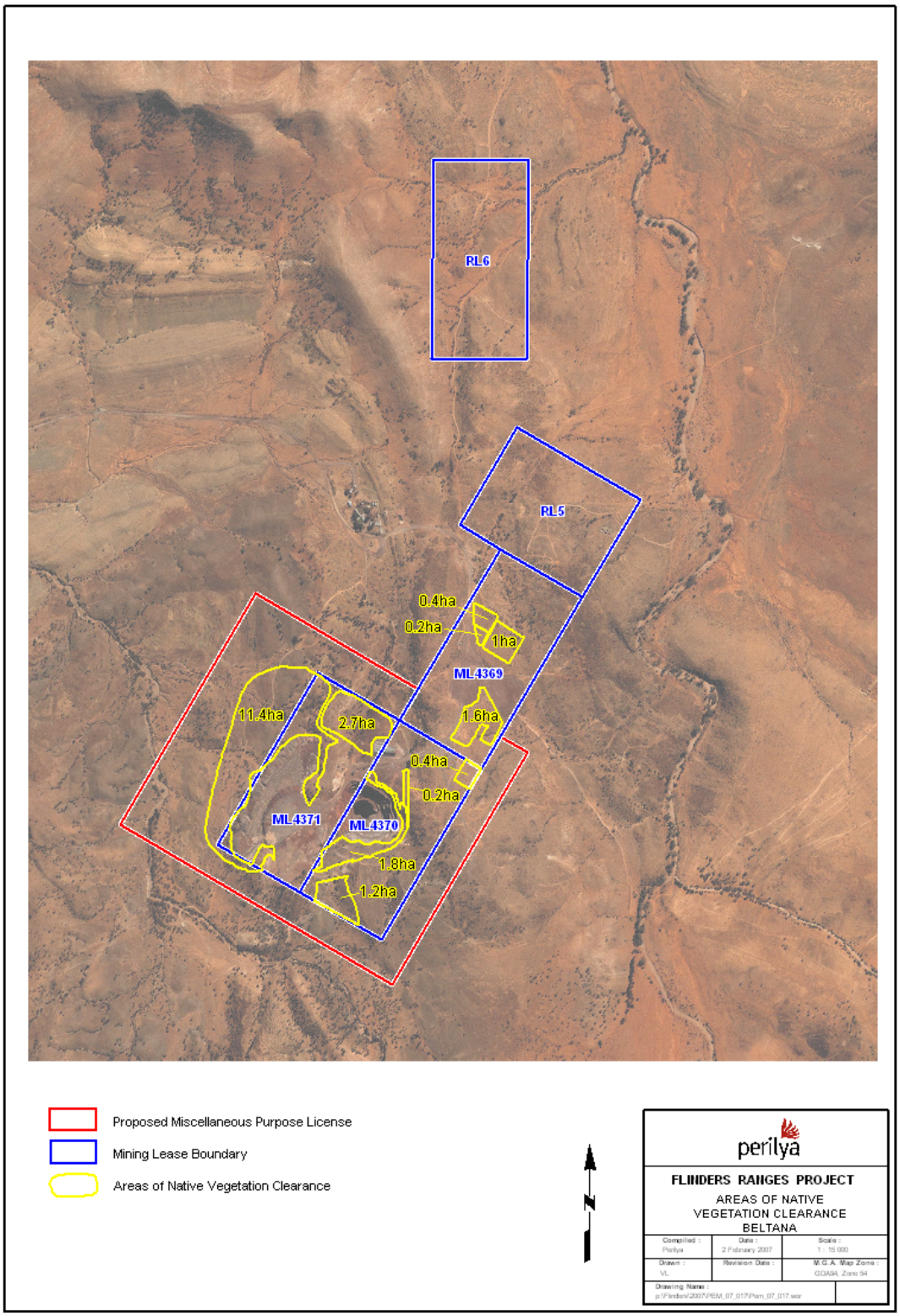
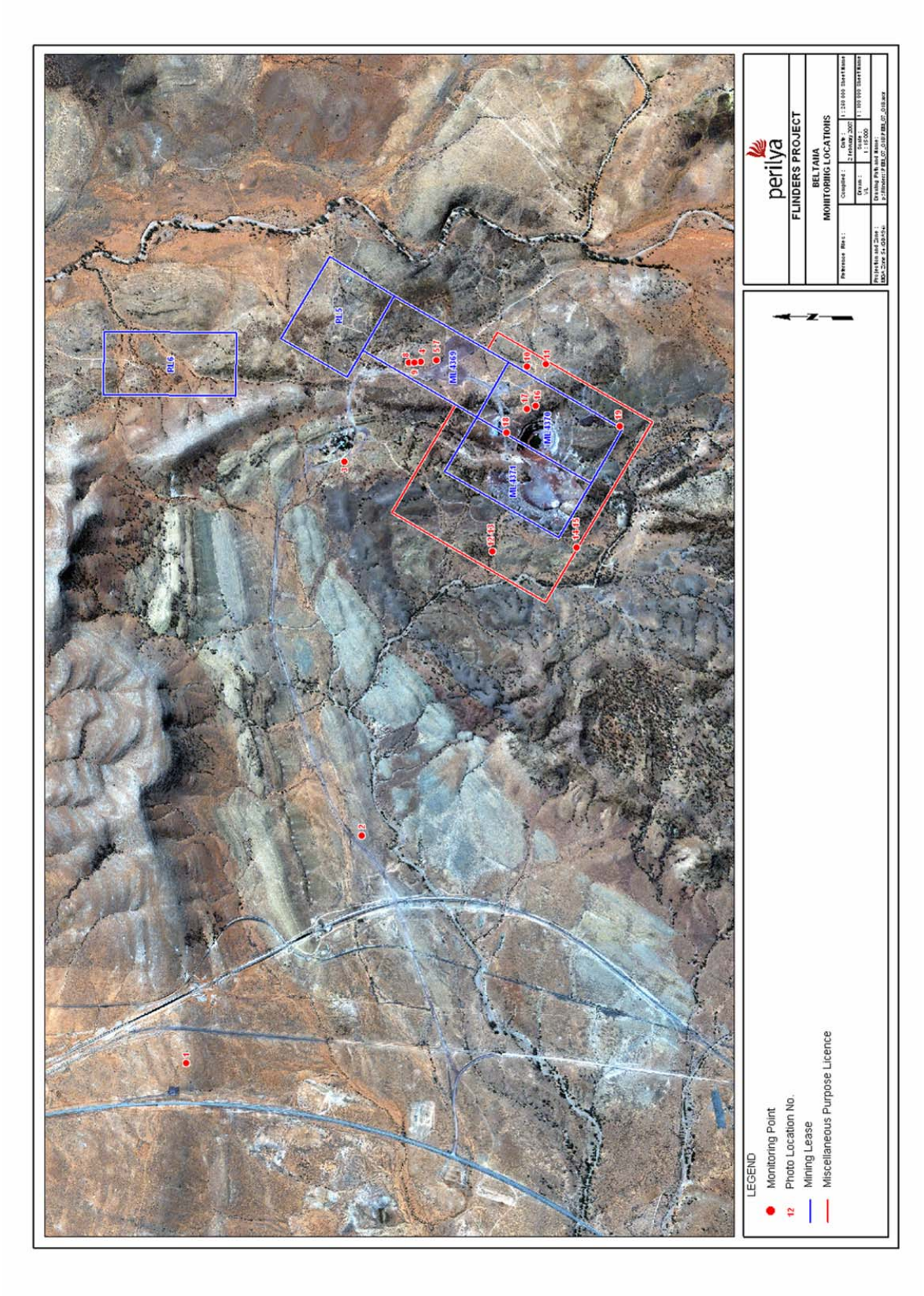


Figure 6.2 Monitoring Locations



6.6 Rehabilitation and Mine Closure Plan

6.6.1 Rehabilitation Introduction

Rehabilitation and mine closure and completion will be undertaken with reference to the recently released Department of Industry Tourism and Resources documents *Mine Closure and Completion* (2006), and *Mine Rehabilitation* (2006)

The mine site consists of an open-pit, waste rock dump (Plate , ore stockpiles, roads and tracks, the evaporation pond, stockpiles of ore grade material recovered from the Copley rail siding, and camp infrastructure. Photographs of current site features are presented as plates 6.1 to 6.4.

All these areas, other than the camp, will require rehabilitation upon completion of mining at Beltana. The camp will be retained for use by personnel involved in exploration on nearby Flinders Project leases, and is therefore not covered by this MARP.

The main features of the site on closure will be the mine and the waste rock dump. On closure, the mine will cover an area of 7 ha and consist of a pit about 90m deep, with benches about 5m wide and 15m high. It will remain open and have water in its base about 40 m deep. The entrance to the pit will be protected using a bund of waste rock and also by the wall of the WRD (to the west) and berms of waste rock (in other directions) as required. It will be fully fenced to restrict access and signage will be erected to warn people of danger. Access to the pit will be further restricted by standard station fencing outside the abandonment bund and across the face of the WRD.

The WRD will cover an area of about 19 Ha immediately to the west of the pit and will attain a maximum height of about 15m above the surrounding land surface. It will be flat topped and the sides will be battered to angles of less than 25 degrees. Available topsoil will be placed on the WRD and the final form will be contoured to better resist erosion and retain rainfall to promote the establishment of vegetation. The surface of the WRD will be revegetated using locally derived seed stock.

Plate 6.1 Western Face of WRD

Plate 6.2 Area Proposed for Crushed Ore Stockpiles

Plate 6.3 Low Grade Ore Stockpiled on WRD

Plate 6.4 Bagged Exploration Drill Cuttings

6.6.2 Objectives and Criteria

Objectives and criteria for site rehabilitation are presented in Table 6.5:

- Disturbed areas will be restored as near as practicably to the surrounding landscape
- Impact on Groundwater quality and reserves will be minimal following mine closure
- Impacts on surface water quality due to Freehold's activities will be minimal
- Public safety at closure is improved over that prior to the Freehold mining phase

Criteria for each of these objectives are presented below.

Table 6.5 Rehabilitation Objectives & Assessment Criteria

Objective	Assessment Criteria
Disturbed areas will be restored to a safe and stable landform compatible with the surrounding landscape	• Visual appearance of landscape similar to surrounding areas (photo monitoring) • Native vegetation in restored areas is successfully established • Erosion rates in restored areas are similar to erosion rates in surrounding (undisturbed) areas
Groundwater quality and reserves on closure will be similar to that when measured prior to the commencement of mining	• Values of total dissolved solids, metals, common ions and pH are within the range of values obtained from sampling and analysis prior to Freehold's mining activities • Depth to water is similar to that prior to Freehold's mining activities
Surface water quality is similar to that obtained from initial monitoring	• Values of total dissolved solids, metals, common ions and pH are within the range of values obtained from sampling and analysis prior to Freehold's mining activities
Public safety at closure is improved over that prior to the Freehold mining phase	• Photo evidence of bunding and barriers erected around pit, fencing, signage also erected • Photo monitoring of WRD shows batter angles of 25^0 or less • Photo monitoring shows that pit walls and benches are stable and that slope failure has not occurred in the closure period

6.6.3 Rehabilitation Procedure

The rehabilitation procedure will be:

- Decommission areas / equipment as they become unneeded.
- Remove sediment from the evaporation pond to the WRD.
- Grade windrows back over tracks or cleared areas.
- Reshape or profile the area if necessary.
- Covering the WRD, evaporative pond area and other disturbed areas with recovered dolomitic rock and/or topsoil and vegetation, if available.
- Deep ripping 'on the contour'.
- Seeding with local native grasses, shrubs and trees.
- Maintenance and monitoring until mine closure.

Specifically, at completion of the pit cut-back:

- Any costeans, sumps, drains or other disturbances adjacent to the pit made as a result of mining or exploration will be backfilled and rehabilitated.
- Mining waste material, including plastic sample bags, etc will be suitably buried within the WRD.
- The evaporation pond will be filled in or removed and the land rehabilitated.
- Abandoned equipment and temporary buildings will be removed from the MLs and MPL at the termination of mining activity (Note: this does not include the camp or the infrastructure outside the MLs, but does include the magazine stores).
- Surface holes drilled outside of the pit area for the purposes of exploration or the estimation of Ore Reserves will be capped, plugged or otherwise made safe after completion of mining.
- At the completion of operations, or progressively where possible, disturbed areas and access roads will be rehabilitated, or otherwise left in a suitable condition, in consultation with the local station owner. This will include the replacement of stockpiled topsoil and the seeding of topsoil with locally derived stock.
- Temporary stockpiles will be graded down to topsoil, and any ore bearing material recovered will be hauled off site or to the WRD or the low grade ore dump.
- Batters will be contour ripped 'on the contour' to retain water on the slopes and establish vegetation.
- The perimeter of the pit will be protected by the wall of the WRD (to the west) and berms of waste rock (in other directions) as required.
- The access to the pit (at the top of the ramp) will be protected using a bund of waste rock.
- Signage will be erected restricting access and warning of abandoned mining areas.
- Access to the pit will be further restricted by standard station fencing outside the abandonment bund and across the face of the WRD.
- The WRD will be constructed and contoured to minimize visual impact and erosion, with outer slopes not exceeding 25º from the horizontal. Final dozing will shape and sculpt the WRD into the existing topography. As topsoil will be in short supply, it is envisaged that the bulk of recovered weathered dolomite and topsoil will be used on the western face of the WRD, as this face can be seen from the access road. The area of proposed WRD extension is shown in Plate 6.5.
- As indicated above, some of the rehabilitation will be in parallel with the mining operations. Except for the ore stockpile area, the remaining rehabilitation will commence when mining ceases. Rehabilitation of the ore stockpile area will not be able to commence until after the last shipment of ore.

The layout upon mine closure is shown in Figure 6.3. Cross sections showing the waste rock dump and mine pit outline on closure are presented as Figures 4.5 and 4.6. A schematic of intended mine site rehabilitation is presented as Figure 6.4 and as an A3 figure in Appendix I.

Figure 6.3 Layout at Mine Closure

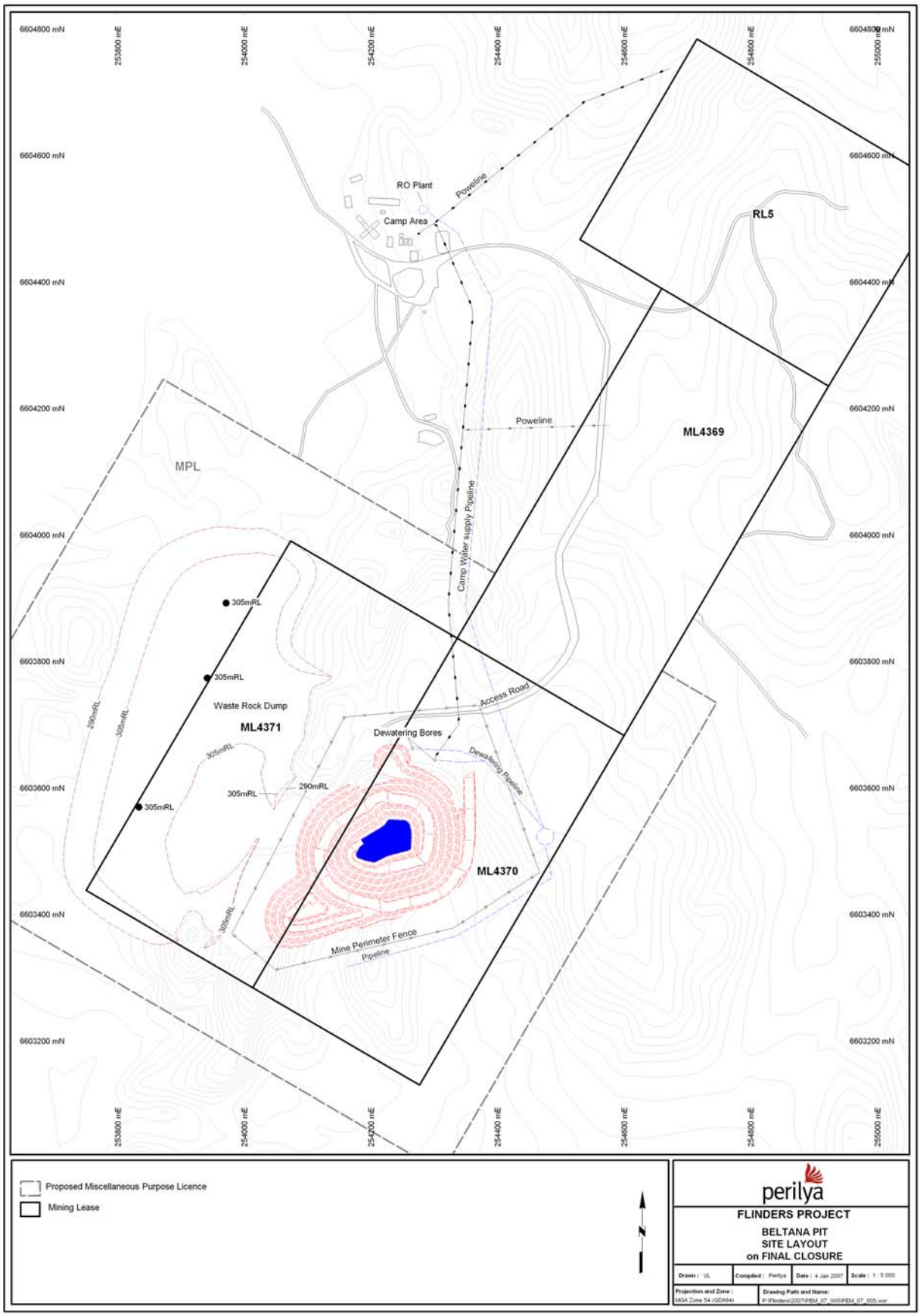


Figure 6.4 Planned Rehabilitation

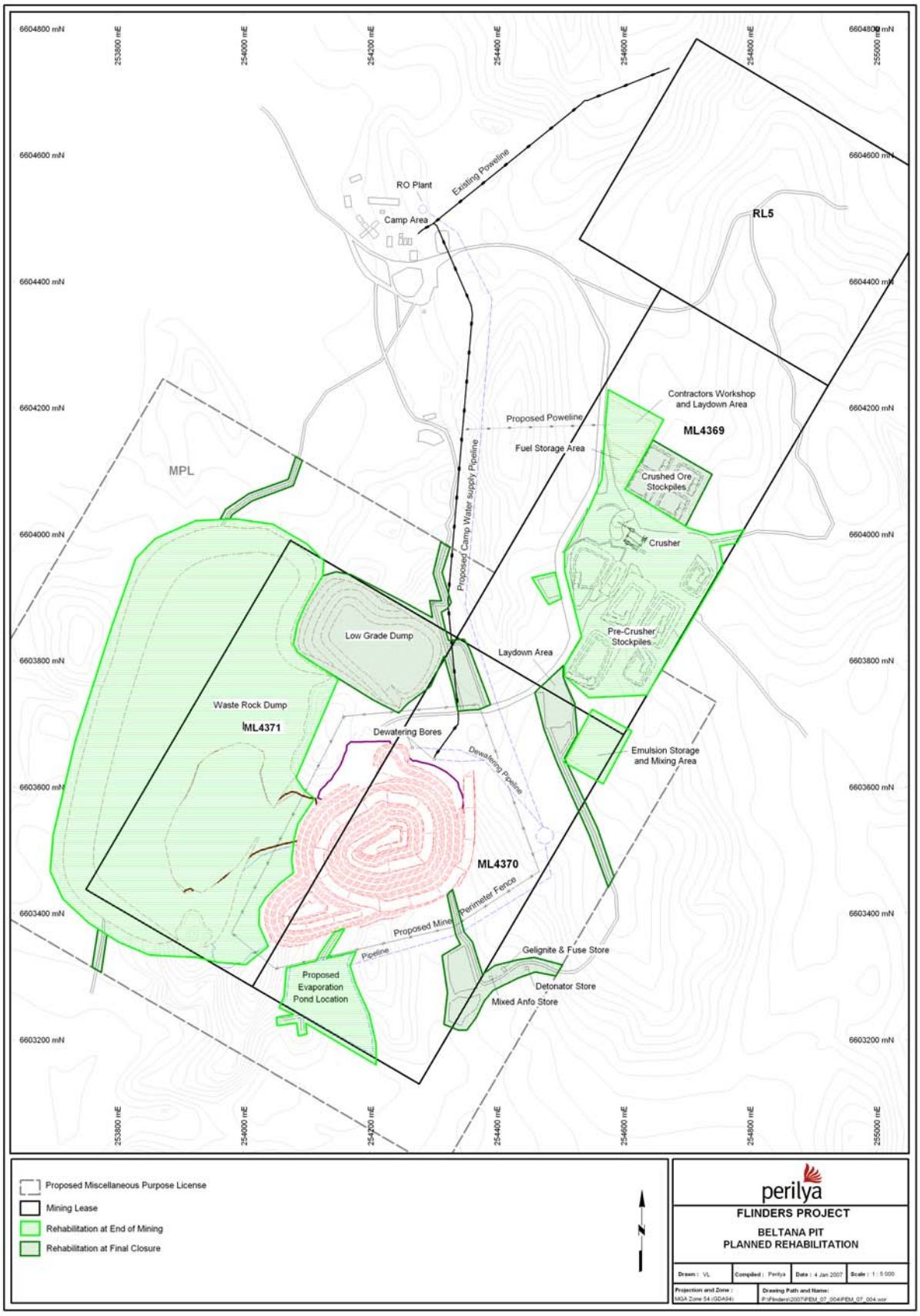


Plate 6.5 Area for Extension of WRD

6.6.4 Financial Provisions

Removal and stockpiling of topsoil and weathered dolomite will be part of the mining operations, as will the dumping of waste rock. Additional to mining operations will be the uplift and encapsulation within the waste rock of recovered Copley ore grade soil and evaporation pond silt, bagged drill cuttings and, if not blended, low-grade ore. The cost of this is included as part of the closure works.

Upon cessation of mining the WRD will be shaped and contoured, all areas disturbed by mining will be ripped, infrastructure not required for further mining operations will be removed (unless a future potential use is identified), and any contaminated sediment from the evaporation pond will be encapsulated in the WRD. Funds have been budgeted for this purpose. The cost estimate is provided in Table 6.5.

Table 6.5 Rehabilitation Cost Estimate

Item	**Cost, $**
Fencing & signage	10,000
Top soil replacement	36,000
Seeding	2,000
Pre-crushed ore pad rehabilitation	63,000
Waste dump rehabilitation	85,000
Crushed stockpile area rehabilitation	28,000
Infrastructure rehabilitation	11,000
Decommissioning dewatering bores	2,000
Erosion control	8,000
Mine contractors laydown area	5,000
TOTAL	**$250,000**

No provision has been made at this time for the camp, as preliminary discussions indicate that the landowner will be pleased to accept the camp facilities in their present form. The camp could also be quite suitable for use by a school, church or community group for use as a school holiday camp, etc.

6.6.5 Relinquishment

Rehabilitation and mine closure will be undertaken using the recently released Department of Industry Tourism and Resources documents *Mine Closure and Completion* (2006) and *Mine Rehabilitation* (2006) Using these guidelines, it is considered that the company will have satisfied the accepted completion criteria for the Beltana Mine and its surroundings.

Following rehabilitation and mine closure, monitoring and surveillance will continue for a period of two years, as discussed in Section 6.4.9. As discussed in this section, if the monitoring and surveillance following closure demonstrates that groundwater conditions are stabilised, and that the rehabilitation is stable and revegetation is acceptable, mine completion will have deemed to occur and the site can be relinquished.

7.0 MANAGEMENT SYSTEMS

This section outlines Perilya's management systems relevant to the Beltana mine operations. It also includes an overview of the management system in place for the principle mining contractor for the Beltana mine.

7.1 HSE Committee

The Perilya Board of Directors has established a Board Health Safety and Environment (HSE) Committee, which meets monthly to review HSE policy and performance across the Perilya group. It also reviews audits and compliance with polices, procedures or negotiations. A senior executive HSE Management Committee has also been established, meeting monthly to:

- Set policies and standards
- Provide guidance to the Board
- Drive leadership and accountability for HSE matters
- Monitor compliance with HSE policies, procedures and regulations

7.2 Principles and Policies

Perilya has established corporate principles and a number of policies that define how its operations should be conducted. The HSE Management System is built on the environment and safety policies and a set of guiding principles described below. A key element of the system is that health, safety or environment are 'first among equals' with production and profits.

7.2.1 Environment Policy

Perilya balances its economic and environmental values and builds systems to identify, assess and manage environmental risk at each stage of exploration, development, operation and closure. Thus to ensure the standards of environmental performance to which it is committed, Perilya:

- Conducts operations, as a minimum, in compliance with all relevant environmental regulations, licences and legislation;
- Identifies, monitors and manages environmental risks arising from its operations;
- Seeks continuous performance improvement in environmental management, production processes, waste management and the use of resources;
- Sets and periodically reviews objectives and targets which relate to environmental management;
- Provides appropriate training and awareness for all employees on environmental issues;
- Communicates regularly with employees about its aim and about the responsibilities of individuals; and
- Communicates with shareholders and the community about its environmental performance and contributes to the development of laws and regulations which may affect its business.

An environmentally responsible culture is promoted at all locations and Perilya's environmental team works closely with employees and stakeholders to ensure environmental matters are considered in all aspects of the company's work. Perilya believes in the principles that:

- All environmental incidents are preventable; and
- Environmental performance can always improve.

7.2.2 Safety Policy

The health, safety and wellbeing of Perilya's people, contractors, suppliers, visitors and host communities is a key value for the company. *Perilya is committed to ensuring the highest standards of occupational health and safety management at its operations.*

Perilya will follow a four pronged approach to safety management:

2. Visible leadership;
3. Safety management controls;
4. Behaviour and awareness; and
5. Emergency response.

Perilya's philosophy is that all personnel share the responsibility for a safe workplace. Perilya personnel ensure that a healthy and safe workplace is maintained and that their activities are carried out in the manner required by the appropriate legislation and company standards. This is achieved by all personnel participating in:

- Ongoing training and supervision;
- Ongoing accident prevention awareness and hazard control;
- Safe operating procedures;
- Wearing protective clothing and equipment; and
- Maintaining facilities for immediate care of employees.

Perilya's fitness for work policy is designed to further promote wellbeing and a safe workplace by addressing drug, alcohol and fatigue related issues.

7.2.3 HSE Goals

The Health, Safety and Environment Management System goals are:

- Zero fatalities and injuries;
- Zero cases of occupational illness; and
- Zero infringements.

- Beyond legal compliance for energy efficiency and greenhouse gas emissions, water efficiency, dust management, rehabilitation, hydrocarbon management, closure and heritage management.

7.2.4 HSE Guiding Principles

The Health Safety and Environmental Management System guiding principles are:

- All fatalities, injuries and diseases are preventable;
- No task is so important that it cannot be done safely;
- Hazards can be identified and their risks managed;
- Everyone has a personal responsibility for the safety and health of themselves and others and for the environment; and
- Health, safety and environmental performance can always improve.

Perilya continues to follow a four pronged approach to health, safety and environmental management which includes visible leadership; management controls; behaviour and awareness; and emergency response.

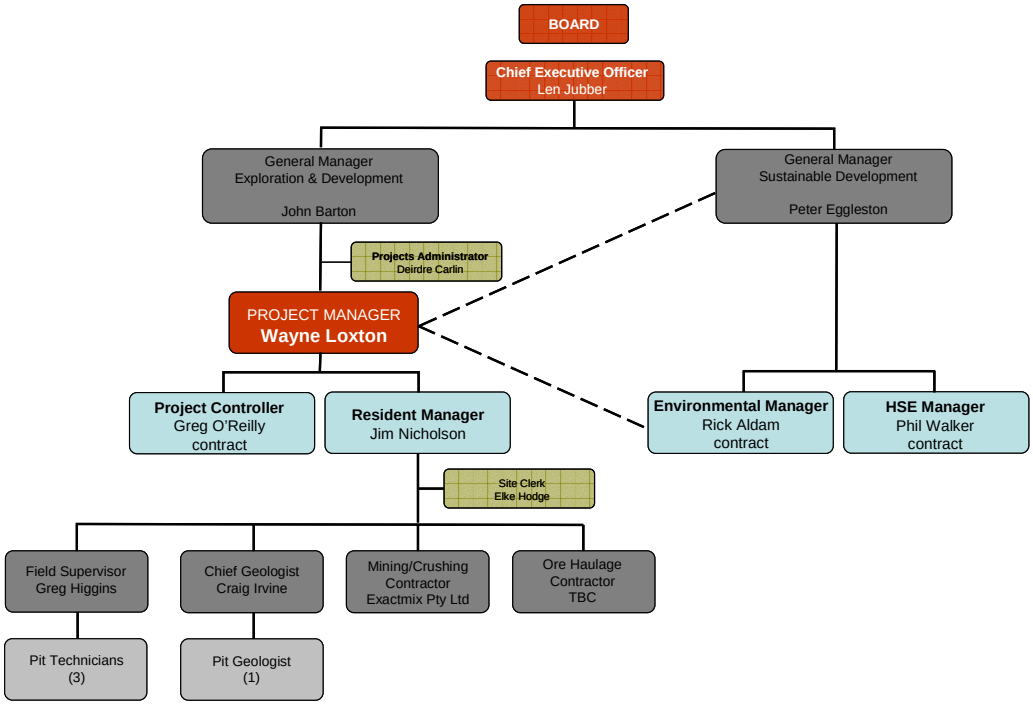
7.3 Visible Leadership

A centrepiece of Perilya's Management System is visible leadership. All of Perilya's leaders have detailed role descriptions that describe the behaviours required in the workplace. HSE aspects are incorporated into these role descriptions. In addition, all of Perilya's leaders are required to develop individual safety plans outlining their contribution to improving the company's health and safety performance. It is planned to extend this in 2007 to include environmental responsibility.

The Perilya Board of Directors and senior management regularly conduct 'walk arounds', inspections and safety interactions.

A project manager (reporting to the CEO), mine manager and senior geologist have been appointed for the Beltana mine project. They will be supported by a Group Health & Safety Manager and a Group Sustainable Development Manager under the direction of the General Manager for Sustainable Development. The organisation chart for the project is presented as Figure 7.1.

Figure 7.1 Organisational Chart



7.4 HSE Management System

Perilya's group-wide HSE Management System is based on the comprehensive system in place at Broken Hill. The group HSE Management System is being further developed in line with the Australian/New Zealand Standard 48DI and the AS/NZ 18014001:2006 Environmental Management System Standards. These Standards provide a solid framework to ground all aspects of safety and environmental management of Perilya's operations.

Perilya's system works on a continuous improvement model and focuses on risk management. The system is regularly submitted for internal and external review to ensure continuing compliance.

Perilya's HSE performance is closely monitored by the HSE Management Committee and the Board HSE Committee. The Beltana mine project will be required to report monthly on its HSE performance, compliance and on any incidents that require investigation. It is also required to report on safety meetings, workplace inspections and internal audits or reviews.

Detailed environmental plans, including dust, rehabilitation, water and mine closure are discussed in Section 6 of this MARP document. Other relevant management systems and plans are discussed below. The HSE committee charter is presented as Appendix K.

7.5 Risk Management System

Perilya has developed a risk management system to assist in prioritizing risks, including environmental impacts. This risk management system is consistent with the requirements in AS/NZS 4360:2004 and AS/NZS 4360:1999.

Noting that priorities may change over time due to changes in operational conditions and also community and stakeholder expectations, the risk assessment and management process will be an iterative process that is reviewed on an on-going basis.

The consequence of an environmental issue is assessed by determining the severity of the effect, the area/population to be affected, the permanence of effects, cultural impacts, and compliance with legislative requirements.

As noted in Section 6, the environmental risks for the proposed Beltana operations have been identified and assessed as low risk and mitigation measure prescribed. Perilya has also conducted a risk assessment for the project and incorporated the outcomes into the project and operational planning.

The audit and risk management committee charter is presented in Appendix L.

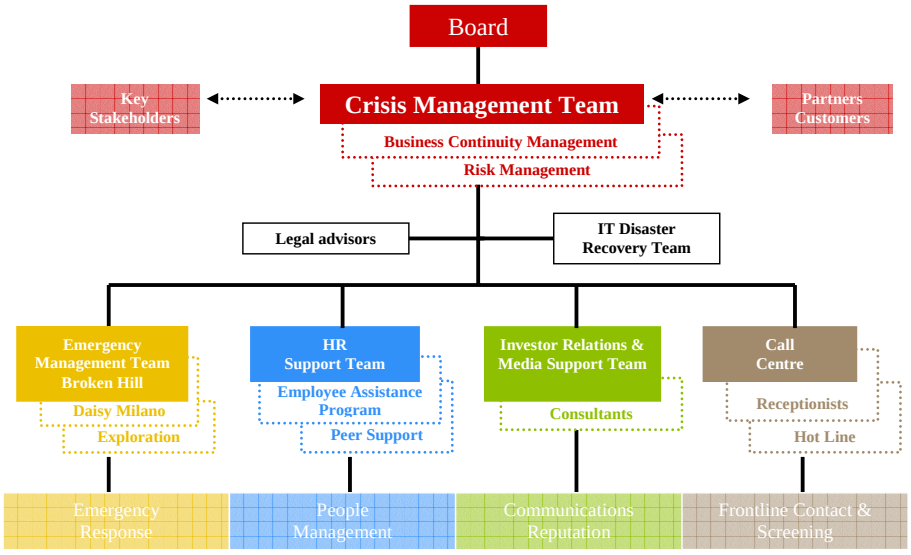
7.6 Crisis Management System and Emergency Response Plan

Perilya has developed a comprehensive group-wide Crisis Management System that details the thresholds for invoking the system and roles and accountabilities. It includes information system recovery, emergency response management, investor/media/shareholder communications and call centre requirements.

In line with industry requirements and best practices, Freehold has developed an Emergency Response Plan for the Beltana mine operations. This plan draws on existing emergency response capabilities at Leigh Creek and Broken Hill.

In addition, Perilya has well developed emergency response teams at Broken Hill that can be contacted in an emergency situation. The company's emergency response training at Broken Hill is nationally accredited and the teams have significant equipment to draw upon in an emergency situation. A schematic of the crisis management system to be adopted for the Beltana project is presented as Figure 7.2.

Figure 7.2 Crisis Management System



7.7 Compliance System

7.7.1 Monitoring, Inspection and Audit

Perilya (as Freehold) has developed a monitoring program, as described in Section 6 of this MARP.

Perilya's monitoring program will enable Perilya (as Freehold) to identify changes or trends so that actual and predicted risks can be compared, and keep a check on specific risks that are identified as being significant.

The need for corrective action can be considered in light of inspections and audits or in the unlikely event that impacts reach an unacceptable level. Alternatively the monitoring program may indicate that certain risks are not significant, and resources may be channelled to other areas.

Perilya (as Freehold) will report on performance against commitments made in the MARP as required by PIRSA.

7.7.2 Procedures to Achieve Compliance with Lease Conditions and Environmental Objectives Defined in the MARP

Perilya operates the Broken Hill mine in western New South Wales and also the Daisy Milano mine in Western Australia. Both operations require adherence to environmental management systems and legislation. Freehold has developed a set of environmental management procedures for the Beltana operation, based on operating experience at other Perilya mines, the requirements of South Australian legislation and the requirements stated in this MARP document. This includes reference to the Mining Act, the Water Resources Act, the Environment Protection Act and licence conditions provided for the mining leases and the MPL.

Freehold has commissioned Exact Mix Pty Ltd (Exact Mix) as the contract miner for this operation. Exact Mix is a privately owned mining company based in Adelaide and possesses the expertise and experience to safely and efficiently perform the required tasks. Exact Mix has developed a set of safety, environmental management, quality assurance and maintenance plans and procedures, that, in conjunction with those developed by Freehold provide a great level of confidence in the ability of the company and the contractor to appropriately conduct mining operations at Beltana.

Procedures to be enacted include monitoring programs, data storage and management processes, quality assurance systems (to provide confidence in the integrity of collected data including internal audit review of the data obtained), and the development and implementation of environmental improvement measures arising from the review of monitoring data.

Reporting and disclosure to agencies will be in accordance with relevant acts and guidance documentation (including the MARP).

Compliance will be monitored by the HSE Management Committee and reported regularly to the Perilya Board HSE Committee (see Section 7.1). The Project Manager is accountable for ensuring compliance with these conditions, environmental objectives as outlined in this MARP and for reporting monthly to the Perilya HSE Committee.

The environmental monitoring plan and achievement of the environmental objectives for the Beltana Mine are outlined in Section 6 of this MARP.

7.7.3 Site Induction, Training and Awareness

Training and competency are key components of the compliance system. Perilya (as Freehold) recognises this, and includes formal induction processes as an integral part of the system. Inductions include presentation of environmental, cultural, safety and other relevant information, as well as regulatory obligations. Inductions are required of all new personnel and all site visitors, and have to be renewed on an annual basis.

The induction procedures for Beltana will be similar to those used in Perilya's Broken Hill operations. The induction procedures will cover Perilya's safety, environmental, cultural and other obligations in relation to the Beltana operations.

Induction material will be available to PIRSA on request.

The Mine Manager is accountable for ensuring that appropriate inductions are provided to all contractors, employees or visitors on arrival at the site and for reviewing these on a regular basis in consultation with the General Manager of Sustainable Development.

7.7.4 Compliance Resourcing

The following resources will be made available to ensure that the compliance system operates effectively

- The Project Manager, reporting to the CEO, will be accountable for ensuring compliance with lease conditions, management plans and environmental policies and objectives.
- The Mine Manager, reporting to the Project Manager, will be directly responsible for the HSE performance of operations and ensuring that compliance requirements are effectively implemented.
- The Group Health and Safety Manager, reporting directly to the General Manager Sustainable Development, will provide support in implementing Perilya's Health and Safety policy and management systems.
- The Manager Sustainable Development, reporting to the General Manager Sustainable Development, will provide support in implementing Perilya's environmental policy and management system.
- The Mining Contractor (Exact Mix), reporting to the Mine Manger, will be responsible for ensuring compliance with Perilya's requirements and any regulatory obligations.

7.7.5 Previous Experience of the Operator

Freehold Mining Pty Ltd (Freehold) is a wholly owned subsidiary of Perilya Limited. Perilya Limited is a diversified mining and exploration company which owns and operates the Broken Hill lead, zinc and silver mine in New South Wales, Australia making it one of Australia's largest base metal miners.

It also has interests in nickel and in exploration for gold, base metals, oil and gas. In Western Australia, Perilya operated the Fortnum gold and produced 540,000 oz of gold from the mine.

In 2002, the company acquired the Broken Hill mine from Pasminco Limited. Broken Hill is one of the largest and most renowned deposits of lead, zinc and silver in the world and has been continuously mined since 1885. Perilya currently has a workforce at Broken Hill of about 600, and hence has a well developed capability in base metals mining.

The company also recently achieved the first full year of production from its Daisy Milano gold project, located near Kalgoorlie in Western Australia.

The expertise and resources from these mines is available for the Beltana project, and will enable the operation to be actioned in a safe, environmentally sound and efficient manner.

Mining at Beltana will be contracted to Exact Mix Pty Ltd. (Exact Mix). Exact Mix is a private company, owned and directed by Greg Rhodes, formed in 1997 and located in Brooklyn Park South Australia. The company specialises in backfill operations, quarrying, crushing, drill, rehabilitation works, load and haul operations and shotcrete. The Exact Mix reputation is one built on their ability to be innovative, operate safely and consistently provide and maintain a modern fleet of earthmoving and mining equipment.

Exact Mix has offices located at each project site and administrative functions are directly managed on site. Operations follow an organisational structure and procedures developed by the company head office. The company has approximately 220 employees and forms part of a group of companies, including Rhodes Contracting and Northern Project Contracting, also owned and directed by Greg Rhodes.

Projects carried out by Exact Mix and affiliated companies include:

- The Granites Backfill Project – Newmont
- Granites, Dead Bullock Soak & Tanami Open Cut Rehabilitation Projects – Newmont
- Granites Tailings Dam Lift
- Darwin River Dam Spillway Extension
- Numerous HDPE Lined Sewage Treatment Ponds
- 40km Ground Rush Haul Road Construction - Newmont
- BHP Olympic Dam Surface Backfill Operations Contract
- BHP Olympic Dam Expansion Earthworks Contract
- Giants Reef Malbec West Open Pit, Drill & Blast, Load & Haul
- Olympic Dam Underground Shotcrete & Concrete Contract
- Ore Haulage and Crusher Feed Croesus Mining
- Zinifex Century Zinc, Topsoil Pre-strip, Load & Haul, Waste Crushing

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